460cw1_2020

February 5, 2021

1 Coursework1: Convolutional Neural Networks

1.1 instructions

Please submit a version of this notebook containing your answers **together with your trained model** on CATe as CW2.zip. Write your answers in the cells below each question.

1.1.1 Setting up working environment

For this coursework you will need to train a large network, therefore we recommend you work with Google Colaboratory, which provides free GPU time. You will need a Google account to do so.

Please log in to your account and go to the following page: https://colab.research.google.com. Then upload this notebook.

For GPU support, go to "Edit" -> "Notebook Settings", and select "Hardware accelerator" as "GPU".

You will need to install pytorch by running the following cell:

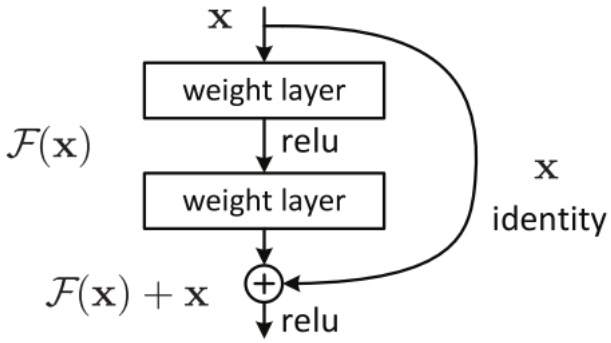
[ ]:
```
!pip install torch torchvision
```

```
Requirement already satisfied: torch in c:\users\yunmao\.conda\envs\ml\lib\site-
packages (1.7.1)
Requirement already satisfied: torchvision in
c:\users\yunmao\.conda\envs\ml\lib\site-packages (0.8.2)
Requirement already satisfied: typing-extensions in
c:\users\yunmao\.conda\envs\ml\lib\site-packages (from torch) (3.7.4.3)
Requirement already satisfied: numpy in c:\users\yunmao\.conda\envs\ml\lib\site-
packages (from torch) (1.19.5)
Requirement already satisfied: pillow>=4.1.1 in
c:\users\yunmao\.conda\envs\ml\lib\site-packages (from torchvision) (8.1.0)
```

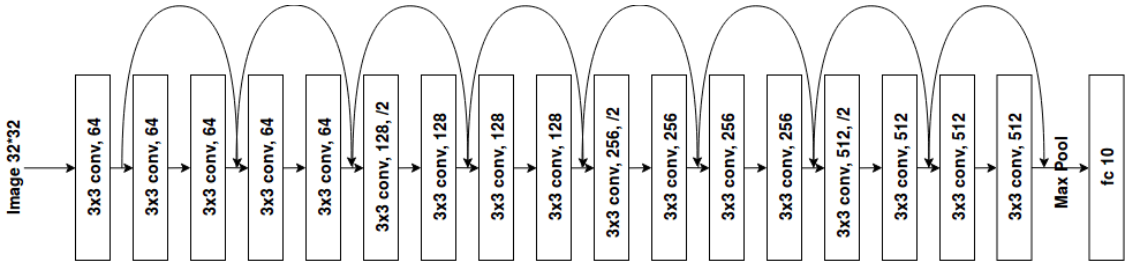
1.2 Introduction

For this coursework you will implement one of the most commonly used model for image recognition tasks, the Residual Network. The architecture is introduced in 2015 by Kaiming He, et al. in the paper "Deep residual learning for image recognition".

In a residual network, each block contains some convolutional layers, plus "skip" connections, which allow the activations to by pass a layer, and then be summed up with the activations of the skipped layer. The image below illustrates a building block in residual networks.



Depending on the number of building blocks, resnets can have different architectures, for example ResNet-50, ResNet-101 and etc. Here you are required to build ResNet-18 to perform classification on the CIFAR-10 dataset, therefore your network will have the following architecture:



1.3 Part 1 (40 points)

In this part, you will use basic pytorch operations to define the 2D convolution, max pooling operation, linear layer as well as 2d batch normalization.

1.3.1 YOUR TASK

- implement the forward pass for Conv2D, MaxPool2D, Linear and BatchNorm2d
- You are **NOT** allowed to use the torch.nn modules

[3]:
```
import torch
import torch.nn as nn
import torch.nn.functional as F

class Conv2d(nn.Module):
    def __init__(self,
                 in_channels,
                 out_channels,
                 kernel_size,
                 stride=1,
                 padding=0,
                 bias=True):

        super(Conv2d, self).__init__()
```

```
        """
        An implementation of a convolutional layer.

        The input consists of N data points, each with C channels, height H and
        width W. We convolve each input with F different filters, where each␣
↪filter
        spans all C channels and has height HH and width WW.

        Parameters:
        - w: Filter weights of shape (F, C, HH, WW)
        - b: Biases, of shape (F,)
        - kernel_size: Size of the convolving kernel
        - stride: The number of pixels between adjacent receptive fields in the
            horizontal and vertical directions.
        - padding: The number of pixels that will be used to zero-pad the input.
        """

        ############################################################################
        # TODO: Define the parameters used in the forward pass                     #
        ############################################################################
        # *****START OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****

        self.in_channels = in_channels
        self.out_channels = out_channels
        # self.stride = stride

        self.padding = padding

        if type(kernel_size) is tuple :
            self.kernel_size = kernel_size
        else:
            self.kernel_size = (kernel_size, kernel_size)

        if type(stride) is tuple :
            self.stride = stride
        else:
            self.stride = (stride, stride)

        # Good practice is to start your weights in the range of [-y, y] where␣
↪y=1/sqrt(n)  (n is the number of inputs to a given neuron).
        self.w = torch.randn((out_channels, in_channels, self.kernel_size[0],␣
↪self.kernel_size[1]), requires_grad = True) \
                    * torch.sqrt(torch.tensor(1.0/in_channels))

        if bias:
            self.b = torch.randn(out_channels, requires_grad = True)  * torch.
↪sqrt(torch.tensor(1.0/in_channels))
```

```
        else:
            self.b = None

        self.bias = bias

        # *****END OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****
        ################################################################################
        #                                END OF YOUR CODE                              #
        ################################################################################

    def forward(self, x):
        """
        Input:
        - x: Input data of shape (N, C, H, W)
        Output:
        - out: Output data, of shape (N, F, H', W').
        """

        ################################################################################
        # TODO: Implement the forward pass                                             #
        ################################################################################
        # *****START OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****

           #Calculate the output shape
        out_H = (x.shape[2] + 2*self.padding - self.kernel_size[0]) // self.
↪stride[0] + 1
        out_W = (x.shape[3] + 2*self.padding - self.kernel_size[1]) // self.
↪stride[1] + 1

        x_unfold = F.unfold(x, kernel_size = self.kernel_size, padding = self.
↪padding, stride = self.stride)

        if self.bias:
            out_unfold = x_unfold.permute(0, 2, 1).matmul(self.w.view(self.w.
↪size(0), -1).t()).permute(0, 2, 1) + self.b.view(-1, 1)
        else:
            out_unfold = x_unfold.permute(0, 2, 1).matmul(self.w.view(self.w.
↪size(0), -1).t()).permute(0, 2, 1)
        out = out_unfold.view(x.shape[0], self.out_channels, out_H, out_W)

        # for testing the function
        # out_test = nn.functional.conv2d(x, self.w, self.b, padding=1)
        # print((out_test - out).abs().max())

        # *****END OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****
        ################################################################################
        #                                END OF YOUR CODE                              #
```

```
        ##############################################################################

        return out
# for testing the function
# inputs = torch.rand(3, 3, 24, 24)
# conv2 = Conv2d(in_channels=3, out_channels=3, kernel_size=(3, 3),stride=1,␣
 ↪padding=1)
# out = conv2(inputs)
```

[ ]:
```
class MaxPool2d(nn.Module):
    def __init__(self, kernel_size):
        super(MaxPool2d, self).__init__()
        """
        An implementation of a max-pooling layer.

        Parameters:
        - kernel_size: the size of the window to take a max over
        """
        ##############################################################################
        # TODO: Define the parameters used in the forward pass                       #
        ##############################################################################
        # *****START OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****

        if type(kernel_size) is tuple :
            self.kernel_size = kernel_size
        else:
            self.kernel_size = (kernel_size, kernel_size)

        # *****END OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****
        ##############################################################################
        #                                END OF YOUR CODE                            #
        ##############################################################################

    def forward(self, x):
        """
        Input:
        - x: Input data of shape (N, C, H, W)
        Output:
        - out: Output data, of shape (N, F, H', W').
        """
        ##############################################################################
        # TODO: Implement the forward pass                                           #
        ##############################################################################
        # *****START OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****

        H_k, W_k = self.kernel_size
```

```
        x_unfold = F.unfold(x, kernel_size = self.kernel_size, stride = self.
↪kernel_size)

        x_reshape = x_unfold.view(x.shape[0], x.shape[1], self.kernel_size[0] *␣
↪self.kernel_size[1], -1)

        x_max = x_reshape.max(axis = 2)[0]

        H_out = x.shape[2] // H_k
        W_out = x.shape[3] // W_k

        out = x_max.view(x.shape[0], x.shape[1], H_out, W_out)
        # print(out == nn.functional.max_pool2d(x, kernel_size = self.
↪kernel_size))
        # *****END OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****
        ################################################################################
        #                                END OF YOUR CODE                              #
        ################################################################################

        return out
# inputs = torch.rand(2, 2, 3, 4)
# maxpool = MaxPool2d(kernel_size=2)
# print(maxpool.forward(inputs).shape)
```

[ ]:
```
class Linear(nn.Module):
    def __init__(self, in_channels, out_channels, bias=True):
        super(Linear, self).__init__()
        """
        An implementation of a Linear layer.

        Parameters:
        - weight: the learnable weights of the module of shape (in_channels,␣
↪out_channels).
        - bias: the learnable bias of the module of shape (out_channels).
        """
        ################################################################################
        # TODO: Define the parameters used in the forward pass                         #
        ################################################################################
        # *****START OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****

        self.weight = torch.randn((in_channels, out_channels), requires_grad =␣
↪True) * torch.sqrt(torch.tensor(1.0/in_channels))

        if bias:
            self.bias = torch.randn(out_channels, requires_grad = True)  *␣
↪torch.sqrt(torch.tensor(1.0/in_channels))
        else:
```

```
            self.bias = None

        # *****END OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****
        ##############################################################################
        #                                END OF YOUR CODE                            #
        ##############################################################################

    def forward(self, x):
        """
        Input:
        - x: Input data of shape (N, *, H) where * means any number of␣
↪additional
        dimensions and H = in_channels
        Output:
        - out: Output data of shape (N, *, H') where * means any number of␣
↪additional
        dimensions and H' = out_channels
        """
        ##############################################################################
        # TODO: Implement the forward pass                                           #
        ##############################################################################
        # *****START OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****

        if self.bias != None:
            out = torch.matmul(x, self.weight) + self.bias
        else:
            out = torch.matmul(x, self.weight)
        # nn.functional.linear(x,self.weight, self.bias)
        # print(out == nn.functional.linear(x,self.weight.t(), self.bias))
        # *****END OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****
        ##############################################################################
        #                                END OF YOUR CODE                            #
        ##############################################################################

        return out
# inputs = torch.rand(3, 3, 23, 23)
# linear = Linear(in_channels=23, out_channels = 4)
# out2 = linear.forward(inputs)
```

[60]:
```
class BatchNorm2d(nn.Module):
    def __init__(self, num_features, eps=1e-05, momentum=0.1):
        super(BatchNorm2d, self).__init__()
        """
        An implementation of a Batch Normalization over a mini-batch of 2D␣
↪inputs.

        The mean and standard-deviation are calculated per-dimension over the
```

```
        mini-batches and gamma and beta are learnable parameter vectors of
        size num_features.

        Parameters:
        - num_features: C from an expected input of size (N, C, H, W).
        - eps: a value added to the denominator for numerical stability.␣
↪Default: 1e-5
        - momentum: momentum - the value used for the running_mean and␣
↪running_var
        computation. Default: 0.1
        - gamma: the learnable weights of shape (num_features).
        - beta: the learnable bias of the module of shape (num_features).
        """
        ##############################################################################
        # TODO: Define the parameters used in the forward pass                       #
        ##############################################################################
        # *****START OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****

        self.num_features = num_features
        self.eps = eps
        self.momentum = momentum
        self.gamma = torch.ones(num_features, requires_grad = True)
        self.beta = torch.zeros(num_features, requires_grad = True)
        self.running_mean = torch.zeros(num_features)
        self.running_var = torch.ones(num_features)
        self.training = True


        # *****END OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****
        ##############################################################################
        #                               END OF YOUR CODE                             #
        ##############################################################################

    def forward(self, x):
        """
        During training this layer keeps running estimates of its computed mean␣
↪and
        variance, which are then used for normalization during evaluation.
        Input:
        - x: Input data of shape (N, C, H, W)
        Output:
        - out: Output data of shape (N, C, H, W) (same shape as input)
        """
        ##############################################################################
        # TODO: Implement the forward pass                                           #
        #       (be aware of the difference for training and testing)                #
        ##############################################################################
```

```
        # *****START OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****
        if self.training:
            mean = x.mean([0, 2, 3])
            var = x.var([0, 2, 3])
            self.running_mean = (1 - self.momentum) * self.running_mean + self.
↪momentum * mean
            self.running_var = (1 - self.momentum) * self.running_var + self.
↪momentum * var
            var = x.var([0, 2, 3], unbiased = False)
        else:
            mean = self.running_mean
            var = self.running_var

        x = (x - mean.view(1, -1, 1, 1)) / torch.sqrt(var + self.eps).view(1,␣
↪-1, 1, 1) * self.gamma.view(1, -1, 1, 1) \
            + self.beta.view(1, -1, 1, 1)

        # *****END OF YOUR CODE (DO NOT DELETE/MODIFY THIS LINE)*****
        ################################################################################
        #                                END OF YOUR CODE                              #
        ################################################################################

        return x
# inputs = torch.rand(3, 3, 23, 23)
# batch = BatchNorm2d(3)
# test = nn.BatchNorm2d(3)

# for i in range(3):
#     out = test.forward(inputs)
#     out2 = batch.forward(inputs)
# # test.training = False
# # batch.training = False
# out = test.forward(inputs)
# out2 = batch.forward(inputs)
# for i in range(5):
#     out = test.forward(inputs)
#     out2 = batch.forward(inputs)
# print(out)
# print(out2)
# print(test.running_var)
# print(batch.running_var)
```

1.4 Part 2

In this part, you will train a ResNet-18 defined on the CIFAR-10 dataset. Code for training and evaluation are provided.

1.4.1 Your Task

1. Train your network to achieve the best possible test set accuracy after a maximum of 10 epochs of training.
2. You can use techniques such as optimal hyper-parameter searching, data pre-processing
3. If necessary, you can also use another optimizer
4. **Answer the following question:** Given such a network with a large number of trainable parameters, and a training set of a large number of data, what do you think is the best strategy for hyperparameter searching?

YOUR ANSWER FOR PART 2.4 HERE

A: In my view, Bayesian Optimisation can be one of the best strategies to find the quit good hyperparameters. As we know, the time and power for training can be quit huge under large number of data if you just search the hyperparameters with grid search, worsely you even cannot get the good ones. While, you can find a better hyperparameter combination with a very small number of steps with Bayesian Optimisation.

[1]:
```
import torch
from torch.nn import Conv2d, MaxPool2d
import torch.nn as nn
import torch.nn.functional as F
```

Next, we define ResNet-18:

[2]:
```
# define resnet building blocks

class ResidualBlock(nn.Module):
    def __init__(self, inchannel, outchannel, stride=1):

        super(ResidualBlock, self).__init__()

        self.left = nn.Sequential(Conv2d(inchannel, outchannel, kernel_size=3,
                                         stride=stride, padding=1, bias=False),
                                  nn.BatchNorm2d(outchannel),
                                  nn.ReLU(inplace=True),
                                  Conv2d(outchannel, outchannel, kernel_size=3,
                                         stride=1, padding=1, bias=False),
                                  nn.BatchNorm2d(outchannel))

        self.shortcut = nn.Sequential()

        if stride != 1 or inchannel != outchannel:

            self.shortcut = nn.Sequential(Conv2d(inchannel, outchannel,
                                                 kernel_size=1, stride=stride,
                                                 padding = 0, bias=False),
                                          nn.BatchNorm2d(outchannel) )
```

```
    def forward(self, x):

        out = self.left(x)

        out += self.shortcut(x)

        out = F.relu(out)

        return out



    # define resnet

class ResNet(nn.Module):

    def __init__(self, ResidualBlock, num_classes = 10):

        super(ResNet, self).__init__()

        self.inchannel = 64
        self.conv1 = nn.Sequential(Conv2d(3, 64, kernel_size = 3, stride = 1,
                                          padding = 1, bias = False),
                                   nn.BatchNorm2d(64),
                                   nn.ReLU())

        self.layer1 = self.make_layer(ResidualBlock, 64, 2, stride = 1)
        self.layer2 = self.make_layer(ResidualBlock, 128, 2, stride = 2)
        self.layer3 = self.make_layer(ResidualBlock, 256, 2, stride = 2)
        self.layer4 = self.make_layer(ResidualBlock, 512, 2, stride = 2)
        self.maxpool = MaxPool2d(4)
        self.fc = nn.Linear(512, num_classes)


    def make_layer(self, block, channels, num_blocks, stride):

        strides = [stride] + [1] * (num_blocks - 1)

        layers = []

        for stride in strides:

            layers.append(block(self.inchannel, channels, stride))

            self.inchannel = channels
```

```
        return nn.Sequential(*layers)


    def forward(self, x):

        x = self.conv1(x)

        x = self.layer1(x)
        x = self.layer2(x)
        x = self.layer3(x)
        x = self.layer4(x)

        x = self.maxpool(x)

        x = x.view(x.size(0), -1)

        x = self.fc(x)

        return x


def ResNet18():
    return ResNet(ResidualBlock)
```

1.4.2 Loading dataset

We will import images from the torchvision.datasets library First, we need to define the alterations (transforms) we want to perform to our images - given that transformations are applied when importing the data. Define the following transforms using the torchvision.datasets library – you can read the transforms documentation here: 1. Convert images to tensor 2. Normalize mean and std of images with values:mean=[0.4914, 0.4822, 0.4465], std=[0.2023, 0.1994, 0.2010]

[3]:
```
import torch.optim as optim
from torch.utils.data import DataLoader
from torch.utils.data import sampler

import torchvision.datasets as dset

import numpy as np

import torchvision.transforms as T

################################################################
#                           YOUR CODE HERE                     #
################################################################

transform_aug = T.Compose([
```

```
    T.RandomRotation(10),
    T.RandomCrop(size=32, padding=4),
    T.RandomHorizontalFlip(),
    T.ToTensor(),
    T.Normalize(mean = [0.4914, 0.4822, 0.4465], std = [0.2023, 0.1994, 0.2010])
])

transform = T.Compose([
    T.ToTensor(),
    T.Normalize(mean = [0.4914, 0.4822, 0.4465], std = [0.2023, 0.1994, 0.2010])
])

################################################################
#                        END OF YOUR CODE                      #
################################################################
```

Now load the dataset using the transform you defined above, with batch_size = 64 You can check the documentation here. Then create data loaders (using DataLoader from torch.utils.data) for the training and test set

[4]:
```
################################################################
#                        YOUR CODE HERE                        #
################################################################

data_dir = './data'

cifar10_train_data = dset.CIFAR10(data_dir, train = True, download = True,␣
 ↪transform = transform_aug)
loader_train = DataLoader(cifar10_train_data, batch_size=64, sampler=sampler.
 ↪SubsetRandomSampler(range(49000)))

cifar10_val_data = dset.CIFAR10(data_dir, train = True, download = True,␣
 ↪transform = transform)
loader_val = DataLoader(cifar10_val_data, batch_size=64, sampler=sampler.
 ↪SubsetRandomSampler(range(49000, 50000)))

cifar10_test = dset.CIFAR10(data_dir, train = False, download = True, transform␣
 ↪= transform)
loader_test = DataLoader(cifar10_test, batch_size=64)
################################################################
#                        END OF YOUR CODE                      #
################################################################
```

```
Files already downloaded and verified
Files already downloaded and verified
Files already downloaded and verified
```

[5]:
```
USE_GPU = True
dtype = torch.float32

if USE_GPU and torch.cuda.is_available():
    device = torch.device('cuda')
else:
    device = torch.device('cpu')

print_every = 100
def check_accuracy(loader, model):
    # function for test accuracy on validation and test set

    if loader.dataset.train:
        print('Checking accuracy on validation set')
    else:
        print('Checking accuracy on test set')
    num_correct = 0
    num_samples = 0
    model.eval()  # set model to evaluation mode
    with torch.no_grad():
        for x, y in loader:
            x = x.to(device=device, dtype=dtype)  # move to device
            y = y.to(device=device, dtype=torch.long)
            scores = model(x)
            _, preds = scores.max(1)
            num_correct += (preds == y).sum()
            num_samples += preds.size(0)
        acc = float(num_correct) / num_samples
        print('Got %d / %d correct (%.2f)' % (num_correct, num_samples, 100 *␣
 ↪acc))
    return acc # add by Tianyu Dai


def train_part(model, optimizer, epochs=1):
    """
    Train a model on CIFAR-10 using the PyTorch Module API.

    Inputs:
    - model: A PyTorch Module giving the model to train.
    - optimizer: An Optimizer object we will use to train the model
    - epochs: (Optional) A Python integer giving the number of epochs to train␣
 ↪for

    Returns: Nothing, but prints model accuracies during training.
    """
    model = model.to(device=device)  # move the model parameters to CPU/GPU
    for e in range(epochs):
```

```
        print(len(loader_train))
        for t, (x, y) in enumerate(loader_train):
            model.train()  # put model to training mode
            x = x.to(device=device, dtype=dtype)  # move to device, e.g. GPU
            y = y.to(device=device, dtype=torch.long)

            scores = model(x)
            loss = F.cross_entropy(scores, y)

            # Zero out all of the gradients for the variables which the␣
 ↪optimizer
            # will update.
            optimizer.zero_grad()

            loss.backward()

            # Update the parameters of the model using the gradients
            optimizer.step()

            if t % print_every == 0:
                print('Epoch: %d, Iteration %d, loss = %.4f' % (e, t, loss.
 ↪item()))
                # check_accuracy(loader_val, model)
                print()
```

[6]:
```
# code for optimising your network performance

################################################################
#                        YOUR CODE HERE                        #
################################################################

## I have used two method to optimising my net work, one without learn rate␣
 ↪scheduler, while other with it.
#  for the function train_part2, the scheduler parameter is added.

def train_part2(model, optimizer, epochs=1, scheduler = None):
    """
    Train a model on CIFAR-10 using the PyTorch Module API.

    Inputs:
    - model: A PyTorch Module giving the model to train.
    - optimizer: An Optimizer object we will use to train the model
    - epochs: (Optional) A Python integer giving the number of epochs to train␣
 ↪for

    Returns: Nothing, but prints model accuracies during training.
    """
```

```
    model = model.to(device=device)  # move the model parameters to CPU/GPU
    for e in range(epochs):
        print(len(loader_train))
        for t, (x, y) in enumerate(loader_train):
            model.train()  # put model to training mode
            x = x.to(device=device, dtype=dtype)  # move to device, e.g. GPU
            y = y.to(device=device, dtype=torch.long)

            scores = model(x)
            loss = F.cross_entropy(scores, y)

            # Zero out all of the gradients for the variables which the␣
↪optimizer
            # will update.
            optimizer.zero_grad()

            loss.backward()

            # Update the parameters of the model using the gradients
            optimizer.step()

            if t % print_every == 0:
                print('Epoch: %d, Iteration %d, loss = %.4f' % (e, t, loss.
↪item()))
                check_accuracy(loader_val, model)
                print()
        scheduler.step()
```

[ ]:
```
!pip install GPyopt
```

```
Collecting GPyopt
  Downloading https://files.pythonhosted.org/packages/52/be/669d505416d7e4
65b2aef7df3b58d590f56468c4f7dc50c91fe91b8a78d9/GPyOpt-1.2.6.tar.gz (56kB)
     |                  | 61kB 6.6MB/s
Requirement already satisfied: numpy>=1.7 in
/usr/local/lib/python3.6/dist-packages (from GPyopt) (1.19.5)
Requirement already satisfied: scipy>=0.16 in /usr/local/lib/python3.6/dist-
packages (from GPyopt) (1.4.1)
Collecting GPy>=1.8
  Downloading https://files.pythonhosted.org/packages/67/95/976598f98adbfa
918a480cb2d643f93fb555ca5b6c5614f76b69678114c1/GPy-1.9.9.tar.gz (995kB)
     |                  | 1.0MB 21.8MB/s
Requirement already satisfied: six in /usr/local/lib/python3.6/dist-
packages (from GPy>=1.8->GPyopt) (1.15.0)
Collecting paramz>=0.9.0
  Downloading https://files.pythonhosted.org/packages/d8/37/4abbeb78d30f20
d3402887f46e6e9f3ef32034a9dea65d243654c82c8553/paramz-0.9.5.tar.gz (71kB)
     |                  | 71kB 11.2MB/s
```

```
Requirement already satisfied: decorator>=4.0.10 in
/usr/local/lib/python3.6/dist-packages (from paramz>=0.9.0->GPy>=1.8->GPyopt)
(4.4.2)
Building wheels for collected packages: GPyopt, GPy, paramz
  Building wheel for GPyopt (setup.py) … done
  Created wheel for GPyopt: filename=GPyOpt-1.2.6-cp36-none-any.whl size=83623
sha256=5db6858d32c213a07b1f1924813580754150a4c4a7894107adbc7f32977a4b48
  Stored in directory: /root/.cache/pip/wheels/b2/00/69/cfa967a125cf25e66f644be6
193ad6f0edf231147879ad714f
  Building wheel for GPy (setup.py) … done
  Created wheel for GPy: filename=GPy-1.9.9-cp36-cp36m-linux_x86_64.whl
size=2633961
sha256=2106a6e2d1a2e6f68018fb879721db2d5fa9eec5001a5116076fc30743971ca3
  Stored in directory: /root/.cache/pip/wheels/5d/36/66/2b58860c84c9f2b51615da66
bfd6feeddbc4e04d887ff96dfa
  Building wheel for paramz (setup.py) … done
  Created wheel for paramz: filename=paramz-0.9.5-cp36-none-any.whl size=102552
sha256=60318d6e522d1e31f8c4e3258dc400d55ea6e67145312874cb7f218c26528451
  Stored in directory: /root/.cache/pip/wheels/c8/4a/0e/6e0dc85541825f991c431619
e25b870d4b812c911214690cf8
Successfully built GPyopt GPy paramz
Installing collected packages: paramz, GPy, GPyopt
Successfully installed GPy-1.9.9 GPyopt-1.2.6 paramz-0.9.5
```

[ ]:
```
import GPyOpt
def Bayes_Opt(parameters):
    lr = parameters[0, 0]
    weight_decay = parameters[0, 1]
    print("---- New lr = %.5f and weight_decay = %.5f ----"% (lr, weight_decay))
    model = ResNet18()
    optimizer = optim.Adam(model.parameters(),lr = lr, weight_decay =␣
 ↪weight_decay)
    train_part(model, optimizer, epochs = 10)
    return check_accuracy(loader_val, model)

domain = [  {'name' : 'lr', 'type': 'continuous', 'domain': (0.0005, 0.005)},
        {'name': 'weight_decay', 'type': 'continuous', 'domain': (0.0001, 0.
 ↪001)},  ]
opt = GPyOpt.methods.BayesianOptimization(f = Bayes_Opt,domain =␣
 ↪domain,acquisition_type ='LCB',acquisition_weight = 0.1,maximize = True)


opt.run_optimization( max_iter = 10)
```

```
---- New lr = 0.00212 and weight_decay = 0.00013 ----
766
Epoch: 0, Iteration 0, loss = 3.6991
Checking accuracy on validation set
```

```
Got 107 / 1000 correct (10.70)

Epoch: 0, Iteration 100, loss = 1.6612
Checking accuracy on validation set
Got 313 / 1000 correct (31.30)

Epoch: 0, Iteration 200, loss = 1.6770
Checking accuracy on validation set
Got 340 / 1000 correct (34.00)

Epoch: 0, Iteration 300, loss = 1.5844
Checking accuracy on validation set
Got 384 / 1000 correct (38.40)

Epoch: 0, Iteration 400, loss = 1.7507
Checking accuracy on validation set
Got 372 / 1000 correct (37.20)

Epoch: 0, Iteration 500, loss = 1.5577
Checking accuracy on validation set
Got 471 / 1000 correct (47.10)

Epoch: 0, Iteration 600, loss = 1.6247
Checking accuracy on validation set
Got 422 / 1000 correct (42.20)

Epoch: 0, Iteration 700, loss = 1.4275
Checking accuracy on validation set
Got 500 / 1000 correct (50.00)

766
Epoch: 1, Iteration 0, loss = 1.5315
Checking accuracy on validation set
Got 538 / 1000 correct (53.80)

Epoch: 1, Iteration 100, loss = 1.4147
Checking accuracy on validation set
Got 585 / 1000 correct (58.50)

Epoch: 1, Iteration 200, loss = 1.1238
Checking accuracy on validation set
Got 572 / 1000 correct (57.20)

Epoch: 1, Iteration 300, loss = 1.2450
Checking accuracy on validation set
Got 555 / 1000 correct (55.50)

Epoch: 1, Iteration 400, loss = 1.0476
```

```
Checking accuracy on validation set
Got 580 / 1000 correct (58.00)

Epoch: 1, Iteration 500, loss = 0.9857
Checking accuracy on validation set
Got 611 / 1000 correct (61.10)

Epoch: 1, Iteration 600, loss = 1.3515
Checking accuracy on validation set
Got 598 / 1000 correct (59.80)

Epoch: 1, Iteration 700, loss = 1.0223
Checking accuracy on validation set
Got 556 / 1000 correct (55.60)

766
Epoch: 2, Iteration 0, loss = 0.9896
Checking accuracy on validation set
Got 617 / 1000 correct (61.70)

Epoch: 2, Iteration 100, loss = 0.8825
Checking accuracy on validation set
Got 621 / 1000 correct (62.10)

Epoch: 2, Iteration 200, loss = 0.9283
Checking accuracy on validation set
Got 661 / 1000 correct (66.10)

Epoch: 2, Iteration 300, loss = 0.8696
Checking accuracy on validation set
Got 652 / 1000 correct (65.20)

Epoch: 2, Iteration 400, loss = 0.9148
Checking accuracy on validation set
Got 624 / 1000 correct (62.40)

Epoch: 2, Iteration 500, loss = 0.8600
Checking accuracy on validation set
Got 668 / 1000 correct (66.80)

Epoch: 2, Iteration 600, loss = 0.9862
Checking accuracy on validation set
Got 686 / 1000 correct (68.60)

Epoch: 2, Iteration 700, loss = 1.1166
Checking accuracy on validation set
Got 674 / 1000 correct (67.40)
```

```
766
Epoch: 3, Iteration 0, loss = 1.0123
Checking accuracy on validation set
Got 678 / 1000 correct (67.80)

Epoch: 3, Iteration 100, loss = 0.8012
Checking accuracy on validation set
Got 673 / 1000 correct (67.30)

Epoch: 3, Iteration 200, loss = 1.0722
Checking accuracy on validation set
Got 708 / 1000 correct (70.80)

Epoch: 3, Iteration 300, loss = 1.1618
Checking accuracy on validation set
Got 703 / 1000 correct (70.30)

Epoch: 3, Iteration 400, loss = 0.6213
Checking accuracy on validation set
Got 710 / 1000 correct (71.00)

Epoch: 3, Iteration 500, loss = 0.7957
Checking accuracy on validation set
Got 725 / 1000 correct (72.50)

Epoch: 3, Iteration 600, loss = 0.9643
Checking accuracy on validation set
Got 702 / 1000 correct (70.20)

Epoch: 3, Iteration 700, loss = 1.0311
Checking accuracy on validation set
Got 709 / 1000 correct (70.90)

766
Epoch: 4, Iteration 0, loss = 0.8642
Checking accuracy on validation set
Got 711 / 1000 correct (71.10)

Epoch: 4, Iteration 100, loss = 1.0074
Checking accuracy on validation set
Got 729 / 1000 correct (72.90)

Epoch: 4, Iteration 200, loss = 0.8587
Checking accuracy on validation set
Got 743 / 1000 correct (74.30)

Epoch: 4, Iteration 300, loss = 0.6553
Checking accuracy on validation set
```

```
Got 754 / 1000 correct (75.40)

Epoch: 4, Iteration 400, loss = 0.9331
Checking accuracy on validation set
Got 768 / 1000 correct (76.80)

Epoch: 4, Iteration 500, loss = 0.6007
Checking accuracy on validation set
Got 761 / 1000 correct (76.10)

Epoch: 4, Iteration 600, loss = 0.9240
Checking accuracy on validation set
Got 728 / 1000 correct (72.80)

Epoch: 4, Iteration 700, loss = 0.6366
Checking accuracy on validation set
Got 774 / 1000 correct (77.40)

766
Epoch: 5, Iteration 0, loss = 0.6410
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

Epoch: 5, Iteration 100, loss = 0.8375
Checking accuracy on validation set
Got 766 / 1000 correct (76.60)

Epoch: 5, Iteration 200, loss = 0.6668
Checking accuracy on validation set
Got 758 / 1000 correct (75.80)

Epoch: 5, Iteration 300, loss = 0.7622
Checking accuracy on validation set
Got 741 / 1000 correct (74.10)

Epoch: 5, Iteration 400, loss = 1.1154
Checking accuracy on validation set
Got 763 / 1000 correct (76.30)

Epoch: 5, Iteration 500, loss = 0.6868
Checking accuracy on validation set
Got 756 / 1000 correct (75.60)

Epoch: 5, Iteration 600, loss = 0.7558
Checking accuracy on validation set
Got 808 / 1000 correct (80.80)

Epoch: 5, Iteration 700, loss = 0.5453
```

```
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

766
Epoch: 6, Iteration 0, loss = 0.6800
Checking accuracy on validation set
Got 776 / 1000 correct (77.60)

Epoch: 6, Iteration 100, loss = 0.7670
Checking accuracy on validation set
Got 736 / 1000 correct (73.60)

Epoch: 6, Iteration 200, loss = 0.4405
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

Epoch: 6, Iteration 300, loss = 0.9417
Checking accuracy on validation set
Got 762 / 1000 correct (76.20)

Epoch: 6, Iteration 400, loss = 0.8832
Checking accuracy on validation set
Got 756 / 1000 correct (75.60)

Epoch: 6, Iteration 500, loss = 1.0137
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

Epoch: 6, Iteration 600, loss = 0.6195
Checking accuracy on validation set
Got 793 / 1000 correct (79.30)

Epoch: 6, Iteration 700, loss = 0.6126
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

766
Epoch: 7, Iteration 0, loss = 0.5029
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 7, Iteration 100, loss = 0.6902
Checking accuracy on validation set
Got 803 / 1000 correct (80.30)

Epoch: 7, Iteration 200, loss = 0.7581
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)
```

```
Epoch: 7, Iteration 300, loss = 0.6064
Checking accuracy on validation set
Got 787 / 1000 correct (78.70)

Epoch: 7, Iteration 400, loss = 0.6673
Checking accuracy on validation set
Got 738 / 1000 correct (73.80)

Epoch: 7, Iteration 500, loss = 0.5918
Checking accuracy on validation set
Got 811 / 1000 correct (81.10)

Epoch: 7, Iteration 600, loss = 0.6958
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 7, Iteration 700, loss = 0.5946
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

766
Epoch: 8, Iteration 0, loss = 0.8255
Checking accuracy on validation set
Got 799 / 1000 correct (79.90)

Epoch: 8, Iteration 100, loss = 0.6452
Checking accuracy on validation set
Got 796 / 1000 correct (79.60)

Epoch: 8, Iteration 200, loss = 0.6256
Checking accuracy on validation set
Got 804 / 1000 correct (80.40)

Epoch: 8, Iteration 300, loss = 0.7987
Checking accuracy on validation set
Got 817 / 1000 correct (81.70)

Epoch: 8, Iteration 400, loss = 0.4277
Checking accuracy on validation set
Got 804 / 1000 correct (80.40)

Epoch: 8, Iteration 500, loss = 0.5055
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 8, Iteration 600, loss = 0.5609
Checking accuracy on validation set
```

```
Got 797 / 1000 correct (79.70)

Epoch: 8, Iteration 700, loss = 0.7767
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

766
Epoch: 9, Iteration 0, loss = 0.5631
Checking accuracy on validation set
Got 785 / 1000 correct (78.50)

Epoch: 9, Iteration 100, loss = 0.6253
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 9, Iteration 200, loss = 0.4565
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

Epoch: 9, Iteration 300, loss = 0.6071
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

Epoch: 9, Iteration 400, loss = 0.7066
Checking accuracy on validation set
Got 792 / 1000 correct (79.20)

Epoch: 9, Iteration 500, loss = 0.4473
Checking accuracy on validation set
Got 821 / 1000 correct (82.10)

Epoch: 9, Iteration 600, loss = 0.6348
Checking accuracy on validation set
Got 820 / 1000 correct (82.00)

Epoch: 9, Iteration 700, loss = 0.5920
Checking accuracy on validation set
Got 814 / 1000 correct (81.40)

Checking accuracy on validation set
Got 834 / 1000 correct (83.40)
---- New lr = 0.00436 and weight_decay = 0.00043 ----
766
Epoch: 0, Iteration 0, loss = 3.4620
Checking accuracy on validation set
Got 87 / 1000 correct (8.70)

Epoch: 0, Iteration 100, loss = 2.1996
```

```
Checking accuracy on validation set
Got 255 / 1000 correct (25.50)

Epoch: 0, Iteration 200, loss = 2.1659
Checking accuracy on validation set
Got 257 / 1000 correct (25.70)

Epoch: 0, Iteration 300, loss = 1.9238
Checking accuracy on validation set
Got 329 / 1000 correct (32.90)

Epoch: 0, Iteration 400, loss = 1.5040
Checking accuracy on validation set
Got 356 / 1000 correct (35.60)

Epoch: 0, Iteration 500, loss = 1.6353
Checking accuracy on validation set
Got 367 / 1000 correct (36.70)

Epoch: 0, Iteration 600, loss = 1.7766
Checking accuracy on validation set
Got 459 / 1000 correct (45.90)

Epoch: 0, Iteration 700, loss = 1.3713
Checking accuracy on validation set
Got 361 / 1000 correct (36.10)

766
Epoch: 1, Iteration 0, loss = 1.6148
Checking accuracy on validation set
Got 381 / 1000 correct (38.10)

Epoch: 1, Iteration 100, loss = 1.4392
Checking accuracy on validation set
Got 436 / 1000 correct (43.60)

Epoch: 1, Iteration 200, loss = 1.4399
Checking accuracy on validation set
Got 474 / 1000 correct (47.40)

Epoch: 1, Iteration 300, loss = 1.3040
Checking accuracy on validation set
Got 500 / 1000 correct (50.00)

Epoch: 1, Iteration 400, loss = 1.3870
Checking accuracy on validation set
Got 474 / 1000 correct (47.40)
```

```
Epoch: 1, Iteration 500, loss = 1.2443
Checking accuracy on validation set
Got 501 / 1000 correct (50.10)

Epoch: 1, Iteration 600, loss = 1.2861
Checking accuracy on validation set
Got 535 / 1000 correct (53.50)

Epoch: 1, Iteration 700, loss = 1.1665
Checking accuracy on validation set
Got 551 / 1000 correct (55.10)

766
Epoch: 2, Iteration 0, loss = 1.2621
Checking accuracy on validation set
Got 542 / 1000 correct (54.20)

Epoch: 2, Iteration 100, loss = 1.1407
Checking accuracy on validation set
Got 565 / 1000 correct (56.50)

Epoch: 2, Iteration 200, loss = 1.3779
Checking accuracy on validation set
Got 574 / 1000 correct (57.40)

Epoch: 2, Iteration 300, loss = 1.2618
Checking accuracy on validation set
Got 555 / 1000 correct (55.50)

Epoch: 2, Iteration 400, loss = 1.0655
Checking accuracy on validation set
Got 555 / 1000 correct (55.50)

Epoch: 2, Iteration 500, loss = 1.2842
Checking accuracy on validation set
Got 599 / 1000 correct (59.90)

Epoch: 2, Iteration 600, loss = 0.9316
Checking accuracy on validation set
Got 546 / 1000 correct (54.60)

Epoch: 2, Iteration 700, loss = 0.9524
Checking accuracy on validation set
Got 609 / 1000 correct (60.90)

766
Epoch: 3, Iteration 0, loss = 1.1476
Checking accuracy on validation set
```

```
Got 618 / 1000 correct (61.80)

Epoch: 3, Iteration 100, loss = 0.9909
Checking accuracy on validation set
Got 606 / 1000 correct (60.60)

Epoch: 3, Iteration 200, loss = 1.3002
Checking accuracy on validation set
Got 636 / 1000 correct (63.60)

Epoch: 3, Iteration 300, loss = 1.1747
Checking accuracy on validation set
Got 577 / 1000 correct (57.70)

Epoch: 3, Iteration 400, loss = 0.8237
Checking accuracy on validation set
Got 646 / 1000 correct (64.60)

Epoch: 3, Iteration 500, loss = 0.8466
Checking accuracy on validation set
Got 648 / 1000 correct (64.80)

Epoch: 3, Iteration 600, loss = 1.0334
Checking accuracy on validation set
Got 680 / 1000 correct (68.00)

Epoch: 3, Iteration 700, loss = 1.0465
Checking accuracy on validation set
Got 676 / 1000 correct (67.60)

766
Epoch: 4, Iteration 0, loss = 0.9823
Checking accuracy on validation set
Got 587 / 1000 correct (58.70)

Epoch: 4, Iteration 100, loss = 1.2976
Checking accuracy on validation set
Got 666 / 1000 correct (66.60)

Epoch: 4, Iteration 200, loss = 1.2033
Checking accuracy on validation set
Got 637 / 1000 correct (63.70)

Epoch: 4, Iteration 300, loss = 1.0674
Checking accuracy on validation set
Got 644 / 1000 correct (64.40)

Epoch: 4, Iteration 400, loss = 1.0377
```

```
Checking accuracy on validation set
Got 676 / 1000 correct (67.60)

Epoch: 4, Iteration 500, loss = 1.0306
Checking accuracy on validation set
Got 652 / 1000 correct (65.20)

Epoch: 4, Iteration 600, loss = 0.7871
Checking accuracy on validation set
Got 678 / 1000 correct (67.80)

Epoch: 4, Iteration 700, loss = 0.9151
Checking accuracy on validation set
Got 690 / 1000 correct (69.00)

766
Epoch: 5, Iteration 0, loss = 1.0005
Checking accuracy on validation set
Got 648 / 1000 correct (64.80)

Epoch: 5, Iteration 100, loss = 0.9758
Checking accuracy on validation set
Got 675 / 1000 correct (67.50)

Epoch: 5, Iteration 200, loss = 0.9337
Checking accuracy on validation set
Got 685 / 1000 correct (68.50)

Epoch: 5, Iteration 300, loss = 1.1043
Checking accuracy on validation set
Got 673 / 1000 correct (67.30)

Epoch: 5, Iteration 400, loss = 1.0914
Checking accuracy on validation set
Got 608 / 1000 correct (60.80)

Epoch: 5, Iteration 500, loss = 0.9031
Checking accuracy on validation set
Got 673 / 1000 correct (67.30)

Epoch: 5, Iteration 600, loss = 1.0843
Checking accuracy on validation set
Got 652 / 1000 correct (65.20)

Epoch: 5, Iteration 700, loss = 0.8896
Checking accuracy on validation set
Got 692 / 1000 correct (69.20)
```

```
766
Epoch: 6, Iteration 0, loss = 1.0099
Checking accuracy on validation set
Got 701 / 1000 correct (70.10)

Epoch: 6, Iteration 100, loss = 0.9278
Checking accuracy on validation set
Got 712 / 1000 correct (71.20)

Epoch: 6, Iteration 200, loss = 1.1078
Checking accuracy on validation set
Got 671 / 1000 correct (67.10)

Epoch: 6, Iteration 300, loss = 0.7642
Checking accuracy on validation set
Got 712 / 1000 correct (71.20)

Epoch: 6, Iteration 400, loss = 0.8321
Checking accuracy on validation set
Got 726 / 1000 correct (72.60)

Epoch: 6, Iteration 500, loss = 0.6917
Checking accuracy on validation set
Got 689 / 1000 correct (68.90)

Epoch: 6, Iteration 600, loss = 0.8216
Checking accuracy on validation set
Got 660 / 1000 correct (66.00)

Epoch: 6, Iteration 700, loss = 1.0368
Checking accuracy on validation set
Got 679 / 1000 correct (67.90)

766
Epoch: 7, Iteration 0, loss = 0.8373
Checking accuracy on validation set
Got 692 / 1000 correct (69.20)

Epoch: 7, Iteration 100, loss = 1.0273
Checking accuracy on validation set
Got 696 / 1000 correct (69.60)

Epoch: 7, Iteration 200, loss = 0.7657
Checking accuracy on validation set
Got 698 / 1000 correct (69.80)

Epoch: 7, Iteration 300, loss = 0.9009
Checking accuracy on validation set
```

```
Got 730 / 1000 correct (73.00)

Epoch: 7, Iteration 400, loss = 0.8699
Checking accuracy on validation set
Got 714 / 1000 correct (71.40)

Epoch: 7, Iteration 500, loss = 1.0327
Checking accuracy on validation set
Got 728 / 1000 correct (72.80)

Epoch: 7, Iteration 600, loss = 0.7949
Checking accuracy on validation set
Got 764 / 1000 correct (76.40)

Epoch: 7, Iteration 700, loss = 0.8411
Checking accuracy on validation set
Got 682 / 1000 correct (68.20)

766
Epoch: 8, Iteration 0, loss = 0.7828
Checking accuracy on validation set
Got 701 / 1000 correct (70.10)

Epoch: 8, Iteration 100, loss = 0.6952
Checking accuracy on validation set
Got 721 / 1000 correct (72.10)

Epoch: 8, Iteration 200, loss = 0.9176
Checking accuracy on validation set
Got 745 / 1000 correct (74.50)

Epoch: 8, Iteration 300, loss = 0.7200
Checking accuracy on validation set
Got 739 / 1000 correct (73.90)

Epoch: 8, Iteration 400, loss = 0.6784
Checking accuracy on validation set
Got 731 / 1000 correct (73.10)

Epoch: 8, Iteration 500, loss = 0.7591
Checking accuracy on validation set
Got 723 / 1000 correct (72.30)

Epoch: 8, Iteration 600, loss = 0.5839
Checking accuracy on validation set
Got 714 / 1000 correct (71.40)

Epoch: 8, Iteration 700, loss = 0.8639
```

```
Checking accuracy on validation set
Got 707 / 1000 correct (70.70)

766
Epoch: 9, Iteration 0, loss = 0.7626
Checking accuracy on validation set
Got 730 / 1000 correct (73.00)

Epoch: 9, Iteration 100, loss = 0.9066
Checking accuracy on validation set
Got 717 / 1000 correct (71.70)

Epoch: 9, Iteration 200, loss = 0.6524
Checking accuracy on validation set
Got 745 / 1000 correct (74.50)

Epoch: 9, Iteration 300, loss = 0.8014
Checking accuracy on validation set
Got 757 / 1000 correct (75.70)

Epoch: 9, Iteration 400, loss = 0.8328
Checking accuracy on validation set
Got 689 / 1000 correct (68.90)

Epoch: 9, Iteration 500, loss = 0.6587
Checking accuracy on validation set
Got 730 / 1000 correct (73.00)

Epoch: 9, Iteration 600, loss = 0.6628
Checking accuracy on validation set
Got 754 / 1000 correct (75.40)

Epoch: 9, Iteration 700, loss = 0.8611
Checking accuracy on validation set
Got 747 / 1000 correct (74.70)

Checking accuracy on validation set
Got 661 / 1000 correct (66.10)
---- New lr = 0.00054 and weight_decay = 0.00075 ----
766
Epoch: 0, Iteration 0, loss = 3.4717
Checking accuracy on validation set
Got 136 / 1000 correct (13.60)

Epoch: 0, Iteration 100, loss = 1.6679
Checking accuracy on validation set
Got 339 / 1000 correct (33.90)
```

```
Epoch: 0, Iteration 200, loss = 1.3465
Checking accuracy on validation set
Got 441 / 1000 correct (44.10)

Epoch: 0, Iteration 300, loss = 1.2794
Checking accuracy on validation set
Got 468 / 1000 correct (46.80)

Epoch: 0, Iteration 400, loss = 1.0497
Checking accuracy on validation set
Got 472 / 1000 correct (47.20)

Epoch: 0, Iteration 500, loss = 1.5951
Checking accuracy on validation set
Got 562 / 1000 correct (56.20)

Epoch: 0, Iteration 600, loss = 1.1339
Checking accuracy on validation set
Got 524 / 1000 correct (52.40)

Epoch: 0, Iteration 700, loss = 1.1411
Checking accuracy on validation set
Got 504 / 1000 correct (50.40)

766
Epoch: 1, Iteration 0, loss = 0.9967
Checking accuracy on validation set
Got 634 / 1000 correct (63.40)

Epoch: 1, Iteration 100, loss = 1.2501
Checking accuracy on validation set
Got 617 / 1000 correct (61.70)

Epoch: 1, Iteration 200, loss = 1.3029
Checking accuracy on validation set
Got 559 / 1000 correct (55.90)

Epoch: 1, Iteration 300, loss = 1.3562
Checking accuracy on validation set
Got 672 / 1000 correct (67.20)

Epoch: 1, Iteration 400, loss = 0.9250
Checking accuracy on validation set
Got 675 / 1000 correct (67.50)

Epoch: 1, Iteration 500, loss = 1.0387
Checking accuracy on validation set
Got 611 / 1000 correct (61.10)
```

```
Epoch: 1, Iteration 600, loss = 0.8259
Checking accuracy on validation set
Got 674 / 1000 correct (67.40)

Epoch: 1, Iteration 700, loss = 0.8010
Checking accuracy on validation set
Got 712 / 1000 correct (71.20)

766
Epoch: 2, Iteration 0, loss = 0.7967
Checking accuracy on validation set
Got 595 / 1000 correct (59.50)

Epoch: 2, Iteration 100, loss = 0.6788
Checking accuracy on validation set
Got 699 / 1000 correct (69.90)

Epoch: 2, Iteration 200, loss = 0.9476
Checking accuracy on validation set
Got 712 / 1000 correct (71.20)

Epoch: 2, Iteration 300, loss = 0.7392
Checking accuracy on validation set
Got 739 / 1000 correct (73.90)

Epoch: 2, Iteration 400, loss = 0.9760
Checking accuracy on validation set
Got 686 / 1000 correct (68.60)

Epoch: 2, Iteration 500, loss = 0.9528
Checking accuracy on validation set
Got 701 / 1000 correct (70.10)

Epoch: 2, Iteration 600, loss = 0.6238
Checking accuracy on validation set
Got 760 / 1000 correct (76.00)

Epoch: 2, Iteration 700, loss = 0.9815
Checking accuracy on validation set
Got 743 / 1000 correct (74.30)

766
Epoch: 3, Iteration 0, loss = 0.5655
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

Epoch: 3, Iteration 100, loss = 0.7785
```

```
Checking accuracy on validation set
Got 769 / 1000 correct (76.90)

Epoch: 3, Iteration 200, loss = 0.7119
Checking accuracy on validation set
Got 755 / 1000 correct (75.50)

Epoch: 3, Iteration 300, loss = 0.7810
Checking accuracy on validation set
Got 764 / 1000 correct (76.40)

Epoch: 3, Iteration 400, loss = 0.6422
Checking accuracy on validation set
Got 747 / 1000 correct (74.70)

Epoch: 3, Iteration 500, loss = 1.1456
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)

Epoch: 3, Iteration 600, loss = 0.9161
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

Epoch: 3, Iteration 700, loss = 0.7744
Checking accuracy on validation set
Got 772 / 1000 correct (77.20)

766
Epoch: 4, Iteration 0, loss = 0.8108
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 4, Iteration 100, loss = 0.7126
Checking accuracy on validation set
Got 795 / 1000 correct (79.50)

Epoch: 4, Iteration 200, loss = 0.4532
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

Epoch: 4, Iteration 300, loss = 0.5126
Checking accuracy on validation set
Got 788 / 1000 correct (78.80)

Epoch: 4, Iteration 400, loss = 0.8368
Checking accuracy on validation set
Got 793 / 1000 correct (79.30)
```

```
Epoch: 4, Iteration 500, loss = 0.5903
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 4, Iteration 600, loss = 0.4587
Checking accuracy on validation set
Got 799 / 1000 correct (79.90)

Epoch: 4, Iteration 700, loss = 0.6397
Checking accuracy on validation set
Got 749 / 1000 correct (74.90)

766
Epoch: 5, Iteration 0, loss = 0.6492
Checking accuracy on validation set
Got 765 / 1000 correct (76.50)

Epoch: 5, Iteration 100, loss = 0.4773
Checking accuracy on validation set
Got 751 / 1000 correct (75.10)

Epoch: 5, Iteration 200, loss = 0.7213
Checking accuracy on validation set
Got 777 / 1000 correct (77.70)

Epoch: 5, Iteration 300, loss = 0.3517
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 5, Iteration 400, loss = 0.4851
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

Epoch: 5, Iteration 500, loss = 0.4831
Checking accuracy on validation set
Got 794 / 1000 correct (79.40)

Epoch: 5, Iteration 600, loss = 0.6262
Checking accuracy on validation set
Got 804 / 1000 correct (80.40)

Epoch: 5, Iteration 700, loss = 0.5309
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

766
Epoch: 6, Iteration 0, loss = 0.5612
Checking accuracy on validation set
```

```
Got 774 / 1000 correct (77.40)

Epoch: 6, Iteration 100, loss = 0.8659
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

Epoch: 6, Iteration 200, loss = 0.4710
Checking accuracy on validation set
Got 821 / 1000 correct (82.10)

Epoch: 6, Iteration 300, loss = 0.7906
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 6, Iteration 400, loss = 0.6560
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)

Epoch: 6, Iteration 500, loss = 0.5261
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 6, Iteration 600, loss = 0.6829
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 6, Iteration 700, loss = 0.6867
Checking accuracy on validation set
Got 827 / 1000 correct (82.70)

766
Epoch: 7, Iteration 0, loss = 0.4425
Checking accuracy on validation set
Got 795 / 1000 correct (79.50)

Epoch: 7, Iteration 100, loss = 0.3692
Checking accuracy on validation set
Got 805 / 1000 correct (80.50)

Epoch: 7, Iteration 200, loss = 0.7967
Checking accuracy on validation set
Got 823 / 1000 correct (82.30)

Epoch: 7, Iteration 300, loss = 0.4009
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 7, Iteration 400, loss = 0.5452
```

```
Checking accuracy on validation set
Got 835 / 1000 correct (83.50)

Epoch: 7, Iteration 500, loss = 0.6414
Checking accuracy on validation set
Got 808 / 1000 correct (80.80)

Epoch: 7, Iteration 600, loss = 0.4052
Checking accuracy on validation set
Got 776 / 1000 correct (77.60)

Epoch: 7, Iteration 700, loss = 0.4581
Checking accuracy on validation set
Got 820 / 1000 correct (82.00)

766
Epoch: 8, Iteration 0, loss = 0.3370
Checking accuracy on validation set
Got 816 / 1000 correct (81.60)

Epoch: 8, Iteration 100, loss = 0.5719
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Epoch: 8, Iteration 200, loss = 0.6107
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

Epoch: 8, Iteration 300, loss = 0.3562
Checking accuracy on validation set
Got 842 / 1000 correct (84.20)

Epoch: 8, Iteration 400, loss = 0.5714
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

Epoch: 8, Iteration 500, loss = 0.7531
Checking accuracy on validation set
Got 822 / 1000 correct (82.20)

Epoch: 8, Iteration 600, loss = 0.7050
Checking accuracy on validation set
Got 834 / 1000 correct (83.40)

Epoch: 8, Iteration 700, loss = 0.5880
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)
```

```
766
Epoch: 9, Iteration 0, loss = 0.4624
Checking accuracy on validation set
Got 836 / 1000 correct (83.60)

Epoch: 9, Iteration 100, loss = 0.2769
Checking accuracy on validation set
Got 846 / 1000 correct (84.60)

Epoch: 9, Iteration 200, loss = 0.4989
Checking accuracy on validation set
Got 840 / 1000 correct (84.00)

Epoch: 9, Iteration 300, loss = 0.3623
Checking accuracy on validation set
Got 857 / 1000 correct (85.70)

Epoch: 9, Iteration 400, loss = 0.5116
Checking accuracy on validation set
Got 845 / 1000 correct (84.50)

Epoch: 9, Iteration 500, loss = 0.6583
Checking accuracy on validation set
Got 839 / 1000 correct (83.90)

Epoch: 9, Iteration 600, loss = 0.5442
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Epoch: 9, Iteration 700, loss = 0.4197
Checking accuracy on validation set
Got 846 / 1000 correct (84.60)

Checking accuracy on validation set
Got 815 / 1000 correct (81.50)
---- New lr = 0.00237 and weight_decay = 0.00025 ----
766
Epoch: 0, Iteration 0, loss = 4.1793
Checking accuracy on validation set
Got 118 / 1000 correct (11.80)

Epoch: 0, Iteration 100, loss = 2.5484
Checking accuracy on validation set
Got 303 / 1000 correct (30.30)

Epoch: 0, Iteration 200, loss = 1.9622
Checking accuracy on validation set
Got 315 / 1000 correct (31.50)
```

```
Epoch: 0, Iteration 300, loss = 1.7700
Checking accuracy on validation set
Got 370 / 1000 correct (37.00)

Epoch: 0, Iteration 400, loss = 1.8527
Checking accuracy on validation set
Got 388 / 1000 correct (38.80)

Epoch: 0, Iteration 500, loss = 1.6491
Checking accuracy on validation set
Got 462 / 1000 correct (46.20)

Epoch: 0, Iteration 600, loss = 1.7105
Checking accuracy on validation set
Got 434 / 1000 correct (43.40)

Epoch: 0, Iteration 700, loss = 1.5549
Checking accuracy on validation set
Got 459 / 1000 correct (45.90)

766
Epoch: 1, Iteration 0, loss = 1.3154
Checking accuracy on validation set
Got 447 / 1000 correct (44.70)

Epoch: 1, Iteration 100, loss = 1.2250
Checking accuracy on validation set
Got 482 / 1000 correct (48.20)

Epoch: 1, Iteration 200, loss = 1.5368
Checking accuracy on validation set
Got 423 / 1000 correct (42.30)

Epoch: 1, Iteration 300, loss = 1.4170
Checking accuracy on validation set
Got 541 / 1000 correct (54.10)

Epoch: 1, Iteration 400, loss = 1.1212
Checking accuracy on validation set
Got 514 / 1000 correct (51.40)

Epoch: 1, Iteration 500, loss = 1.0606
Checking accuracy on validation set
Got 573 / 1000 correct (57.30)

Epoch: 1, Iteration 600, loss = 1.2285
Checking accuracy on validation set
```

```
Got 465 / 1000 correct (46.50)

Epoch: 1, Iteration 700, loss = 1.0321
Checking accuracy on validation set
Got 585 / 1000 correct (58.50)

766
Epoch: 2, Iteration 0, loss = 1.2234
Checking accuracy on validation set
Got 589 / 1000 correct (58.90)

Epoch: 2, Iteration 100, loss = 1.1061
Checking accuracy on validation set
Got 590 / 1000 correct (59.00)

Epoch: 2, Iteration 200, loss = 0.9904
Checking accuracy on validation set
Got 539 / 1000 correct (53.90)

Epoch: 2, Iteration 300, loss = 0.9322
Checking accuracy on validation set
Got 550 / 1000 correct (55.00)

Epoch: 2, Iteration 400, loss = 1.4275
Checking accuracy on validation set
Got 647 / 1000 correct (64.70)

Epoch: 2, Iteration 500, loss = 1.0921
Checking accuracy on validation set
Got 616 / 1000 correct (61.60)

Epoch: 2, Iteration 600, loss = 0.8230
Checking accuracy on validation set
Got 673 / 1000 correct (67.30)

Epoch: 2, Iteration 700, loss = 1.3125
Checking accuracy on validation set
Got 678 / 1000 correct (67.80)

766
Epoch: 3, Iteration 0, loss = 0.8059
Checking accuracy on validation set
Got 649 / 1000 correct (64.90)

Epoch: 3, Iteration 100, loss = 1.2662
Checking accuracy on validation set
Got 652 / 1000 correct (65.20)
```

```
Epoch: 3, Iteration 200, loss = 1.4342
Checking accuracy on validation set
Got 671 / 1000 correct (67.10)

Epoch: 3, Iteration 300, loss = 1.0389
Checking accuracy on validation set
Got 610 / 1000 correct (61.00)

Epoch: 3, Iteration 400, loss = 0.8884
Checking accuracy on validation set
Got 653 / 1000 correct (65.30)

Epoch: 3, Iteration 500, loss = 0.9431
Checking accuracy on validation set
Got 584 / 1000 correct (58.40)

Epoch: 3, Iteration 600, loss = 0.9420
Checking accuracy on validation set
Got 694 / 1000 correct (69.40)

Epoch: 3, Iteration 700, loss = 1.0104
Checking accuracy on validation set
Got 658 / 1000 correct (65.80)

766
Epoch: 4, Iteration 0, loss = 0.6480
Checking accuracy on validation set
Got 725 / 1000 correct (72.50)

Epoch: 4, Iteration 100, loss = 0.9509
Checking accuracy on validation set
Got 724 / 1000 correct (72.40)

Epoch: 4, Iteration 200, loss = 0.8382
Checking accuracy on validation set
Got 680 / 1000 correct (68.00)

Epoch: 4, Iteration 300, loss = 0.8911
Checking accuracy on validation set
Got 729 / 1000 correct (72.90)

Epoch: 4, Iteration 400, loss = 0.8223
Checking accuracy on validation set
Got 706 / 1000 correct (70.60)

Epoch: 4, Iteration 500, loss = 0.8344
Checking accuracy on validation set
Got 748 / 1000 correct (74.80)
```

```
Epoch: 4, Iteration 600, loss = 0.9187
Checking accuracy on validation set
Got 726 / 1000 correct (72.60)

Epoch: 4, Iteration 700, loss = 0.7117
Checking accuracy on validation set
Got 710 / 1000 correct (71.00)

766
Epoch: 5, Iteration 0, loss = 0.9971
Checking accuracy on validation set
Got 723 / 1000 correct (72.30)

Epoch: 5, Iteration 100, loss = 0.5312
Checking accuracy on validation set
Got 755 / 1000 correct (75.50)

Epoch: 5, Iteration 200, loss = 0.6531
Checking accuracy on validation set
Got 763 / 1000 correct (76.30)

Epoch: 5, Iteration 300, loss = 0.9101
Checking accuracy on validation set
Got 738 / 1000 correct (73.80)

Epoch: 5, Iteration 400, loss = 0.9794
Checking accuracy on validation set
Got 738 / 1000 correct (73.80)

Epoch: 5, Iteration 500, loss = 0.8032
Checking accuracy on validation set
Got 785 / 1000 correct (78.50)

Epoch: 5, Iteration 600, loss = 0.6739
Checking accuracy on validation set
Got 761 / 1000 correct (76.10)

Epoch: 5, Iteration 700, loss = 0.5911
Checking accuracy on validation set
Got 767 / 1000 correct (76.70)

766
Epoch: 6, Iteration 0, loss = 0.8268
Checking accuracy on validation set
Got 749 / 1000 correct (74.90)

Epoch: 6, Iteration 100, loss = 0.8238
```

```
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)

Epoch: 6, Iteration 200, loss = 0.6990
Checking accuracy on validation set
Got 742 / 1000 correct (74.20)

Epoch: 6, Iteration 300, loss = 0.7243
Checking accuracy on validation set
Got 766 / 1000 correct (76.60)

Epoch: 6, Iteration 400, loss = 0.8468
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 6, Iteration 500, loss = 0.5584
Checking accuracy on validation set
Got 781 / 1000 correct (78.10)

Epoch: 6, Iteration 600, loss = 0.7031
Checking accuracy on validation set
Got 753 / 1000 correct (75.30)

Epoch: 6, Iteration 700, loss = 0.8523
Checking accuracy on validation set
Got 796 / 1000 correct (79.60)

766
Epoch: 7, Iteration 0, loss = 0.6473
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

Epoch: 7, Iteration 100, loss = 0.7900
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 7, Iteration 200, loss = 0.7323
Checking accuracy on validation set
Got 794 / 1000 correct (79.40)

Epoch: 7, Iteration 300, loss = 0.7542
Checking accuracy on validation set
Got 811 / 1000 correct (81.10)

Epoch: 7, Iteration 400, loss = 0.3939
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)
```

```
Epoch: 7, Iteration 500, loss = 0.9694
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 7, Iteration 600, loss = 0.7124
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 7, Iteration 700, loss = 0.6660
Checking accuracy on validation set
Got 788 / 1000 correct (78.80)

766
Epoch: 8, Iteration 0, loss = 0.6534
Checking accuracy on validation set
Got 808 / 1000 correct (80.80)

Epoch: 8, Iteration 100, loss = 0.4023
Checking accuracy on validation set
Got 805 / 1000 correct (80.50)

Epoch: 8, Iteration 200, loss = 0.6430
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

Epoch: 8, Iteration 300, loss = 0.7326
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 8, Iteration 400, loss = 0.4063
Checking accuracy on validation set
Got 767 / 1000 correct (76.70)

Epoch: 8, Iteration 500, loss = 0.6452
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 8, Iteration 600, loss = 0.7223
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 8, Iteration 700, loss = 0.6381
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

766
Epoch: 9, Iteration 0, loss = 0.5030
Checking accuracy on validation set
```

```
Got 807 / 1000 correct (80.70)

Epoch: 9, Iteration 100, loss = 0.6153
Checking accuracy on validation set
Got 796 / 1000 correct (79.60)

Epoch: 9, Iteration 200, loss = 0.5535
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)

Epoch: 9, Iteration 300, loss = 0.7405
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 9, Iteration 400, loss = 0.3113
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 9, Iteration 500, loss = 0.4472
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

Epoch: 9, Iteration 600, loss = 0.4203
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

Epoch: 9, Iteration 700, loss = 0.6771
Checking accuracy on validation set
Got 776 / 1000 correct (77.60)

Checking accuracy on validation set
Got 812 / 1000 correct (81.20)
---- New lr = 0.00120 and weight_decay = 0.00080 ----
766
Epoch: 0, Iteration 0, loss = 3.2614
Checking accuracy on validation set
Got 117 / 1000 correct (11.70)

Epoch: 0, Iteration 100, loss = 1.9088
Checking accuracy on validation set
Got 337 / 1000 correct (33.70)

Epoch: 0, Iteration 200, loss = 1.6255
Checking accuracy on validation set
Got 395 / 1000 correct (39.50)

Epoch: 0, Iteration 300, loss = 1.4188
Checking accuracy on validation set
```

```
Got 426 / 1000 correct (42.60)

Epoch: 0, Iteration 400, loss = 1.4744
Checking accuracy on validation set
Got 478 / 1000 correct (47.80)

Epoch: 0, Iteration 500, loss = 1.5330
Checking accuracy on validation set
Got 333 / 1000 correct (33.30)

Epoch: 0, Iteration 600, loss = 1.6294
Checking accuracy on validation set
Got 453 / 1000 correct (45.30)

Epoch: 0, Iteration 700, loss = 1.5761
Checking accuracy on validation set
Got 471 / 1000 correct (47.10)

766
Epoch: 1, Iteration 0, loss = 1.3879
Checking accuracy on validation set
Got 526 / 1000 correct (52.60)

Epoch: 1, Iteration 100, loss = 1.3661
Checking accuracy on validation set
Got 540 / 1000 correct (54.00)

Epoch: 1, Iteration 200, loss = 1.2735
Checking accuracy on validation set
Got 524 / 1000 correct (52.40)

Epoch: 1, Iteration 300, loss = 1.2293
Checking accuracy on validation set
Got 577 / 1000 correct (57.70)

Epoch: 1, Iteration 400, loss = 1.2795
Checking accuracy on validation set
Got 581 / 1000 correct (58.10)

Epoch: 1, Iteration 500, loss = 1.2490
Checking accuracy on validation set
Got 595 / 1000 correct (59.50)

Epoch: 1, Iteration 600, loss = 0.9781
Checking accuracy on validation set
Got 589 / 1000 correct (58.90)

Epoch: 1, Iteration 700, loss = 1.0093
```

```
Checking accuracy on validation set
Got 568 / 1000 correct (56.80)

766
Epoch: 2, Iteration 0, loss = 1.0968
Checking accuracy on validation set
Got 573 / 1000 correct (57.30)

Epoch: 2, Iteration 100, loss = 1.1275
Checking accuracy on validation set
Got 546 / 1000 correct (54.60)

Epoch: 2, Iteration 200, loss = 0.8807
Checking accuracy on validation set
Got 592 / 1000 correct (59.20)

Epoch: 2, Iteration 300, loss = 1.2455
Checking accuracy on validation set
Got 613 / 1000 correct (61.30)

Epoch: 2, Iteration 400, loss = 0.9981
Checking accuracy on validation set
Got 643 / 1000 correct (64.30)

Epoch: 2, Iteration 500, loss = 1.1209
Checking accuracy on validation set
Got 666 / 1000 correct (66.60)

Epoch: 2, Iteration 600, loss = 1.0208
Checking accuracy on validation set
Got 686 / 1000 correct (68.60)

Epoch: 2, Iteration 700, loss = 1.0614
Checking accuracy on validation set
Got 578 / 1000 correct (57.80)

766
Epoch: 3, Iteration 0, loss = 0.8487
Checking accuracy on validation set
Got 581 / 1000 correct (58.10)

Epoch: 3, Iteration 100, loss = 1.0686
Checking accuracy on validation set
Got 693 / 1000 correct (69.30)

Epoch: 3, Iteration 200, loss = 0.9531
Checking accuracy on validation set
Got 641 / 1000 correct (64.10)
```

```
Epoch: 3, Iteration 300, loss = 0.7356
Checking accuracy on validation set
Got 695 / 1000 correct (69.50)

Epoch: 3, Iteration 400, loss = 1.0272
Checking accuracy on validation set
Got 581 / 1000 correct (58.10)

Epoch: 3, Iteration 500, loss = 0.9614
Checking accuracy on validation set
Got 674 / 1000 correct (67.40)

Epoch: 3, Iteration 600, loss = 0.8424
Checking accuracy on validation set
Got 705 / 1000 correct (70.50)

Epoch: 3, Iteration 700, loss = 0.8609
Checking accuracy on validation set
Got 701 / 1000 correct (70.10)

766
Epoch: 4, Iteration 0, loss = 0.8225
Checking accuracy on validation set
Got 716 / 1000 correct (71.60)

Epoch: 4, Iteration 100, loss = 0.7704
Checking accuracy on validation set
Got 677 / 1000 correct (67.70)

Epoch: 4, Iteration 200, loss = 0.9049
Checking accuracy on validation set
Got 705 / 1000 correct (70.50)

Epoch: 4, Iteration 300, loss = 0.9314
Checking accuracy on validation set
Got 707 / 1000 correct (70.70)

Epoch: 4, Iteration 400, loss = 0.9410
Checking accuracy on validation set
Got 698 / 1000 correct (69.80)

Epoch: 4, Iteration 500, loss = 1.0104
Checking accuracy on validation set
Got 727 / 1000 correct (72.70)

Epoch: 4, Iteration 600, loss = 0.8121
Checking accuracy on validation set
```

```
Got 744 / 1000 correct (74.40)

Epoch: 4, Iteration 700, loss = 0.8204
Checking accuracy on validation set
Got 731 / 1000 correct (73.10)

766
Epoch: 5, Iteration 0, loss = 0.6797
Checking accuracy on validation set
Got 748 / 1000 correct (74.80)

Epoch: 5, Iteration 100, loss = 0.6976
Checking accuracy on validation set
Got 762 / 1000 correct (76.20)

Epoch: 5, Iteration 200, loss = 0.6350
Checking accuracy on validation set
Got 733 / 1000 correct (73.30)

Epoch: 5, Iteration 300, loss = 0.8498
Checking accuracy on validation set
Got 732 / 1000 correct (73.20)

Epoch: 5, Iteration 400, loss = 0.6859
Checking accuracy on validation set
Got 746 / 1000 correct (74.60)

Epoch: 5, Iteration 500, loss = 0.5634
Checking accuracy on validation set
Got 772 / 1000 correct (77.20)

Epoch: 5, Iteration 600, loss = 0.6001
Checking accuracy on validation set
Got 738 / 1000 correct (73.80)

Epoch: 5, Iteration 700, loss = 0.5672
Checking accuracy on validation set
Got 731 / 1000 correct (73.10)

766
Epoch: 6, Iteration 0, loss = 0.6694
Checking accuracy on validation set
Got 763 / 1000 correct (76.30)

Epoch: 6, Iteration 100, loss = 0.7682
Checking accuracy on validation set
Got 727 / 1000 correct (72.70)
```

```
Epoch: 6, Iteration 200, loss = 0.5734
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

Epoch: 6, Iteration 300, loss = 0.6905
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

Epoch: 6, Iteration 400, loss = 0.6748
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 6, Iteration 500, loss = 0.5193
Checking accuracy on validation set
Got 774 / 1000 correct (77.40)

Epoch: 6, Iteration 600, loss = 0.6373
Checking accuracy on validation set
Got 794 / 1000 correct (79.40)

Epoch: 6, Iteration 700, loss = 0.7484
Checking accuracy on validation set
Got 785 / 1000 correct (78.50)

766
Epoch: 7, Iteration 0, loss = 0.7486
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

Epoch: 7, Iteration 100, loss = 0.7751
Checking accuracy on validation set
Got 794 / 1000 correct (79.40)

Epoch: 7, Iteration 200, loss = 0.4654
Checking accuracy on validation set
Got 786 / 1000 correct (78.60)

Epoch: 7, Iteration 300, loss = 1.0860
Checking accuracy on validation set
Got 772 / 1000 correct (77.20)

Epoch: 7, Iteration 400, loss = 0.7464
Checking accuracy on validation set
Got 785 / 1000 correct (78.50)

Epoch: 7, Iteration 500, loss = 0.5870
Checking accuracy on validation set
Got 792 / 1000 correct (79.20)
```

```
Epoch: 7, Iteration 600, loss = 0.7671
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

Epoch: 7, Iteration 700, loss = 0.7933
Checking accuracy on validation set
Got 781 / 1000 correct (78.10)

766
Epoch: 8, Iteration 0, loss = 0.4610
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)

Epoch: 8, Iteration 100, loss = 0.6934
Checking accuracy on validation set
Got 795 / 1000 correct (79.50)

Epoch: 8, Iteration 200, loss = 0.6043
Checking accuracy on validation set
Got 764 / 1000 correct (76.40)

Epoch: 8, Iteration 300, loss = 0.5587
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)

Epoch: 8, Iteration 400, loss = 0.6358
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

Epoch: 8, Iteration 500, loss = 0.7137
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 8, Iteration 600, loss = 0.4559
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 8, Iteration 700, loss = 0.7269
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

766
Epoch: 9, Iteration 0, loss = 0.7253
Checking accuracy on validation set
Got 792 / 1000 correct (79.20)

Epoch: 9, Iteration 100, loss = 0.7316
```

```
Checking accuracy on validation set
Got 827 / 1000 correct (82.70)

Epoch: 9, Iteration 200, loss = 0.5183
Checking accuracy on validation set
Got 804 / 1000 correct (80.40)

Epoch: 9, Iteration 300, loss = 0.5698
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 9, Iteration 400, loss = 0.6955
Checking accuracy on validation set
Got 822 / 1000 correct (82.20)

Epoch: 9, Iteration 500, loss = 0.7105
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Epoch: 9, Iteration 600, loss = 0.6265
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 9, Iteration 700, loss = 0.6090
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Checking accuracy on validation set
Got 830 / 1000 correct (83.00)
---- New lr = 0.00050 and weight_decay = 0.00082 ----
766
Epoch: 0, Iteration 0, loss = 3.3882
Checking accuracy on validation set
Got 96 / 1000 correct (9.60)

Epoch: 0, Iteration 100, loss = 1.9832
Checking accuracy on validation set
Got 383 / 1000 correct (38.30)

Epoch: 0, Iteration 200, loss = 1.7399
Checking accuracy on validation set
Got 374 / 1000 correct (37.40)

Epoch: 0, Iteration 300, loss = 1.4217
Checking accuracy on validation set
Got 405 / 1000 correct (40.50)

Epoch: 0, Iteration 400, loss = 0.9706
```

```
Checking accuracy on validation set
Got 516 / 1000 correct (51.60)

Epoch: 0, Iteration 500, loss = 1.5235
Checking accuracy on validation set
Got 559 / 1000 correct (55.90)

Epoch: 0, Iteration 600, loss = 1.4245
Checking accuracy on validation set
Got 504 / 1000 correct (50.40)

Epoch: 0, Iteration 700, loss = 1.1195
Checking accuracy on validation set
Got 628 / 1000 correct (62.80)

766
Epoch: 1, Iteration 0, loss = 1.0691
Checking accuracy on validation set
Got 630 / 1000 correct (63.00)

Epoch: 1, Iteration 100, loss = 1.3584
Checking accuracy on validation set
Got 626 / 1000 correct (62.60)

Epoch: 1, Iteration 200, loss = 0.8176
Checking accuracy on validation set
Got 637 / 1000 correct (63.70)

Epoch: 1, Iteration 300, loss = 1.1158
Checking accuracy on validation set
Got 689 / 1000 correct (68.90)

Epoch: 1, Iteration 400, loss = 0.8554
Checking accuracy on validation set
Got 653 / 1000 correct (65.30)

Epoch: 1, Iteration 500, loss = 0.8557
Checking accuracy on validation set
Got 742 / 1000 correct (74.20)

Epoch: 1, Iteration 600, loss = 0.9247
Checking accuracy on validation set
Got 678 / 1000 correct (67.80)

Epoch: 1, Iteration 700, loss = 1.1115
Checking accuracy on validation set
Got 687 / 1000 correct (68.70)
```

```
766
Epoch: 2, Iteration 0, loss = 0.9358
Checking accuracy on validation set
Got 690 / 1000 correct (69.00)

Epoch: 2, Iteration 100, loss = 0.7606
Checking accuracy on validation set
Got 735 / 1000 correct (73.50)

Epoch: 2, Iteration 200, loss = 0.7134
Checking accuracy on validation set
Got 687 / 1000 correct (68.70)

Epoch: 2, Iteration 300, loss = 0.8810
Checking accuracy on validation set
Got 736 / 1000 correct (73.60)

Epoch: 2, Iteration 400, loss = 0.8457
Checking accuracy on validation set
Got 757 / 1000 correct (75.70)

Epoch: 2, Iteration 500, loss = 0.8176
Checking accuracy on validation set
Got 765 / 1000 correct (76.50)

Epoch: 2, Iteration 600, loss = 0.8160
Checking accuracy on validation set
Got 736 / 1000 correct (73.60)

Epoch: 2, Iteration 700, loss = 0.6686
Checking accuracy on validation set
Got 738 / 1000 correct (73.80)

766
Epoch: 3, Iteration 0, loss = 0.7775
Checking accuracy on validation set
Got 745 / 1000 correct (74.50)

Epoch: 3, Iteration 100, loss = 0.8526
Checking accuracy on validation set
Got 746 / 1000 correct (74.60)

Epoch: 3, Iteration 200, loss = 0.7031
Checking accuracy on validation set
Got 747 / 1000 correct (74.70)

Epoch: 3, Iteration 300, loss = 0.5623
Checking accuracy on validation set
```

```
Got 754 / 1000 correct (75.40)

Epoch: 3, Iteration 400, loss = 0.8627
Checking accuracy on validation set
Got 787 / 1000 correct (78.70)

Epoch: 3, Iteration 500, loss = 0.6818
Checking accuracy on validation set
Got 682 / 1000 correct (68.20)

Epoch: 3, Iteration 600, loss = 0.6608
Checking accuracy on validation set
Got 729 / 1000 correct (72.90)

Epoch: 3, Iteration 700, loss = 0.8219
Checking accuracy on validation set
Got 760 / 1000 correct (76.00)

766
Epoch: 4, Iteration 0, loss = 0.6142
Checking accuracy on validation set
Got 761 / 1000 correct (76.10)

Epoch: 4, Iteration 100, loss = 0.5636
Checking accuracy on validation set
Got 761 / 1000 correct (76.10)

Epoch: 4, Iteration 200, loss = 0.8941
Checking accuracy on validation set
Got 765 / 1000 correct (76.50)

Epoch: 4, Iteration 300, loss = 0.6417
Checking accuracy on validation set
Got 764 / 1000 correct (76.40)

Epoch: 4, Iteration 400, loss = 0.4629
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

Epoch: 4, Iteration 500, loss = 0.3687
Checking accuracy on validation set
Got 793 / 1000 correct (79.30)

Epoch: 4, Iteration 600, loss = 0.7354
Checking accuracy on validation set
Got 764 / 1000 correct (76.40)

Epoch: 4, Iteration 700, loss = 0.5455
```

```
Checking accuracy on validation set
Got 789 / 1000 correct (78.90)

766
Epoch: 5, Iteration 0, loss = 0.6358
Checking accuracy on validation set
Got 805 / 1000 correct (80.50)

Epoch: 5, Iteration 100, loss = 0.8770
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

Epoch: 5, Iteration 200, loss = 0.7338
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

Epoch: 5, Iteration 300, loss = 0.5864
Checking accuracy on validation set
Got 767 / 1000 correct (76.70)

Epoch: 5, Iteration 400, loss = 0.6946
Checking accuracy on validation set
Got 822 / 1000 correct (82.20)

Epoch: 5, Iteration 500, loss = 0.5171
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 5, Iteration 600, loss = 0.6001
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 5, Iteration 700, loss = 0.7053
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

766
Epoch: 6, Iteration 0, loss = 0.5662
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 6, Iteration 100, loss = 0.7583
Checking accuracy on validation set
Got 803 / 1000 correct (80.30)

Epoch: 6, Iteration 200, loss = 0.8706
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)
```

```
Epoch: 6, Iteration 300, loss = 0.4611
Checking accuracy on validation set
Got 808 / 1000 correct (80.80)

Epoch: 6, Iteration 400, loss = 0.5987
Checking accuracy on validation set
Got 794 / 1000 correct (79.40)

Epoch: 6, Iteration 500, loss = 0.4876
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

Epoch: 6, Iteration 600, loss = 0.5553
Checking accuracy on validation set
Got 769 / 1000 correct (76.90)

Epoch: 6, Iteration 700, loss = 0.3599
Checking accuracy on validation set
Got 848 / 1000 correct (84.80)

766
Epoch: 7, Iteration 0, loss = 0.8698
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

Epoch: 7, Iteration 100, loss = 0.4808
Checking accuracy on validation set
Got 825 / 1000 correct (82.50)

Epoch: 7, Iteration 200, loss = 0.3942
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

Epoch: 7, Iteration 300, loss = 0.5623
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

Epoch: 7, Iteration 400, loss = 0.4901
Checking accuracy on validation set
Got 817 / 1000 correct (81.70)

Epoch: 7, Iteration 500, loss = 0.4920
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 7, Iteration 600, loss = 0.5605
Checking accuracy on validation set
```

```
Got 823 / 1000 correct (82.30)

Epoch: 7, Iteration 700, loss = 0.4478
Checking accuracy on validation set
Got 823 / 1000 correct (82.30)

766
Epoch: 8, Iteration 0, loss = 0.4168
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 8, Iteration 100, loss = 0.6236
Checking accuracy on validation set
Got 834 / 1000 correct (83.40)

Epoch: 8, Iteration 200, loss = 0.3991
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 8, Iteration 300, loss = 0.6085
Checking accuracy on validation set
Got 837 / 1000 correct (83.70)

Epoch: 8, Iteration 400, loss = 0.6161
Checking accuracy on validation set
Got 826 / 1000 correct (82.60)

Epoch: 8, Iteration 500, loss = 0.7398
Checking accuracy on validation set
Got 817 / 1000 correct (81.70)

Epoch: 8, Iteration 600, loss = 0.4308
Checking accuracy on validation set
Got 811 / 1000 correct (81.10)

Epoch: 8, Iteration 700, loss = 0.5133
Checking accuracy on validation set
Got 822 / 1000 correct (82.20)

766
Epoch: 9, Iteration 0, loss = 0.3946
Checking accuracy on validation set
Got 839 / 1000 correct (83.90)

Epoch: 9, Iteration 100, loss = 0.5042
Checking accuracy on validation set
Got 855 / 1000 correct (85.50)
```

```
Epoch: 9, Iteration 200, loss = 0.4650
Checking accuracy on validation set
Got 831 / 1000 correct (83.10)

Epoch: 9, Iteration 300, loss = 0.4590
Checking accuracy on validation set
Got 794 / 1000 correct (79.40)

Epoch: 9, Iteration 400, loss = 0.4735
Checking accuracy on validation set
Got 832 / 1000 correct (83.20)

Epoch: 9, Iteration 500, loss = 0.3961
Checking accuracy on validation set
Got 804 / 1000 correct (80.40)

Epoch: 9, Iteration 600, loss = 0.3924
Checking accuracy on validation set
Got 817 / 1000 correct (81.70)

Epoch: 9, Iteration 700, loss = 0.4914
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Checking accuracy on validation set
Got 847 / 1000 correct (84.70)
---- New lr = 0.00053 and weight_decay = 0.00074 ----
766
Epoch: 0, Iteration 0, loss = 2.8960
Checking accuracy on validation set
Got 89 / 1000 correct (8.90)

Epoch: 0, Iteration 100, loss = 1.7372
Checking accuracy on validation set
Got 349 / 1000 correct (34.90)

Epoch: 0, Iteration 200, loss = 1.5385
Checking accuracy on validation set
Got 467 / 1000 correct (46.70)

Epoch: 0, Iteration 300, loss = 1.7382
Checking accuracy on validation set
Got 514 / 1000 correct (51.40)

Epoch: 0, Iteration 400, loss = 1.3829
Checking accuracy on validation set
Got 524 / 1000 correct (52.40)
```

```
Epoch: 0, Iteration 500, loss = 1.3320
Checking accuracy on validation set
Got 553 / 1000 correct (55.30)

Epoch: 0, Iteration 600, loss = 1.4322
Checking accuracy on validation set
Got 505 / 1000 correct (50.50)

Epoch: 0, Iteration 700, loss = 0.9005
Checking accuracy on validation set
Got 597 / 1000 correct (59.70)

766
Epoch: 1, Iteration 0, loss = 1.1869
Checking accuracy on validation set
Got 603 / 1000 correct (60.30)

Epoch: 1, Iteration 100, loss = 1.0709
Checking accuracy on validation set
Got 604 / 1000 correct (60.40)

Epoch: 1, Iteration 200, loss = 0.8830
Checking accuracy on validation set
Got 604 / 1000 correct (60.40)

Epoch: 1, Iteration 300, loss = 1.0941
Checking accuracy on validation set
Got 668 / 1000 correct (66.80)

Epoch: 1, Iteration 400, loss = 0.9058
Checking accuracy on validation set
Got 661 / 1000 correct (66.10)

Epoch: 1, Iteration 500, loss = 0.7797
Checking accuracy on validation set
Got 712 / 1000 correct (71.20)

Epoch: 1, Iteration 600, loss = 0.8978
Checking accuracy on validation set
Got 697 / 1000 correct (69.70)

Epoch: 1, Iteration 700, loss = 0.9699
Checking accuracy on validation set
Got 709 / 1000 correct (70.90)

766
Epoch: 2, Iteration 0, loss = 0.7268
Checking accuracy on validation set
```

```
Got 736 / 1000 correct (73.60)

Epoch: 2, Iteration 100, loss = 0.6918
Checking accuracy on validation set
Got 673 / 1000 correct (67.30)

Epoch: 2, Iteration 200, loss = 0.9680
Checking accuracy on validation set
Got 686 / 1000 correct (68.60)

Epoch: 2, Iteration 300, loss = 0.6771
Checking accuracy on validation set
Got 735 / 1000 correct (73.50)

Epoch: 2, Iteration 400, loss = 0.8356
Checking accuracy on validation set
Got 745 / 1000 correct (74.50)

Epoch: 2, Iteration 500, loss = 0.7316
Checking accuracy on validation set
Got 749 / 1000 correct (74.90)

Epoch: 2, Iteration 600, loss = 0.7657
Checking accuracy on validation set
Got 725 / 1000 correct (72.50)

Epoch: 2, Iteration 700, loss = 0.6672
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

766
Epoch: 3, Iteration 0, loss = 0.7681
Checking accuracy on validation set
Got 733 / 1000 correct (73.30)

Epoch: 3, Iteration 100, loss = 0.7143
Checking accuracy on validation set
Got 775 / 1000 correct (77.50)

Epoch: 3, Iteration 200, loss = 0.6585
Checking accuracy on validation set
Got 745 / 1000 correct (74.50)

Epoch: 3, Iteration 300, loss = 0.6900
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 3, Iteration 400, loss = 0.5632
```

```
Checking accuracy on validation set
Got 795 / 1000 correct (79.50)

Epoch: 3, Iteration 500, loss = 0.6221
Checking accuracy on validation set
Got 757 / 1000 correct (75.70)

Epoch: 3, Iteration 600, loss = 0.6540
Checking accuracy on validation set
Got 788 / 1000 correct (78.80)

Epoch: 3, Iteration 700, loss = 0.9284
Checking accuracy on validation set
Got 766 / 1000 correct (76.60)

766
Epoch: 4, Iteration 0, loss = 0.6393
Checking accuracy on validation set
Got 769 / 1000 correct (76.90)

Epoch: 4, Iteration 100, loss = 0.5543
Checking accuracy on validation set
Got 807 / 1000 correct (80.70)

Epoch: 4, Iteration 200, loss = 0.5578
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

Epoch: 4, Iteration 300, loss = 0.6493
Checking accuracy on validation set
Got 776 / 1000 correct (77.60)

Epoch: 4, Iteration 400, loss = 0.6937
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 4, Iteration 500, loss = 0.6973
Checking accuracy on validation set
Got 739 / 1000 correct (73.90)

Epoch: 4, Iteration 600, loss = 0.6218
Checking accuracy on validation set
Got 796 / 1000 correct (79.60)

Epoch: 4, Iteration 700, loss = 0.6870
Checking accuracy on validation set
Got 787 / 1000 correct (78.70)
```

```
766
Epoch: 5, Iteration 0, loss = 0.7695
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

Epoch: 5, Iteration 100, loss = 0.9082
Checking accuracy on validation set
Got 750 / 1000 correct (75.00)

Epoch: 5, Iteration 200, loss = 0.5385
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 5, Iteration 300, loss = 0.4258
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)

Epoch: 5, Iteration 400, loss = 0.5241
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 5, Iteration 500, loss = 0.4779
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 5, Iteration 600, loss = 0.7324
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 5, Iteration 700, loss = 0.7170
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)

766
Epoch: 6, Iteration 0, loss = 0.5928
Checking accuracy on validation set
Got 793 / 1000 correct (79.30)

Epoch: 6, Iteration 100, loss = 0.7935
Checking accuracy on validation set
Got 807 / 1000 correct (80.70)

Epoch: 6, Iteration 200, loss = 0.5279
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

Epoch: 6, Iteration 300, loss = 0.5025
Checking accuracy on validation set
```

```
Got 791 / 1000 correct (79.10)

Epoch: 6, Iteration 400, loss = 0.7199
Checking accuracy on validation set
Got 814 / 1000 correct (81.40)

Epoch: 6, Iteration 500, loss = 0.6331
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 6, Iteration 600, loss = 0.6008
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

Epoch: 6, Iteration 700, loss = 0.5692
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

766
Epoch: 7, Iteration 0, loss = 0.6853
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

Epoch: 7, Iteration 100, loss = 0.4740
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

Epoch: 7, Iteration 200, loss = 0.8133
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

Epoch: 7, Iteration 300, loss = 0.5928
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Epoch: 7, Iteration 400, loss = 0.6576
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

Epoch: 7, Iteration 500, loss = 0.5687
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

Epoch: 7, Iteration 600, loss = 0.3314
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

Epoch: 7, Iteration 700, loss = 0.6263
```

```
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)

766
Epoch: 8, Iteration 0, loss = 0.6491
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 8, Iteration 100, loss = 0.5072
Checking accuracy on validation set
Got 827 / 1000 correct (82.70)

Epoch: 8, Iteration 200, loss = 0.3904
Checking accuracy on validation set
Got 850 / 1000 correct (85.00)

Epoch: 8, Iteration 300, loss = 0.4085
Checking accuracy on validation set
Got 838 / 1000 correct (83.80)

Epoch: 8, Iteration 400, loss = 0.5357
Checking accuracy on validation set
Got 823 / 1000 correct (82.30)

Epoch: 8, Iteration 500, loss = 0.4488
Checking accuracy on validation set
Got 841 / 1000 correct (84.10)

Epoch: 8, Iteration 600, loss = 0.7515
Checking accuracy on validation set
Got 834 / 1000 correct (83.40)

Epoch: 8, Iteration 700, loss = 0.6092
Checking accuracy on validation set
Got 837 / 1000 correct (83.70)

766
Epoch: 9, Iteration 0, loss = 0.5596
Checking accuracy on validation set
Got 776 / 1000 correct (77.60)

Epoch: 9, Iteration 100, loss = 0.5594
Checking accuracy on validation set
Got 822 / 1000 correct (82.20)

Epoch: 9, Iteration 200, loss = 0.5287
Checking accuracy on validation set
Got 855 / 1000 correct (85.50)
```

```
Epoch: 9, Iteration 300, loss = 0.7262
Checking accuracy on validation set
Got 846 / 1000 correct (84.60)

Epoch: 9, Iteration 400, loss = 0.5378
Checking accuracy on validation set
Got 838 / 1000 correct (83.80)

Epoch: 9, Iteration 500, loss = 0.5358
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

Epoch: 9, Iteration 600, loss = 0.4880
Checking accuracy on validation set
Got 834 / 1000 correct (83.40)

Epoch: 9, Iteration 700, loss = 0.5292
Checking accuracy on validation set
Got 838 / 1000 correct (83.80)

Checking accuracy on validation set
Got 851 / 1000 correct (85.10)
---- New lr = 0.00051 and weight_decay = 0.00085 ----
766
Epoch: 0, Iteration 0, loss = 4.1503
Checking accuracy on validation set
Got 102 / 1000 correct (10.20)

Epoch: 0, Iteration 100, loss = 1.9966
Checking accuracy on validation set
Got 375 / 1000 correct (37.50)

Epoch: 0, Iteration 200, loss = 1.6229
Checking accuracy on validation set
Got 425 / 1000 correct (42.50)

Epoch: 0, Iteration 300, loss = 1.2188
Checking accuracy on validation set
Got 469 / 1000 correct (46.90)

Epoch: 0, Iteration 400, loss = 1.5325
Checking accuracy on validation set
Got 507 / 1000 correct (50.70)

Epoch: 0, Iteration 500, loss = 1.4456
Checking accuracy on validation set
Got 533 / 1000 correct (53.30)
```

```
Epoch: 0, Iteration 600, loss = 1.1287
Checking accuracy on validation set
Got 533 / 1000 correct (53.30)

Epoch: 0, Iteration 700, loss = 1.0200
Checking accuracy on validation set
Got 580 / 1000 correct (58.00)

766
Epoch: 1, Iteration 0, loss = 1.1188
Checking accuracy on validation set
Got 637 / 1000 correct (63.70)

Epoch: 1, Iteration 100, loss = 0.9769
Checking accuracy on validation set
Got 629 / 1000 correct (62.90)

Epoch: 1, Iteration 200, loss = 0.9254
Checking accuracy on validation set
Got 635 / 1000 correct (63.50)

Epoch: 1, Iteration 300, loss = 0.9253
Checking accuracy on validation set
Got 644 / 1000 correct (64.40)

Epoch: 1, Iteration 400, loss = 0.7224
Checking accuracy on validation set
Got 707 / 1000 correct (70.70)

Epoch: 1, Iteration 500, loss = 0.8657
Checking accuracy on validation set
Got 699 / 1000 correct (69.90)

Epoch: 1, Iteration 600, loss = 0.8441
Checking accuracy on validation set
Got 686 / 1000 correct (68.60)

Epoch: 1, Iteration 700, loss = 1.0471
Checking accuracy on validation set
Got 709 / 1000 correct (70.90)

766
Epoch: 2, Iteration 0, loss = 0.8703
Checking accuracy on validation set
Got 727 / 1000 correct (72.70)

Epoch: 2, Iteration 100, loss = 0.7444
```

```
Checking accuracy on validation set
Got 730 / 1000 correct (73.00)

Epoch: 2, Iteration 200, loss = 0.8265
Checking accuracy on validation set
Got 753 / 1000 correct (75.30)

Epoch: 2, Iteration 300, loss = 0.6313
Checking accuracy on validation set
Got 731 / 1000 correct (73.10)

Epoch: 2, Iteration 400, loss = 0.7653
Checking accuracy on validation set
Got 748 / 1000 correct (74.80)

Epoch: 2, Iteration 500, loss = 0.5917
Checking accuracy on validation set
Got 763 / 1000 correct (76.30)

Epoch: 2, Iteration 600, loss = 0.5945
Checking accuracy on validation set
Got 751 / 1000 correct (75.10)

Epoch: 2, Iteration 700, loss = 0.5390
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

766
Epoch: 3, Iteration 0, loss = 0.6110
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

Epoch: 3, Iteration 100, loss = 0.5770
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

Epoch: 3, Iteration 200, loss = 0.7545
Checking accuracy on validation set
Got 715 / 1000 correct (71.50)

Epoch: 3, Iteration 300, loss = 0.7257
Checking accuracy on validation set
Got 758 / 1000 correct (75.80)

Epoch: 3, Iteration 400, loss = 0.6690
Checking accuracy on validation set
Got 746 / 1000 correct (74.60)
```

```
Epoch: 3, Iteration 500, loss = 0.6368
Checking accuracy on validation set
Got 707 / 1000 correct (70.70)

Epoch: 3, Iteration 600, loss = 0.8973
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)

Epoch: 3, Iteration 700, loss = 0.6669
Checking accuracy on validation set
Got 788 / 1000 correct (78.80)

766
Epoch: 4, Iteration 0, loss = 0.7403
Checking accuracy on validation set
Got 758 / 1000 correct (75.80)

Epoch: 4, Iteration 100, loss = 0.7201
Checking accuracy on validation set
Got 731 / 1000 correct (73.10)

Epoch: 4, Iteration 200, loss = 0.5322
Checking accuracy on validation set
Got 774 / 1000 correct (77.40)

Epoch: 4, Iteration 300, loss = 0.8529
Checking accuracy on validation set
Got 774 / 1000 correct (77.40)

Epoch: 4, Iteration 400, loss = 0.9235
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 4, Iteration 500, loss = 0.6760
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 4, Iteration 600, loss = 0.5609
Checking accuracy on validation set
Got 747 / 1000 correct (74.70)

Epoch: 4, Iteration 700, loss = 0.6591
Checking accuracy on validation set
Got 785 / 1000 correct (78.50)

766
Epoch: 5, Iteration 0, loss = 0.5439
Checking accuracy on validation set
```

```
Got 805 / 1000 correct (80.50)

Epoch: 5, Iteration 100, loss = 0.7734
Checking accuracy on validation set
Got 776 / 1000 correct (77.60)

Epoch: 5, Iteration 200, loss = 0.4753
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

Epoch: 5, Iteration 300, loss = 0.6923
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

Epoch: 5, Iteration 400, loss = 0.5035
Checking accuracy on validation set
Got 793 / 1000 correct (79.30)

Epoch: 5, Iteration 500, loss = 0.5697
Checking accuracy on validation set
Got 804 / 1000 correct (80.40)

Epoch: 5, Iteration 600, loss = 0.5093
Checking accuracy on validation set
Got 796 / 1000 correct (79.60)

Epoch: 5, Iteration 700, loss = 0.3828
Checking accuracy on validation set
Got 772 / 1000 correct (77.20)

766
Epoch: 6, Iteration 0, loss = 0.4392
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

Epoch: 6, Iteration 100, loss = 0.4809
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

Epoch: 6, Iteration 200, loss = 0.5452
Checking accuracy on validation set
Got 805 / 1000 correct (80.50)

Epoch: 6, Iteration 300, loss = 0.6074
Checking accuracy on validation set
Got 807 / 1000 correct (80.70)

Epoch: 6, Iteration 400, loss = 0.5006
```

```
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)

Epoch: 6, Iteration 500, loss = 0.4080
Checking accuracy on validation set
Got 828 / 1000 correct (82.80)

Epoch: 6, Iteration 600, loss = 0.4281
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)

Epoch: 6, Iteration 700, loss = 0.7381
Checking accuracy on validation set
Got 821 / 1000 correct (82.10)

766
Epoch: 7, Iteration 0, loss = 0.4305
Checking accuracy on validation set
Got 832 / 1000 correct (83.20)

Epoch: 7, Iteration 100, loss = 0.5672
Checking accuracy on validation set
Got 814 / 1000 correct (81.40)

Epoch: 7, Iteration 200, loss = 0.5379
Checking accuracy on validation set
Got 786 / 1000 correct (78.60)

Epoch: 7, Iteration 300, loss = 0.6583
Checking accuracy on validation set
Got 811 / 1000 correct (81.10)

Epoch: 7, Iteration 400, loss = 0.6010
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 7, Iteration 500, loss = 0.5061
Checking accuracy on validation set
Got 805 / 1000 correct (80.50)

Epoch: 7, Iteration 600, loss = 0.5041
Checking accuracy on validation set
Got 831 / 1000 correct (83.10)

Epoch: 7, Iteration 700, loss = 0.6369
Checking accuracy on validation set
Got 816 / 1000 correct (81.60)
```

```
766
Epoch: 8, Iteration 0, loss = 0.4875
Checking accuracy on validation set
Got 838 / 1000 correct (83.80)

Epoch: 8, Iteration 100, loss = 0.4042
Checking accuracy on validation set
Got 825 / 1000 correct (82.50)

Epoch: 8, Iteration 200, loss = 0.3034
Checking accuracy on validation set
Got 835 / 1000 correct (83.50)

Epoch: 8, Iteration 300, loss = 0.6222
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 8, Iteration 400, loss = 0.2876
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 8, Iteration 500, loss = 0.4746
Checking accuracy on validation set
Got 809 / 1000 correct (80.90)

Epoch: 8, Iteration 600, loss = 0.4563
Checking accuracy on validation set
Got 837 / 1000 correct (83.70)

Epoch: 8, Iteration 700, loss = 0.6177
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

766
Epoch: 9, Iteration 0, loss = 0.3782
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 9, Iteration 100, loss = 0.4504
Checking accuracy on validation set
Got 822 / 1000 correct (82.20)

Epoch: 9, Iteration 200, loss = 0.4213
Checking accuracy on validation set
Got 837 / 1000 correct (83.70)

Epoch: 9, Iteration 300, loss = 0.6403
Checking accuracy on validation set
```

```
Got 808 / 1000 correct (80.80)

Epoch: 9, Iteration 400, loss = 0.4950
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 9, Iteration 500, loss = 0.5395
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 9, Iteration 600, loss = 0.5900
Checking accuracy on validation set
Got 816 / 1000 correct (81.60)

Epoch: 9, Iteration 700, loss = 0.7208
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

Checking accuracy on validation set
Got 784 / 1000 correct (78.40)
---- New lr = 0.00050 and weight_decay = 0.00074 ----
766
Epoch: 0, Iteration 0, loss = 2.9900
Checking accuracy on validation set
Got 93 / 1000 correct (9.30)

Epoch: 0, Iteration 100, loss = 2.2026
Checking accuracy on validation set
Got 385 / 1000 correct (38.50)

Epoch: 0, Iteration 200, loss = 1.5419
Checking accuracy on validation set
Got 441 / 1000 correct (44.10)

Epoch: 0, Iteration 300, loss = 1.3920
Checking accuracy on validation set
Got 434 / 1000 correct (43.40)

Epoch: 0, Iteration 400, loss = 1.5053
Checking accuracy on validation set
Got 525 / 1000 correct (52.50)

Epoch: 0, Iteration 500, loss = 1.2482
Checking accuracy on validation set
Got 492 / 1000 correct (49.20)

Epoch: 0, Iteration 600, loss = 1.1716
Checking accuracy on validation set
```

```
Got 580 / 1000 correct (58.00)

Epoch: 0, Iteration 700, loss = 1.1843
Checking accuracy on validation set
Got 585 / 1000 correct (58.50)

766
Epoch: 1, Iteration 0, loss = 1.2650
Checking accuracy on validation set
Got 631 / 1000 correct (63.10)

Epoch: 1, Iteration 100, loss = 1.3987
Checking accuracy on validation set
Got 623 / 1000 correct (62.30)

Epoch: 1, Iteration 200, loss = 1.1273
Checking accuracy on validation set
Got 661 / 1000 correct (66.10)

Epoch: 1, Iteration 300, loss = 1.1902
Checking accuracy on validation set
Got 651 / 1000 correct (65.10)

Epoch: 1, Iteration 400, loss = 0.9114
Checking accuracy on validation set
Got 655 / 1000 correct (65.50)

Epoch: 1, Iteration 500, loss = 1.0766
Checking accuracy on validation set
Got 678 / 1000 correct (67.80)

Epoch: 1, Iteration 600, loss = 0.8231
Checking accuracy on validation set
Got 667 / 1000 correct (66.70)

Epoch: 1, Iteration 700, loss = 1.1207
Checking accuracy on validation set
Got 698 / 1000 correct (69.80)

766
Epoch: 2, Iteration 0, loss = 1.0396
Checking accuracy on validation set
Got 716 / 1000 correct (71.60)

Epoch: 2, Iteration 100, loss = 0.8301
Checking accuracy on validation set
Got 744 / 1000 correct (74.40)
```

```
Epoch: 2, Iteration 200, loss = 0.5622
Checking accuracy on validation set
Got 697 / 1000 correct (69.70)

Epoch: 2, Iteration 300, loss = 0.9594
Checking accuracy on validation set
Got 725 / 1000 correct (72.50)

Epoch: 2, Iteration 400, loss = 0.7337
Checking accuracy on validation set
Got 697 / 1000 correct (69.70)

Epoch: 2, Iteration 500, loss = 0.6436
Checking accuracy on validation set
Got 760 / 1000 correct (76.00)

Epoch: 2, Iteration 600, loss = 0.8499
Checking accuracy on validation set
Got 723 / 1000 correct (72.30)

Epoch: 2, Iteration 700, loss = 0.6876
Checking accuracy on validation set
Got 731 / 1000 correct (73.10)

766
Epoch: 3, Iteration 0, loss = 0.6217
Checking accuracy on validation set
Got 756 / 1000 correct (75.60)

Epoch: 3, Iteration 100, loss = 0.7299
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)

Epoch: 3, Iteration 200, loss = 0.5290
Checking accuracy on validation set
Got 764 / 1000 correct (76.40)

Epoch: 3, Iteration 300, loss = 0.6067
Checking accuracy on validation set
Got 775 / 1000 correct (77.50)

Epoch: 3, Iteration 400, loss = 0.6803
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 3, Iteration 500, loss = 0.4996
Checking accuracy on validation set
Got 748 / 1000 correct (74.80)
```

```
Epoch: 3, Iteration 600, loss = 0.5941
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

Epoch: 3, Iteration 700, loss = 0.7592
Checking accuracy on validation set
Got 789 / 1000 correct (78.90)

766
Epoch: 4, Iteration 0, loss = 0.5923
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 4, Iteration 100, loss = 0.6799
Checking accuracy on validation set
Got 792 / 1000 correct (79.20)

Epoch: 4, Iteration 200, loss = 0.5093
Checking accuracy on validation set
Got 699 / 1000 correct (69.90)

Epoch: 4, Iteration 300, loss = 0.6285
Checking accuracy on validation set
Got 796 / 1000 correct (79.60)

Epoch: 4, Iteration 400, loss = 0.5999
Checking accuracy on validation set
Got 725 / 1000 correct (72.50)

Epoch: 4, Iteration 500, loss = 0.8450
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

Epoch: 4, Iteration 600, loss = 0.6552
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 4, Iteration 700, loss = 0.6284
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

766
Epoch: 5, Iteration 0, loss = 0.6110
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 5, Iteration 100, loss = 0.4533
```

```
Checking accuracy on validation set
Got 750 / 1000 correct (75.00)

Epoch: 5, Iteration 200, loss = 0.6417
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 5, Iteration 300, loss = 0.6912
Checking accuracy on validation set
Got 803 / 1000 correct (80.30)

Epoch: 5, Iteration 400, loss = 0.5965
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 5, Iteration 500, loss = 0.5194
Checking accuracy on validation set
Got 807 / 1000 correct (80.70)

Epoch: 5, Iteration 600, loss = 0.5114
Checking accuracy on validation set
Got 821 / 1000 correct (82.10)

Epoch: 5, Iteration 700, loss = 0.7473
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

766
Epoch: 6, Iteration 0, loss = 0.5990
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

Epoch: 6, Iteration 100, loss = 0.7416
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

Epoch: 6, Iteration 200, loss = 0.5837
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 6, Iteration 300, loss = 0.5577
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

Epoch: 6, Iteration 400, loss = 0.5457
Checking accuracy on validation set
Got 840 / 1000 correct (84.00)
```

```
Epoch: 6, Iteration 500, loss = 0.6175
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 6, Iteration 600, loss = 0.6260
Checking accuracy on validation set
Got 794 / 1000 correct (79.40)

Epoch: 6, Iteration 700, loss = 0.3134
Checking accuracy on validation set
Got 817 / 1000 correct (81.70)

766
Epoch: 7, Iteration 0, loss = 0.3607
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 7, Iteration 100, loss = 0.5121
Checking accuracy on validation set
Got 803 / 1000 correct (80.30)

Epoch: 7, Iteration 200, loss = 0.9030
Checking accuracy on validation set
Got 799 / 1000 correct (79.90)

Epoch: 7, Iteration 300, loss = 0.6064
Checking accuracy on validation set
Got 808 / 1000 correct (80.80)

Epoch: 7, Iteration 400, loss = 0.5213
Checking accuracy on validation set
Got 808 / 1000 correct (80.80)

Epoch: 7, Iteration 500, loss = 0.7041
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 7, Iteration 600, loss = 0.3822
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 7, Iteration 700, loss = 0.5971
Checking accuracy on validation set
Got 834 / 1000 correct (83.40)

766
Epoch: 8, Iteration 0, loss = 0.3462
Checking accuracy on validation set
```

```
Got 834 / 1000 correct (83.40)

Epoch: 8, Iteration 100, loss = 0.2971
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 8, Iteration 200, loss = 0.5118
Checking accuracy on validation set
Got 823 / 1000 correct (82.30)

Epoch: 8, Iteration 300, loss = 0.4683
Checking accuracy on validation set
Got 825 / 1000 correct (82.50)

Epoch: 8, Iteration 400, loss = 0.4492
Checking accuracy on validation set
Got 799 / 1000 correct (79.90)

Epoch: 8, Iteration 500, loss = 0.5109
Checking accuracy on validation set
Got 831 / 1000 correct (83.10)

Epoch: 8, Iteration 600, loss = 0.5005
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 8, Iteration 700, loss = 0.3625
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

766
Epoch: 9, Iteration 0, loss = 0.6624
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 9, Iteration 100, loss = 0.5690
Checking accuracy on validation set
Got 831 / 1000 correct (83.10)

Epoch: 9, Iteration 200, loss = 0.7475
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 9, Iteration 300, loss = 0.7934
Checking accuracy on validation set
Got 852 / 1000 correct (85.20)

Epoch: 9, Iteration 400, loss = 0.4027
```

```
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 9, Iteration 500, loss = 0.5645
Checking accuracy on validation set
Got 849 / 1000 correct (84.90)

Epoch: 9, Iteration 600, loss = 0.5980
Checking accuracy on validation set
Got 855 / 1000 correct (85.50)

Epoch: 9, Iteration 700, loss = 0.5367
Checking accuracy on validation set
Got 845 / 1000 correct (84.50)

Checking accuracy on validation set
Got 835 / 1000 correct (83.50)
---- New lr = 0.00051 and weight_decay = 0.00075 ----
766
Epoch: 0, Iteration 0, loss = 3.0983
Checking accuracy on validation set
Got 108 / 1000 correct (10.80)

Epoch: 0, Iteration 100, loss = 1.7051
Checking accuracy on validation set
Got 420 / 1000 correct (42.00)

Epoch: 0, Iteration 200, loss = 1.5716
Checking accuracy on validation set
Got 464 / 1000 correct (46.40)

Epoch: 0, Iteration 300, loss = 1.3148
Checking accuracy on validation set
Got 456 / 1000 correct (45.60)

Epoch: 0, Iteration 400, loss = 1.0571
Checking accuracy on validation set
Got 536 / 1000 correct (53.60)

Epoch: 0, Iteration 500, loss = 1.2714
Checking accuracy on validation set
Got 611 / 1000 correct (61.10)

Epoch: 0, Iteration 600, loss = 1.0131
Checking accuracy on validation set
Got 604 / 1000 correct (60.40)

Epoch: 0, Iteration 700, loss = 1.4530
```

```
Checking accuracy on validation set
Got 561 / 1000 correct (56.10)

766
Epoch: 1, Iteration 0, loss = 1.2481
Checking accuracy on validation set
Got 556 / 1000 correct (55.60)

Epoch: 1, Iteration 100, loss = 1.1219
Checking accuracy on validation set
Got 654 / 1000 correct (65.40)

Epoch: 1, Iteration 200, loss = 1.1604
Checking accuracy on validation set
Got 606 / 1000 correct (60.60)

Epoch: 1, Iteration 300, loss = 0.9005
Checking accuracy on validation set
Got 694 / 1000 correct (69.40)

Epoch: 1, Iteration 400, loss = 0.8375
Checking accuracy on validation set
Got 718 / 1000 correct (71.80)

Epoch: 1, Iteration 500, loss = 1.0693
Checking accuracy on validation set
Got 669 / 1000 correct (66.90)

Epoch: 1, Iteration 600, loss = 1.0741
Checking accuracy on validation set
Got 676 / 1000 correct (67.60)

Epoch: 1, Iteration 700, loss = 0.8250
Checking accuracy on validation set
Got 721 / 1000 correct (72.10)

766
Epoch: 2, Iteration 0, loss = 0.8854
Checking accuracy on validation set
Got 719 / 1000 correct (71.90)

Epoch: 2, Iteration 100, loss = 0.9415
Checking accuracy on validation set
Got 708 / 1000 correct (70.80)

Epoch: 2, Iteration 200, loss = 0.7790
Checking accuracy on validation set
Got 673 / 1000 correct (67.30)
```

```
Epoch: 2, Iteration 300, loss = 0.7506
Checking accuracy on validation set
Got 704 / 1000 correct (70.40)

Epoch: 2, Iteration 400, loss = 0.5354
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

Epoch: 2, Iteration 500, loss = 0.6427
Checking accuracy on validation set
Got 707 / 1000 correct (70.70)

Epoch: 2, Iteration 600, loss = 0.9203
Checking accuracy on validation set
Got 706 / 1000 correct (70.60)

Epoch: 2, Iteration 700, loss = 0.6959
Checking accuracy on validation set
Got 760 / 1000 correct (76.00)

766
Epoch: 3, Iteration 0, loss = 0.8380
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 3, Iteration 100, loss = 0.6226
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 3, Iteration 200, loss = 0.5761
Checking accuracy on validation set
Got 788 / 1000 correct (78.80)

Epoch: 3, Iteration 300, loss = 0.6658
Checking accuracy on validation set
Got 742 / 1000 correct (74.20)

Epoch: 3, Iteration 400, loss = 0.5191
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

Epoch: 3, Iteration 500, loss = 0.5908
Checking accuracy on validation set
Got 761 / 1000 correct (76.10)

Epoch: 3, Iteration 600, loss = 0.6046
Checking accuracy on validation set
```

```
Got 767 / 1000 correct (76.70)

Epoch: 3, Iteration 700, loss = 0.6939
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)

766
Epoch: 4, Iteration 0, loss = 0.5852
Checking accuracy on validation set
Got 787 / 1000 correct (78.70)

Epoch: 4, Iteration 100, loss = 0.6786
Checking accuracy on validation set
Got 771 / 1000 correct (77.10)

Epoch: 4, Iteration 200, loss = 0.5774
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

Epoch: 4, Iteration 300, loss = 0.5768
Checking accuracy on validation set
Got 785 / 1000 correct (78.50)

Epoch: 4, Iteration 400, loss = 0.7820
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

Epoch: 4, Iteration 500, loss = 0.6224
Checking accuracy on validation set
Got 799 / 1000 correct (79.90)

Epoch: 4, Iteration 600, loss = 0.5407
Checking accuracy on validation set
Got 787 / 1000 correct (78.70)

Epoch: 4, Iteration 700, loss = 0.5748
Checking accuracy on validation set
Got 762 / 1000 correct (76.20)

766
Epoch: 5, Iteration 0, loss = 0.6400
Checking accuracy on validation set
Got 792 / 1000 correct (79.20)

Epoch: 5, Iteration 100, loss = 0.4682
Checking accuracy on validation set
Got 777 / 1000 correct (77.70)
```

```
Epoch: 5, Iteration 200, loss = 0.5524
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

Epoch: 5, Iteration 300, loss = 0.6756
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 5, Iteration 400, loss = 0.5301
Checking accuracy on validation set
Got 788 / 1000 correct (78.80)

Epoch: 5, Iteration 500, loss = 0.5190
Checking accuracy on validation set
Got 805 / 1000 correct (80.50)

Epoch: 5, Iteration 600, loss = 0.5214
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 5, Iteration 700, loss = 0.4764
Checking accuracy on validation set
Got 828 / 1000 correct (82.80)

766
Epoch: 6, Iteration 0, loss = 0.5956
Checking accuracy on validation set
Got 803 / 1000 correct (80.30)

Epoch: 6, Iteration 100, loss = 0.7601
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

Epoch: 6, Iteration 200, loss = 0.5999
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 6, Iteration 300, loss = 0.6388
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

Epoch: 6, Iteration 400, loss = 0.6397
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Epoch: 6, Iteration 500, loss = 0.6234
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)
```

```
Epoch: 6, Iteration 600, loss = 0.4905
Checking accuracy on validation set
Got 826 / 1000 correct (82.60)

Epoch: 6, Iteration 700, loss = 0.4038
Checking accuracy on validation set
Got 789 / 1000 correct (78.90)

766
Epoch: 7, Iteration 0, loss = 0.5944
Checking accuracy on validation set
Got 805 / 1000 correct (80.50)

Epoch: 7, Iteration 100, loss = 0.5494
Checking accuracy on validation set
Got 840 / 1000 correct (84.00)

Epoch: 7, Iteration 200, loss = 0.5485
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

Epoch: 7, Iteration 300, loss = 0.6186
Checking accuracy on validation set
Got 811 / 1000 correct (81.10)

Epoch: 7, Iteration 400, loss = 0.5281
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 7, Iteration 500, loss = 0.5067
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 7, Iteration 600, loss = 0.4757
Checking accuracy on validation set
Got 832 / 1000 correct (83.20)

Epoch: 7, Iteration 700, loss = 0.5740
Checking accuracy on validation set
Got 805 / 1000 correct (80.50)

766
Epoch: 8, Iteration 0, loss = 0.4340
Checking accuracy on validation set
Got 808 / 1000 correct (80.80)

Epoch: 8, Iteration 100, loss = 0.7337
```

```
Checking accuracy on validation set
Got 822 / 1000 correct (82.20)

Epoch: 8, Iteration 200, loss = 0.4004
Checking accuracy on validation set
Got 814 / 1000 correct (81.40)

Epoch: 8, Iteration 300, loss = 0.5963
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Epoch: 8, Iteration 400, loss = 0.3859
Checking accuracy on validation set
Got 836 / 1000 correct (83.60)

Epoch: 8, Iteration 500, loss = 0.4326
Checking accuracy on validation set
Got 817 / 1000 correct (81.70)

Epoch: 8, Iteration 600, loss = 0.8595
Checking accuracy on validation set
Got 837 / 1000 correct (83.70)

Epoch: 8, Iteration 700, loss = 0.5769
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

766
Epoch: 9, Iteration 0, loss = 0.6562
Checking accuracy on validation set
Got 752 / 1000 correct (75.20)

Epoch: 9, Iteration 100, loss = 0.6340
Checking accuracy on validation set
Got 844 / 1000 correct (84.40)

Epoch: 9, Iteration 200, loss = 0.5386
Checking accuracy on validation set
Got 828 / 1000 correct (82.80)

Epoch: 9, Iteration 300, loss = 0.4806
Checking accuracy on validation set
Got 817 / 1000 correct (81.70)

Epoch: 9, Iteration 400, loss = 0.4095
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)
```

```
Epoch: 9, Iteration 500, loss = 0.5529
Checking accuracy on validation set
Got 846 / 1000 correct (84.60)

Epoch: 9, Iteration 600, loss = 0.5816
Checking accuracy on validation set
Got 845 / 1000 correct (84.50)

Epoch: 9, Iteration 700, loss = 0.4187
Checking accuracy on validation set
Got 837 / 1000 correct (83.70)

Checking accuracy on validation set
Got 814 / 1000 correct (81.40)
---- New lr = 0.00051 and weight_decay = 0.00097 ----
766
Epoch: 0, Iteration 0, loss = 3.1594
Checking accuracy on validation set
Got 119 / 1000 correct (11.90)

Epoch: 0, Iteration 100, loss = 1.5933
Checking accuracy on validation set
Got 339 / 1000 correct (33.90)

Epoch: 0, Iteration 200, loss = 1.6613
Checking accuracy on validation set
Got 453 / 1000 correct (45.30)

Epoch: 0, Iteration 300, loss = 1.4392
Checking accuracy on validation set
Got 489 / 1000 correct (48.90)

Epoch: 0, Iteration 400, loss = 1.3757
Checking accuracy on validation set
Got 533 / 1000 correct (53.30)

Epoch: 0, Iteration 500, loss = 1.2997
Checking accuracy on validation set
Got 555 / 1000 correct (55.50)

Epoch: 0, Iteration 600, loss = 1.3592
Checking accuracy on validation set
Got 592 / 1000 correct (59.20)

Epoch: 0, Iteration 700, loss = 1.1877
Checking accuracy on validation set
Got 568 / 1000 correct (56.80)
```

```
766
Epoch: 1, Iteration 0, loss = 1.0762
Checking accuracy on validation set
Got 598 / 1000 correct (59.80)

Epoch: 1, Iteration 100, loss = 1.1156
Checking accuracy on validation set
Got 605 / 1000 correct (60.50)

Epoch: 1, Iteration 200, loss = 1.0227
Checking accuracy on validation set
Got 605 / 1000 correct (60.50)

Epoch: 1, Iteration 300, loss = 1.0193
Checking accuracy on validation set
Got 594 / 1000 correct (59.40)

Epoch: 1, Iteration 400, loss = 0.9157
Checking accuracy on validation set
Got 644 / 1000 correct (64.40)

Epoch: 1, Iteration 500, loss = 1.0235
Checking accuracy on validation set
Got 619 / 1000 correct (61.90)

Epoch: 1, Iteration 600, loss = 0.9720
Checking accuracy on validation set
Got 697 / 1000 correct (69.70)

Epoch: 1, Iteration 700, loss = 1.1894
Checking accuracy on validation set
Got 665 / 1000 correct (66.50)

766
Epoch: 2, Iteration 0, loss = 0.7986
Checking accuracy on validation set
Got 704 / 1000 correct (70.40)

Epoch: 2, Iteration 100, loss = 0.6674
Checking accuracy on validation set
Got 729 / 1000 correct (72.90)

Epoch: 2, Iteration 200, loss = 0.9065
Checking accuracy on validation set
Got 697 / 1000 correct (69.70)

Epoch: 2, Iteration 300, loss = 0.8165
Checking accuracy on validation set
```

```
Got 691 / 1000 correct (69.10)

Epoch: 2, Iteration 400, loss = 0.6364
Checking accuracy on validation set
Got 730 / 1000 correct (73.00)

Epoch: 2, Iteration 500, loss = 0.7128
Checking accuracy on validation set
Got 724 / 1000 correct (72.40)

Epoch: 2, Iteration 600, loss = 0.7546
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

Epoch: 2, Iteration 700, loss = 0.7555
Checking accuracy on validation set
Got 755 / 1000 correct (75.50)

766
Epoch: 3, Iteration 0, loss = 0.9789
Checking accuracy on validation set
Got 717 / 1000 correct (71.70)

Epoch: 3, Iteration 100, loss = 0.6425
Checking accuracy on validation set
Got 682 / 1000 correct (68.20)

Epoch: 3, Iteration 200, loss = 0.4944
Checking accuracy on validation set
Got 761 / 1000 correct (76.10)

Epoch: 3, Iteration 300, loss = 0.8772
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 3, Iteration 400, loss = 0.6425
Checking accuracy on validation set
Got 735 / 1000 correct (73.50)

Epoch: 3, Iteration 500, loss = 0.8637
Checking accuracy on validation set
Got 754 / 1000 correct (75.40)

Epoch: 3, Iteration 600, loss = 0.5974
Checking accuracy on validation set
Got 746 / 1000 correct (74.60)

Epoch: 3, Iteration 700, loss = 0.5531
```

```
Checking accuracy on validation set
Got 769 / 1000 correct (76.90)

766
Epoch: 4, Iteration 0, loss = 0.5518
Checking accuracy on validation set
Got 686 / 1000 correct (68.60)

Epoch: 4, Iteration 100, loss = 0.6001
Checking accuracy on validation set
Got 788 / 1000 correct (78.80)

Epoch: 4, Iteration 200, loss = 0.5977
Checking accuracy on validation set
Got 793 / 1000 correct (79.30)

Epoch: 4, Iteration 300, loss = 0.8598
Checking accuracy on validation set
Got 741 / 1000 correct (74.10)

Epoch: 4, Iteration 400, loss = 0.6167
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 4, Iteration 500, loss = 0.5918
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

Epoch: 4, Iteration 600, loss = 0.5196
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 4, Iteration 700, loss = 0.5925
Checking accuracy on validation set
Got 787 / 1000 correct (78.70)

766
Epoch: 5, Iteration 0, loss = 0.5271
Checking accuracy on validation set
Got 805 / 1000 correct (80.50)

Epoch: 5, Iteration 100, loss = 0.6188
Checking accuracy on validation set
Got 749 / 1000 correct (74.90)

Epoch: 5, Iteration 200, loss = 0.7416
Checking accuracy on validation set
Got 785 / 1000 correct (78.50)
```

```
Epoch: 5, Iteration 300, loss = 0.6546
Checking accuracy on validation set
Got 722 / 1000 correct (72.20)

Epoch: 5, Iteration 400, loss = 0.5793
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

Epoch: 5, Iteration 500, loss = 0.7126
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 5, Iteration 600, loss = 0.7926
Checking accuracy on validation set
Got 808 / 1000 correct (80.80)

Epoch: 5, Iteration 700, loss = 0.5117
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

766
Epoch: 6, Iteration 0, loss = 0.5511
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

Epoch: 6, Iteration 100, loss = 0.5697
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 6, Iteration 200, loss = 0.6638
Checking accuracy on validation set
Got 793 / 1000 correct (79.30)

Epoch: 6, Iteration 300, loss = 0.5790
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 6, Iteration 400, loss = 0.5849
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 6, Iteration 500, loss = 0.8372
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 6, Iteration 600, loss = 0.4263
Checking accuracy on validation set
```

```
Got 818 / 1000 correct (81.80)

Epoch: 6, Iteration 700, loss = 0.4212
Checking accuracy on validation set
Got 828 / 1000 correct (82.80)

766
Epoch: 7, Iteration 0, loss = 0.5369
Checking accuracy on validation set
Got 832 / 1000 correct (83.20)

Epoch: 7, Iteration 100, loss = 0.3156
Checking accuracy on validation set
Got 827 / 1000 correct (82.70)

Epoch: 7, Iteration 200, loss = 0.7106
Checking accuracy on validation set
Got 841 / 1000 correct (84.10)

Epoch: 7, Iteration 300, loss = 0.6470
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 7, Iteration 400, loss = 0.4659
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Epoch: 7, Iteration 500, loss = 0.4866
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 7, Iteration 600, loss = 0.5374
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

Epoch: 7, Iteration 700, loss = 0.5527
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

766
Epoch: 8, Iteration 0, loss = 0.5973
Checking accuracy on validation set
Got 767 / 1000 correct (76.70)

Epoch: 8, Iteration 100, loss = 0.7957
Checking accuracy on validation set
Got 842 / 1000 correct (84.20)
```

```
Epoch: 8, Iteration 200, loss = 0.3198
Checking accuracy on validation set
Got 794 / 1000 correct (79.40)

Epoch: 8, Iteration 300, loss = 0.6724
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

Epoch: 8, Iteration 400, loss = 0.5941
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

Epoch: 8, Iteration 500, loss = 0.7354
Checking accuracy on validation set
Got 838 / 1000 correct (83.80)

Epoch: 8, Iteration 600, loss = 0.6024
Checking accuracy on validation set
Got 840 / 1000 correct (84.00)

Epoch: 8, Iteration 700, loss = 0.5895
Checking accuracy on validation set
Got 860 / 1000 correct (86.00)

766
Epoch: 9, Iteration 0, loss = 0.6464
Checking accuracy on validation set
Got 835 / 1000 correct (83.50)

Epoch: 9, Iteration 100, loss = 0.4896
Checking accuracy on validation set
Got 809 / 1000 correct (80.90)

Epoch: 9, Iteration 200, loss = 0.3090
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 9, Iteration 300, loss = 0.2924
Checking accuracy on validation set
Got 811 / 1000 correct (81.10)

Epoch: 9, Iteration 400, loss = 0.4450
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

Epoch: 9, Iteration 500, loss = 0.4467
Checking accuracy on validation set
Got 826 / 1000 correct (82.60)
```

```
Epoch: 9, Iteration 600, loss = 0.4059
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 9, Iteration 700, loss = 0.5869
Checking accuracy on validation set
Got 831 / 1000 correct (83.10)

Checking accuracy on validation set
Got 853 / 1000 correct (85.30)
---- New lr = 0.00050 and weight_decay = 0.00091 ----
766
Epoch: 0, Iteration 0, loss = 3.5292
Checking accuracy on validation set
Got 99 / 1000 correct (9.90)

Epoch: 0, Iteration 100, loss = 1.7849
Checking accuracy on validation set
Got 401 / 1000 correct (40.10)

Epoch: 0, Iteration 200, loss = 1.5000
Checking accuracy on validation set
Got 441 / 1000 correct (44.10)

Epoch: 0, Iteration 300, loss = 1.1252
Checking accuracy on validation set
Got 483 / 1000 correct (48.30)

Epoch: 0, Iteration 400, loss = 1.2558
Checking accuracy on validation set
Got 527 / 1000 correct (52.70)

Epoch: 0, Iteration 500, loss = 1.2677
Checking accuracy on validation set
Got 512 / 1000 correct (51.20)

Epoch: 0, Iteration 600, loss = 1.1492
Checking accuracy on validation set
Got 555 / 1000 correct (55.50)

Epoch: 0, Iteration 700, loss = 0.9287
Checking accuracy on validation set
Got 597 / 1000 correct (59.70)

766
Epoch: 1, Iteration 0, loss = 0.9018
Checking accuracy on validation set
```

```
Got 601 / 1000 correct (60.10)

Epoch: 1, Iteration 100, loss = 1.0772
Checking accuracy on validation set
Got 642 / 1000 correct (64.20)

Epoch: 1, Iteration 200, loss = 1.2542
Checking accuracy on validation set
Got 645 / 1000 correct (64.50)

Epoch: 1, Iteration 300, loss = 1.0525
Checking accuracy on validation set
Got 654 / 1000 correct (65.40)

Epoch: 1, Iteration 400, loss = 1.0601
Checking accuracy on validation set
Got 659 / 1000 correct (65.90)

Epoch: 1, Iteration 500, loss = 0.8084
Checking accuracy on validation set
Got 685 / 1000 correct (68.50)

Epoch: 1, Iteration 600, loss = 0.9537
Checking accuracy on validation set
Got 724 / 1000 correct (72.40)

Epoch: 1, Iteration 700, loss = 0.7780
Checking accuracy on validation set
Got 700 / 1000 correct (70.00)

766
Epoch: 2, Iteration 0, loss = 0.9292
Checking accuracy on validation set
Got 702 / 1000 correct (70.20)

Epoch: 2, Iteration 100, loss = 0.7438
Checking accuracy on validation set
Got 754 / 1000 correct (75.40)

Epoch: 2, Iteration 200, loss = 1.0062
Checking accuracy on validation set
Got 709 / 1000 correct (70.90)

Epoch: 2, Iteration 300, loss = 0.6028
Checking accuracy on validation set
Got 759 / 1000 correct (75.90)

Epoch: 2, Iteration 400, loss = 0.9864
```

```
Checking accuracy on validation set
Got 698 / 1000 correct (69.80)

Epoch: 2, Iteration 500, loss = 0.7675
Checking accuracy on validation set
Got 703 / 1000 correct (70.30)

Epoch: 2, Iteration 600, loss = 0.8466
Checking accuracy on validation set
Got 754 / 1000 correct (75.40)

Epoch: 2, Iteration 700, loss = 0.8401
Checking accuracy on validation set
Got 756 / 1000 correct (75.60)

766
Epoch: 3, Iteration 0, loss = 0.9811
Checking accuracy on validation set
Got 750 / 1000 correct (75.00)

Epoch: 3, Iteration 100, loss = 0.4526
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 3, Iteration 200, loss = 0.6802
Checking accuracy on validation set
Got 738 / 1000 correct (73.80)

Epoch: 3, Iteration 300, loss = 0.5794
Checking accuracy on validation set
Got 768 / 1000 correct (76.80)

Epoch: 3, Iteration 400, loss = 0.8341
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

Epoch: 3, Iteration 500, loss = 0.8173
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 3, Iteration 600, loss = 0.8851
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 3, Iteration 700, loss = 0.8478
Checking accuracy on validation set
Got 762 / 1000 correct (76.20)
```

```
766
Epoch: 4, Iteration 0, loss = 0.6617
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 4, Iteration 100, loss = 0.7000
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

Epoch: 4, Iteration 200, loss = 0.6212
Checking accuracy on validation set
Got 789 / 1000 correct (78.90)

Epoch: 4, Iteration 300, loss = 0.7232
Checking accuracy on validation set
Got 754 / 1000 correct (75.40)

Epoch: 4, Iteration 400, loss = 0.8025
Checking accuracy on validation set
Got 805 / 1000 correct (80.50)

Epoch: 4, Iteration 500, loss = 0.6613
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 4, Iteration 600, loss = 0.6481
Checking accuracy on validation set
Got 758 / 1000 correct (75.80)

Epoch: 4, Iteration 700, loss = 0.9401
Checking accuracy on validation set
Got 753 / 1000 correct (75.30)

766
Epoch: 5, Iteration 0, loss = 0.5713
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 5, Iteration 100, loss = 0.6121
Checking accuracy on validation set
Got 789 / 1000 correct (78.90)

Epoch: 5, Iteration 200, loss = 0.6714
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

Epoch: 5, Iteration 300, loss = 0.5078
Checking accuracy on validation set
```

```
Got 801 / 1000 correct (80.10)

Epoch: 5, Iteration 400, loss = 0.7692
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

Epoch: 5, Iteration 500, loss = 0.7845
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 5, Iteration 600, loss = 0.5401
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 5, Iteration 700, loss = 0.3791
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

766
Epoch: 6, Iteration 0, loss = 0.5391
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 6, Iteration 100, loss = 0.5360
Checking accuracy on validation set
Got 814 / 1000 correct (81.40)

Epoch: 6, Iteration 200, loss = 0.3402
Checking accuracy on validation set
Got 808 / 1000 correct (80.80)

Epoch: 6, Iteration 300, loss = 0.8290
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 6, Iteration 400, loss = 0.6662
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 6, Iteration 500, loss = 0.5482
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 6, Iteration 600, loss = 0.7195
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 6, Iteration 700, loss = 0.5386
```

```
Checking accuracy on validation set
Got 834 / 1000 correct (83.40)

766
Epoch: 7, Iteration 0, loss = 0.4818
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)

Epoch: 7, Iteration 100, loss = 0.4594
Checking accuracy on validation set
Got 843 / 1000 correct (84.30)

Epoch: 7, Iteration 200, loss = 0.6278
Checking accuracy on validation set
Got 831 / 1000 correct (83.10)

Epoch: 7, Iteration 300, loss = 0.4539
Checking accuracy on validation set
Got 785 / 1000 correct (78.50)

Epoch: 7, Iteration 400, loss = 0.7451
Checking accuracy on validation set
Got 771 / 1000 correct (77.10)

Epoch: 7, Iteration 500, loss = 0.5179
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 7, Iteration 600, loss = 0.5149
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 7, Iteration 700, loss = 0.5291
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

766
Epoch: 8, Iteration 0, loss = 0.8229
Checking accuracy on validation set
Got 834 / 1000 correct (83.40)

Epoch: 8, Iteration 100, loss = 0.4574
Checking accuracy on validation set
Got 841 / 1000 correct (84.10)

Epoch: 8, Iteration 200, loss = 0.4412
Checking accuracy on validation set
Got 821 / 1000 correct (82.10)
```

```
Epoch: 8, Iteration 300, loss = 0.6149
Checking accuracy on validation set
Got 827 / 1000 correct (82.70)

Epoch: 8, Iteration 400, loss = 0.5153
Checking accuracy on validation set
Got 836 / 1000 correct (83.60)

Epoch: 8, Iteration 500, loss = 0.5199
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

Epoch: 8, Iteration 600, loss = 0.5540
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Epoch: 8, Iteration 700, loss = 0.3660
Checking accuracy on validation set
Got 817 / 1000 correct (81.70)

766
Epoch: 9, Iteration 0, loss = 0.5438
Checking accuracy on validation set
Got 730 / 1000 correct (73.00)

Epoch: 9, Iteration 100, loss = 0.3687
Checking accuracy on validation set
Got 828 / 1000 correct (82.80)

Epoch: 9, Iteration 200, loss = 0.3749
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

Epoch: 9, Iteration 300, loss = 0.4254
Checking accuracy on validation set
Got 832 / 1000 correct (83.20)

Epoch: 9, Iteration 400, loss = 0.3552
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Epoch: 9, Iteration 500, loss = 0.3540
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Epoch: 9, Iteration 600, loss = 0.4388
Checking accuracy on validation set
```

```
Got 804 / 1000 correct (80.40)

Epoch: 9, Iteration 700, loss = 0.4890
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Checking accuracy on validation set
Got 847 / 1000 correct (84.70)
---- New lr = 0.00050 and weight_decay = 0.00082 ----
766
Epoch: 0, Iteration 0, loss = 3.9432
Checking accuracy on validation set
Got 93 / 1000 correct (9.30)

Epoch: 0, Iteration 100, loss = 1.7274
Checking accuracy on validation set
Got 361 / 1000 correct (36.10)

Epoch: 0, Iteration 200, loss = 1.6559
Checking accuracy on validation set
Got 465 / 1000 correct (46.50)

Epoch: 0, Iteration 300, loss = 1.4980
Checking accuracy on validation set
Got 463 / 1000 correct (46.30)

Epoch: 0, Iteration 400, loss = 1.3796
Checking accuracy on validation set
Got 529 / 1000 correct (52.90)

Epoch: 0, Iteration 500, loss = 1.4555
Checking accuracy on validation set
Got 507 / 1000 correct (50.70)

Epoch: 0, Iteration 600, loss = 1.2790
Checking accuracy on validation set
Got 588 / 1000 correct (58.80)

Epoch: 0, Iteration 700, loss = 1.1431
Checking accuracy on validation set
Got 564 / 1000 correct (56.40)

766
Epoch: 1, Iteration 0, loss = 1.1642
Checking accuracy on validation set
Got 588 / 1000 correct (58.80)

Epoch: 1, Iteration 100, loss = 1.1614
```

```
Checking accuracy on validation set
Got 596 / 1000 correct (59.60)

Epoch: 1, Iteration 200, loss = 0.9741
Checking accuracy on validation set
Got 625 / 1000 correct (62.50)

Epoch: 1, Iteration 300, loss = 1.0658
Checking accuracy on validation set
Got 656 / 1000 correct (65.60)

Epoch: 1, Iteration 400, loss = 0.9641
Checking accuracy on validation set
Got 656 / 1000 correct (65.60)

Epoch: 1, Iteration 500, loss = 1.2149
Checking accuracy on validation set
Got 678 / 1000 correct (67.80)

Epoch: 1, Iteration 600, loss = 0.9369
Checking accuracy on validation set
Got 689 / 1000 correct (68.90)

Epoch: 1, Iteration 700, loss = 0.9825
Checking accuracy on validation set
Got 669 / 1000 correct (66.90)

766
Epoch: 2, Iteration 0, loss = 1.0409
Checking accuracy on validation set
Got 691 / 1000 correct (69.10)

Epoch: 2, Iteration 100, loss = 1.0830
Checking accuracy on validation set
Got 707 / 1000 correct (70.70)

Epoch: 2, Iteration 200, loss = 0.8835
Checking accuracy on validation set
Got 719 / 1000 correct (71.90)

Epoch: 2, Iteration 300, loss = 1.1544
Checking accuracy on validation set
Got 672 / 1000 correct (67.20)

Epoch: 2, Iteration 400, loss = 0.4849
Checking accuracy on validation set
Got 734 / 1000 correct (73.40)
```

```
Epoch: 2, Iteration 500, loss = 0.6828
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 2, Iteration 600, loss = 0.9992
Checking accuracy on validation set
Got 748 / 1000 correct (74.80)

Epoch: 2, Iteration 700, loss = 1.0991
Checking accuracy on validation set
Got 716 / 1000 correct (71.60)

766
Epoch: 3, Iteration 0, loss = 0.7112
Checking accuracy on validation set
Got 781 / 1000 correct (78.10)

Epoch: 3, Iteration 100, loss = 0.6186
Checking accuracy on validation set
Got 697 / 1000 correct (69.70)

Epoch: 3, Iteration 200, loss = 1.0166
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 3, Iteration 300, loss = 0.4893
Checking accuracy on validation set
Got 766 / 1000 correct (76.60)

Epoch: 3, Iteration 400, loss = 0.6277
Checking accuracy on validation set
Got 758 / 1000 correct (75.80)

Epoch: 3, Iteration 500, loss = 0.5451
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)

Epoch: 3, Iteration 600, loss = 0.7836
Checking accuracy on validation set
Got 772 / 1000 correct (77.20)

Epoch: 3, Iteration 700, loss = 0.8119
Checking accuracy on validation set
Got 753 / 1000 correct (75.30)

766
Epoch: 4, Iteration 0, loss = 0.6852
Checking accuracy on validation set
```

```
Got 743 / 1000 correct (74.30)

Epoch: 4, Iteration 100, loss = 0.6550
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 4, Iteration 200, loss = 0.5477
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 4, Iteration 300, loss = 0.5926
Checking accuracy on validation set
Got 771 / 1000 correct (77.10)

Epoch: 4, Iteration 400, loss = 0.8370
Checking accuracy on validation set
Got 758 / 1000 correct (75.80)

Epoch: 4, Iteration 500, loss = 0.5467
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 4, Iteration 600, loss = 0.4604
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)

Epoch: 4, Iteration 700, loss = 0.7892
Checking accuracy on validation set
Got 785 / 1000 correct (78.50)

766
Epoch: 5, Iteration 0, loss = 0.7822
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 5, Iteration 100, loss = 0.8198
Checking accuracy on validation set
Got 746 / 1000 correct (74.60)

Epoch: 5, Iteration 200, loss = 0.5756
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

Epoch: 5, Iteration 300, loss = 0.6554
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 5, Iteration 400, loss = 0.7153
```

```
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 5, Iteration 500, loss = 0.6718
Checking accuracy on validation set
Got 771 / 1000 correct (77.10)

Epoch: 5, Iteration 600, loss = 0.5048
Checking accuracy on validation set
Got 804 / 1000 correct (80.40)

Epoch: 5, Iteration 700, loss = 0.6823
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

766
Epoch: 6, Iteration 0, loss = 0.6810
Checking accuracy on validation set
Got 817 / 1000 correct (81.70)

Epoch: 6, Iteration 100, loss = 0.4934
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 6, Iteration 200, loss = 0.7071
Checking accuracy on validation set
Got 741 / 1000 correct (74.10)

Epoch: 6, Iteration 300, loss = 0.5266
Checking accuracy on validation set
Got 793 / 1000 correct (79.30)

Epoch: 6, Iteration 400, loss = 0.6158
Checking accuracy on validation set
Got 822 / 1000 correct (82.20)

Epoch: 6, Iteration 500, loss = 0.5155
Checking accuracy on validation set
Got 807 / 1000 correct (80.70)

Epoch: 6, Iteration 600, loss = 0.4234
Checking accuracy on validation set
Got 768 / 1000 correct (76.80)

Epoch: 6, Iteration 700, loss = 0.3946
Checking accuracy on validation set
Got 826 / 1000 correct (82.60)
```

```
766
Epoch: 7, Iteration 0, loss = 0.4830
Checking accuracy on validation set
Got 777 / 1000 correct (77.70)

Epoch: 7, Iteration 100, loss = 0.6948
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

Epoch: 7, Iteration 200, loss = 0.5233
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Epoch: 7, Iteration 300, loss = 0.5337
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

Epoch: 7, Iteration 400, loss = 0.5247
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 7, Iteration 500, loss = 0.5005
Checking accuracy on validation set
Got 834 / 1000 correct (83.40)

Epoch: 7, Iteration 600, loss = 0.4929
Checking accuracy on validation set
Got 841 / 1000 correct (84.10)

Epoch: 7, Iteration 700, loss = 0.6678
Checking accuracy on validation set
Got 789 / 1000 correct (78.90)

766
Epoch: 8, Iteration 0, loss = 0.7033
Checking accuracy on validation set
Got 828 / 1000 correct (82.80)

Epoch: 8, Iteration 100, loss = 0.4644
Checking accuracy on validation set
Got 827 / 1000 correct (82.70)

Epoch: 8, Iteration 200, loss = 0.3878
Checking accuracy on validation set
Got 825 / 1000 correct (82.50)

Epoch: 8, Iteration 300, loss = 0.5264
Checking accuracy on validation set
```

```
Got 811 / 1000 correct (81.10)

Epoch: 8, Iteration 400, loss = 0.5193
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 8, Iteration 500, loss = 0.6293
Checking accuracy on validation set
Got 834 / 1000 correct (83.40)

Epoch: 8, Iteration 600, loss = 0.5938
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

Epoch: 8, Iteration 700, loss = 0.3853
Checking accuracy on validation set
Got 858 / 1000 correct (85.80)

766
Epoch: 9, Iteration 0, loss = 0.2763
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 9, Iteration 100, loss = 0.3056
Checking accuracy on validation set
Got 804 / 1000 correct (80.40)

Epoch: 9, Iteration 200, loss = 0.4894
Checking accuracy on validation set
Got 828 / 1000 correct (82.80)

Epoch: 9, Iteration 300, loss = 0.5017
Checking accuracy on validation set
Got 844 / 1000 correct (84.40)

Epoch: 9, Iteration 400, loss = 0.4624
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

Epoch: 9, Iteration 500, loss = 0.7533
Checking accuracy on validation set
Got 850 / 1000 correct (85.00)

Epoch: 9, Iteration 600, loss = 0.3735
Checking accuracy on validation set
Got 849 / 1000 correct (84.90)

Epoch: 9, Iteration 700, loss = 0.4570
```

```
Checking accuracy on validation set
Got 832 / 1000 correct (83.20)

Checking accuracy on validation set
Got 814 / 1000 correct (81.40)
---- New lr = 0.00055 and weight_decay = 0.00098 ----
766
Epoch: 0, Iteration 0, loss = 3.3854
Checking accuracy on validation set
Got 116 / 1000 correct (11.60)

Epoch: 0, Iteration 100, loss = 1.6567
Checking accuracy on validation set
Got 363 / 1000 correct (36.30)

Epoch: 0, Iteration 200, loss = 1.4229
Checking accuracy on validation set
Got 389 / 1000 correct (38.90)

Epoch: 0, Iteration 300, loss = 1.5334
Checking accuracy on validation set
Got 471 / 1000 correct (47.10)

Epoch: 0, Iteration 400, loss = 1.4760
Checking accuracy on validation set
Got 506 / 1000 correct (50.60)

Epoch: 0, Iteration 500, loss = 1.1962
Checking accuracy on validation set
Got 533 / 1000 correct (53.30)

Epoch: 0, Iteration 600, loss = 1.2452
Checking accuracy on validation set
Got 558 / 1000 correct (55.80)

Epoch: 0, Iteration 700, loss = 1.2508
Checking accuracy on validation set
Got 583 / 1000 correct (58.30)

766
Epoch: 1, Iteration 0, loss = 1.3188
Checking accuracy on validation set
Got 548 / 1000 correct (54.80)

Epoch: 1, Iteration 100, loss = 0.9639
Checking accuracy on validation set
Got 615 / 1000 correct (61.50)
```

```
Epoch: 1, Iteration 200, loss = 1.0628
Checking accuracy on validation set
Got 647 / 1000 correct (64.70)

Epoch: 1, Iteration 300, loss = 1.0704
Checking accuracy on validation set
Got 665 / 1000 correct (66.50)

Epoch: 1, Iteration 400, loss = 0.7760
Checking accuracy on validation set
Got 661 / 1000 correct (66.10)

Epoch: 1, Iteration 500, loss = 0.9646
Checking accuracy on validation set
Got 671 / 1000 correct (67.10)

Epoch: 1, Iteration 600, loss = 1.0256
Checking accuracy on validation set
Got 611 / 1000 correct (61.10)

Epoch: 1, Iteration 700, loss = 0.8378
Checking accuracy on validation set
Got 649 / 1000 correct (64.90)

766
Epoch: 2, Iteration 0, loss = 0.9279
Checking accuracy on validation set
Got 674 / 1000 correct (67.40)

Epoch: 2, Iteration 100, loss = 0.7689
Checking accuracy on validation set
Got 701 / 1000 correct (70.10)

Epoch: 2, Iteration 200, loss = 1.0087
Checking accuracy on validation set
Got 713 / 1000 correct (71.30)

Epoch: 2, Iteration 300, loss = 0.8847
Checking accuracy on validation set
Got 728 / 1000 correct (72.80)

Epoch: 2, Iteration 400, loss = 0.9505
Checking accuracy on validation set
Got 703 / 1000 correct (70.30)

Epoch: 2, Iteration 500, loss = 0.9368
Checking accuracy on validation set
Got 729 / 1000 correct (72.90)
```

```
Epoch: 2, Iteration 600, loss = 0.9765
Checking accuracy on validation set
Got 677 / 1000 correct (67.70)

Epoch: 2, Iteration 700, loss = 0.7841
Checking accuracy on validation set
Got 736 / 1000 correct (73.60)

766
Epoch: 3, Iteration 0, loss = 0.7116
Checking accuracy on validation set
Got 742 / 1000 correct (74.20)

Epoch: 3, Iteration 100, loss = 0.7271
Checking accuracy on validation set
Got 737 / 1000 correct (73.70)

Epoch: 3, Iteration 200, loss = 0.6250
Checking accuracy on validation set
Got 686 / 1000 correct (68.60)

Epoch: 3, Iteration 300, loss = 0.7341
Checking accuracy on validation set
Got 762 / 1000 correct (76.20)

Epoch: 3, Iteration 400, loss = 0.6676
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

Epoch: 3, Iteration 500, loss = 0.7619
Checking accuracy on validation set
Got 716 / 1000 correct (71.60)

Epoch: 3, Iteration 600, loss = 0.5638
Checking accuracy on validation set
Got 781 / 1000 correct (78.10)

Epoch: 3, Iteration 700, loss = 0.6864
Checking accuracy on validation set
Got 747 / 1000 correct (74.70)

766
Epoch: 4, Iteration 0, loss = 0.5565
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

Epoch: 4, Iteration 100, loss = 0.7806
```

```
Checking accuracy on validation set
Got 731 / 1000 correct (73.10)

Epoch: 4, Iteration 200, loss = 0.6519
Checking accuracy on validation set
Got 759 / 1000 correct (75.90)

Epoch: 4, Iteration 300, loss = 0.8548
Checking accuracy on validation set
Got 689 / 1000 correct (68.90)

Epoch: 4, Iteration 400, loss = 1.0225
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

Epoch: 4, Iteration 500, loss = 0.5555
Checking accuracy on validation set
Got 771 / 1000 correct (77.10)

Epoch: 4, Iteration 600, loss = 0.6534
Checking accuracy on validation set
Got 752 / 1000 correct (75.20)

Epoch: 4, Iteration 700, loss = 0.6509
Checking accuracy on validation set
Got 781 / 1000 correct (78.10)

766
Epoch: 5, Iteration 0, loss = 0.4907
Checking accuracy on validation set
Got 796 / 1000 correct (79.60)

Epoch: 5, Iteration 100, loss = 0.8136
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 5, Iteration 200, loss = 0.4548
Checking accuracy on validation set
Got 807 / 1000 correct (80.70)

Epoch: 5, Iteration 300, loss = 0.6562
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

Epoch: 5, Iteration 400, loss = 0.7857
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)
```

```
Epoch: 5, Iteration 500, loss = 0.7260
Checking accuracy on validation set
Got 809 / 1000 correct (80.90)

Epoch: 5, Iteration 600, loss = 0.5587
Checking accuracy on validation set
Got 746 / 1000 correct (74.60)

Epoch: 5, Iteration 700, loss = 0.5603
Checking accuracy on validation set
Got 767 / 1000 correct (76.70)

766
Epoch: 6, Iteration 0, loss = 0.3230
Checking accuracy on validation set
Got 763 / 1000 correct (76.30)

Epoch: 6, Iteration 100, loss = 0.6212
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

Epoch: 6, Iteration 200, loss = 0.5422
Checking accuracy on validation set
Got 809 / 1000 correct (80.90)

Epoch: 6, Iteration 300, loss = 0.5094
Checking accuracy on validation set
Got 789 / 1000 correct (78.90)

Epoch: 6, Iteration 400, loss = 0.5657
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 6, Iteration 500, loss = 0.5565
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)

Epoch: 6, Iteration 600, loss = 0.5747
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 6, Iteration 700, loss = 0.4881
Checking accuracy on validation set
Got 821 / 1000 correct (82.10)

766
Epoch: 7, Iteration 0, loss = 0.4859
Checking accuracy on validation set
```

```
Got 821 / 1000 correct (82.10)

Epoch: 7, Iteration 100, loss = 0.4174
Checking accuracy on validation set
Got 831 / 1000 correct (83.10)

Epoch: 7, Iteration 200, loss = 0.3539
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 7, Iteration 300, loss = 0.5127
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 7, Iteration 400, loss = 0.5854
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 7, Iteration 500, loss = 0.5352
Checking accuracy on validation set
Got 820 / 1000 correct (82.00)

Epoch: 7, Iteration 600, loss = 0.3682
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 7, Iteration 700, loss = 0.5187
Checking accuracy on validation set
Got 804 / 1000 correct (80.40)

766
Epoch: 8, Iteration 0, loss = 0.8194
Checking accuracy on validation set
Got 789 / 1000 correct (78.90)

Epoch: 8, Iteration 100, loss = 0.6189
Checking accuracy on validation set
Got 807 / 1000 correct (80.70)

Epoch: 8, Iteration 200, loss = 0.5894
Checking accuracy on validation set
Got 833 / 1000 correct (83.30)

Epoch: 8, Iteration 300, loss = 0.5716
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 8, Iteration 400, loss = 0.3859
```

```
Checking accuracy on validation set
Got 786 / 1000 correct (78.60)

Epoch: 8, Iteration 500, loss = 0.4780
Checking accuracy on validation set
Got 823 / 1000 correct (82.30)

Epoch: 8, Iteration 600, loss = 0.5495
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 8, Iteration 700, loss = 0.5138
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

766
Epoch: 9, Iteration 0, loss = 0.3479
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 9, Iteration 100, loss = 0.3710
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 9, Iteration 200, loss = 0.3846
Checking accuracy on validation set
Got 837 / 1000 correct (83.70)

Epoch: 9, Iteration 300, loss = 0.3355
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 9, Iteration 400, loss = 0.5888
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

Epoch: 9, Iteration 500, loss = 0.5702
Checking accuracy on validation set
Got 846 / 1000 correct (84.60)

Epoch: 9, Iteration 600, loss = 0.5300
Checking accuracy on validation set
Got 836 / 1000 correct (83.60)

Epoch: 9, Iteration 700, loss = 0.4486
Checking accuracy on validation set
Got 857 / 1000 correct (85.70)
```

```
Checking accuracy on validation set
Got 823 / 1000 correct (82.30)
---- New lr = 0.00052 and weight_decay = 0.00093 ----
766
Epoch: 0, Iteration 0, loss = 4.8097
Checking accuracy on validation set
Got 120 / 1000 correct (12.00)

Epoch: 0, Iteration 100, loss = 2.0077
Checking accuracy on validation set
Got 401 / 1000 correct (40.10)

Epoch: 0, Iteration 200, loss = 1.5969
Checking accuracy on validation set
Got 431 / 1000 correct (43.10)

Epoch: 0, Iteration 300, loss = 1.2957
Checking accuracy on validation set
Got 419 / 1000 correct (41.90)

Epoch: 0, Iteration 400, loss = 1.3770
Checking accuracy on validation set
Got 504 / 1000 correct (50.40)

Epoch: 0, Iteration 500, loss = 1.6065
Checking accuracy on validation set
Got 533 / 1000 correct (53.30)

Epoch: 0, Iteration 600, loss = 1.1166
Checking accuracy on validation set
Got 583 / 1000 correct (58.30)

Epoch: 0, Iteration 700, loss = 1.4100
Checking accuracy on validation set
Got 592 / 1000 correct (59.20)

766
Epoch: 1, Iteration 0, loss = 1.3371
Checking accuracy on validation set
Got 618 / 1000 correct (61.80)

Epoch: 1, Iteration 100, loss = 1.2688
Checking accuracy on validation set
Got 579 / 1000 correct (57.90)

Epoch: 1, Iteration 200, loss = 1.2119
Checking accuracy on validation set
Got 621 / 1000 correct (62.10)
```

```
Epoch: 1, Iteration 300, loss = 1.0653
Checking accuracy on validation set
Got 676 / 1000 correct (67.60)

Epoch: 1, Iteration 400, loss = 1.0130
Checking accuracy on validation set
Got 634 / 1000 correct (63.40)

Epoch: 1, Iteration 500, loss = 0.9105
Checking accuracy on validation set
Got 712 / 1000 correct (71.20)

Epoch: 1, Iteration 600, loss = 0.8772
Checking accuracy on validation set
Got 736 / 1000 correct (73.60)

Epoch: 1, Iteration 700, loss = 0.8092
Checking accuracy on validation set
Got 655 / 1000 correct (65.50)

766
Epoch: 2, Iteration 0, loss = 0.9544
Checking accuracy on validation set
Got 718 / 1000 correct (71.80)

Epoch: 2, Iteration 100, loss = 1.2294
Checking accuracy on validation set
Got 750 / 1000 correct (75.00)

Epoch: 2, Iteration 200, loss = 0.7566
Checking accuracy on validation set
Got 715 / 1000 correct (71.50)

Epoch: 2, Iteration 300, loss = 1.1225
Checking accuracy on validation set
Got 688 / 1000 correct (68.80)

Epoch: 2, Iteration 400, loss = 0.7678
Checking accuracy on validation set
Got 766 / 1000 correct (76.60)

Epoch: 2, Iteration 500, loss = 0.5276
Checking accuracy on validation set
Got 738 / 1000 correct (73.80)

Epoch: 2, Iteration 600, loss = 1.1735
Checking accuracy on validation set
```

```
Got 744 / 1000 correct (74.40)

Epoch: 2, Iteration 700, loss = 0.9342
Checking accuracy on validation set
Got 699 / 1000 correct (69.90)

766
Epoch: 3, Iteration 0, loss = 0.7137
Checking accuracy on validation set
Got 749 / 1000 correct (74.90)

Epoch: 3, Iteration 100, loss = 0.7256
Checking accuracy on validation set
Got 759 / 1000 correct (75.90)

Epoch: 3, Iteration 200, loss = 1.0187
Checking accuracy on validation set
Got 732 / 1000 correct (73.20)

Epoch: 3, Iteration 300, loss = 0.9083
Checking accuracy on validation set
Got 747 / 1000 correct (74.70)

Epoch: 3, Iteration 400, loss = 0.5523
Checking accuracy on validation set
Got 730 / 1000 correct (73.00)

Epoch: 3, Iteration 500, loss = 0.7612
Checking accuracy on validation set
Got 728 / 1000 correct (72.80)

Epoch: 3, Iteration 600, loss = 0.7845
Checking accuracy on validation set
Got 758 / 1000 correct (75.80)

Epoch: 3, Iteration 700, loss = 0.5943
Checking accuracy on validation set
Got 718 / 1000 correct (71.80)

766
Epoch: 4, Iteration 0, loss = 0.8133
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 4, Iteration 100, loss = 0.8084
Checking accuracy on validation set
Got 768 / 1000 correct (76.80)
```

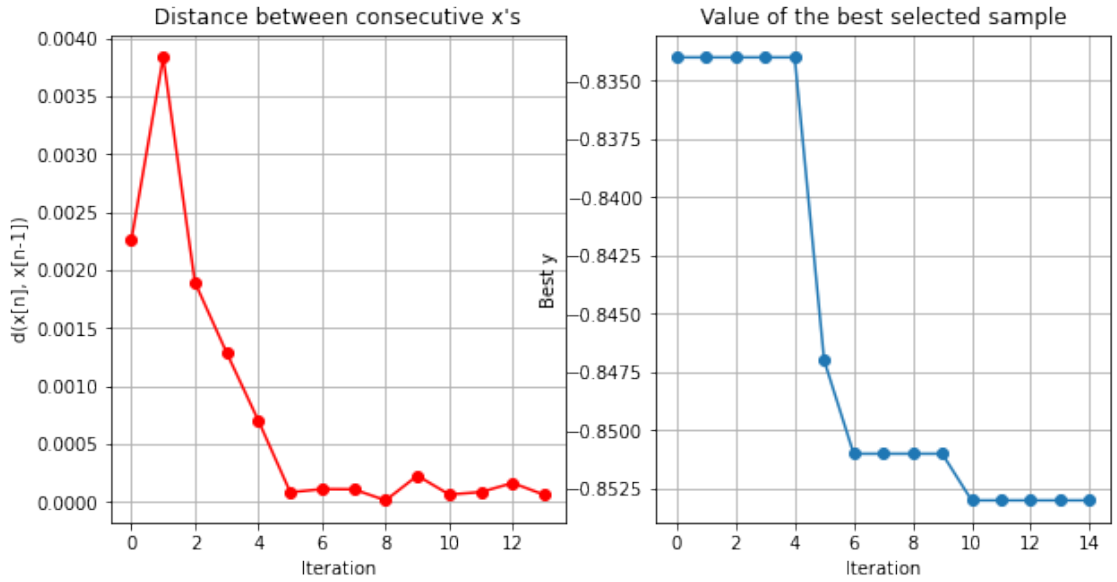
```
Epoch: 4, Iteration 200, loss = 0.8139
Checking accuracy on validation set
Got 777 / 1000 correct (77.70)

Epoch: 4, Iteration 300, loss = 0.6193
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

Epoch: 4, Iteration 400, loss = 0.4547
Checking accuracy on validation set
Got 718 / 1000 correct (71.80)

Epoch: 4, Iteration 500, loss = 0.5483
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 4, Iteration 600, loss = 0.7278
Checking accuracy on validation set
Got 786 / 1000 correct (78.60)

Epoch: 4, Iteration 700, loss = 0.6827
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

766
Epoch: 5, Iteration 0, loss = 0.7242
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

Epoch: 5, Iteration 100, loss = 0.6623
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 5, Iteration 200, loss = 0.3890
Checking accuracy on validation set
Got 776 / 1000 correct (77.60)

Epoch: 5, Iteration 300, loss = 0.5336
Checking accuracy on validation set
Got 820 / 1000 correct (82.00)

Epoch: 5, Iteration 400, loss = 0.5161
Checking accuracy on validation set
Got 789 / 1000 correct (78.90)

Epoch: 5, Iteration 500, loss = 0.4266
Checking accuracy on validation set
Got 795 / 1000 correct (79.50)
```

```
Epoch: 5, Iteration 600, loss = 0.5401
Checking accuracy on validation set
Got 771 / 1000 correct (77.10)

Epoch: 5, Iteration 700, loss = 0.6615
Checking accuracy on validation set
Got 771 / 1000 correct (77.10)

766
Epoch: 6, Iteration 0, loss = 0.4929
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

Epoch: 6, Iteration 100, loss = 0.7394
Checking accuracy on validation set
Got 811 / 1000 correct (81.10)

Epoch: 6, Iteration 200, loss = 0.5043
Checking accuracy on validation set
Got 805 / 1000 correct (80.50)

Epoch: 6, Iteration 300, loss = 0.5000
Checking accuracy on validation set
Got 763 / 1000 correct (76.30)

Epoch: 6, Iteration 400, loss = 0.8214
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

Epoch: 6, Iteration 500, loss = 0.5762
Checking accuracy on validation set
Got 811 / 1000 correct (81.10)

Epoch: 6, Iteration 600, loss = 0.7195
Checking accuracy on validation set
Got 832 / 1000 correct (83.20)

Epoch: 6, Iteration 700, loss = 0.7007
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

766
Epoch: 7, Iteration 0, loss = 0.6578
Checking accuracy on validation set
Got 817 / 1000 correct (81.70)

Epoch: 7, Iteration 100, loss = 0.5217
```

```
Checking accuracy on validation set
Got 796 / 1000 correct (79.60)

Epoch: 7, Iteration 200, loss = 0.4287
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 7, Iteration 300, loss = 0.4335
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

Epoch: 7, Iteration 400, loss = 0.4230
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 7, Iteration 500, loss = 0.6537
Checking accuracy on validation set
Got 832 / 1000 correct (83.20)

Epoch: 7, Iteration 600, loss = 0.5097
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 7, Iteration 700, loss = 0.5066
Checking accuracy on validation set
Got 829 / 1000 correct (82.90)

766
Epoch: 8, Iteration 0, loss = 0.5852
Checking accuracy on validation set
Got 831 / 1000 correct (83.10)

Epoch: 8, Iteration 100, loss = 0.4786
Checking accuracy on validation set
Got 839 / 1000 correct (83.90)

Epoch: 8, Iteration 200, loss = 0.6132
Checking accuracy on validation set
Got 756 / 1000 correct (75.60)

Epoch: 8, Iteration 300, loss = 0.6842
Checking accuracy on validation set
Got 799 / 1000 correct (79.90)

Epoch: 8, Iteration 400, loss = 0.6220
Checking accuracy on validation set
Got 833 / 1000 correct (83.30)
```

```
Epoch: 8, Iteration 500, loss = 0.5882
Checking accuracy on validation set
Got 841 / 1000 correct (84.10)

Epoch: 8, Iteration 600, loss = 0.6863
Checking accuracy on validation set
Got 825 / 1000 correct (82.50)

Epoch: 8, Iteration 700, loss = 0.4889
Checking accuracy on validation set
Got 849 / 1000 correct (84.90)

766
Epoch: 9, Iteration 0, loss = 0.4778
Checking accuracy on validation set
Got 839 / 1000 correct (83.90)

Epoch: 9, Iteration 100, loss = 0.5545
Checking accuracy on validation set
Got 837 / 1000 correct (83.70)

Epoch: 9, Iteration 200, loss = 0.3108
Checking accuracy on validation set
Got 849 / 1000 correct (84.90)

Epoch: 9, Iteration 300, loss = 0.2996
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 9, Iteration 400, loss = 0.5607
Checking accuracy on validation set
Got 843 / 1000 correct (84.30)

Epoch: 9, Iteration 500, loss = 0.6222
Checking accuracy on validation set
Got 826 / 1000 correct (82.60)

Epoch: 9, Iteration 600, loss = 0.5995
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 9, Iteration 700, loss = 0.4971
Checking accuracy on validation set
Got 842 / 1000 correct (84.20)

Checking accuracy on validation set
Got 841 / 1000 correct (84.10)
```

[ ]:
```
opt.plot_convergence()
print("Best Hyperparameters: ", opt.x_opt)
print("Best Accuracy: ", opt.fx_opt)
##############################################################
#                          END OF YOUR CODE                  #
##############################################################
```




```
Best Hyperparameters:  [0.00051311 0.00097364]
Best Accuracy:  -0.853
```

[ ]:
```
# define and train the network
model = ResNet18()
optimizer = optim.Adam(model.parameters(),lr = 0.000513, weight_decay = 0.
↪000973)

train_part(model, optimizer, epochs = 10)


# report test set accuracy

check_accuracy(loader_test, model)


# save the model
torch.save(model.state_dict(), 'model(83.8).pt')
```

```
766
Epoch: 0, Iteration 0, loss = 3.8242
```

```
Epoch: 0, Iteration 100, loss = 1.6075

Epoch: 0, Iteration 200, loss = 1.5011

Epoch: 0, Iteration 300, loss = 1.3821

Epoch: 0, Iteration 400, loss = 1.2997

Epoch: 0, Iteration 500, loss = 1.1808

Epoch: 0, Iteration 600, loss = 1.6881

Epoch: 0, Iteration 700, loss = 1.0739

766
Epoch: 1, Iteration 0, loss = 1.2621

Epoch: 1, Iteration 100, loss = 0.9631

Epoch: 1, Iteration 200, loss = 1.3792

Epoch: 1, Iteration 300, loss = 1.1428

Epoch: 1, Iteration 400, loss = 0.9323

Epoch: 1, Iteration 500, loss = 0.7955

Epoch: 1, Iteration 600, loss = 1.0677

Epoch: 1, Iteration 700, loss = 0.9228

766
Epoch: 2, Iteration 0, loss = 0.8093

Epoch: 2, Iteration 100, loss = 0.7533

Epoch: 2, Iteration 200, loss = 0.8682

Epoch: 2, Iteration 300, loss = 0.8569

Epoch: 2, Iteration 400, loss = 0.7559

Epoch: 2, Iteration 500, loss = 0.6908

Epoch: 2, Iteration 600, loss = 0.6042

Epoch: 2, Iteration 700, loss = 0.5876
```

```
766
Epoch: 3, Iteration 0, loss = 0.9688

Epoch: 3, Iteration 100, loss = 1.1008

Epoch: 3, Iteration 200, loss = 0.7724

Epoch: 3, Iteration 300, loss = 0.6468

Epoch: 3, Iteration 400, loss = 0.9111

Epoch: 3, Iteration 500, loss = 0.8497

Epoch: 3, Iteration 600, loss = 0.6558

Epoch: 3, Iteration 700, loss = 0.8008

766
Epoch: 4, Iteration 0, loss = 0.6815

Epoch: 4, Iteration 100, loss = 0.6311

Epoch: 4, Iteration 200, loss = 0.5132

Epoch: 4, Iteration 300, loss = 0.5730

Epoch: 4, Iteration 400, loss = 0.5668

Epoch: 4, Iteration 500, loss = 0.4968

Epoch: 4, Iteration 600, loss = 0.6016

Epoch: 4, Iteration 700, loss = 0.8137

766
Epoch: 5, Iteration 0, loss = 0.5700

Epoch: 5, Iteration 100, loss = 0.6260

Epoch: 5, Iteration 200, loss = 0.5672

Epoch: 5, Iteration 300, loss = 0.6930

Epoch: 5, Iteration 400, loss = 0.6346

Epoch: 5, Iteration 500, loss = 0.5215
```

```
Epoch: 5, Iteration 600, loss = 0.6199

Epoch: 5, Iteration 700, loss = 0.3816

766
Epoch: 6, Iteration 0, loss = 0.7697

Epoch: 6, Iteration 100, loss = 0.6668

Epoch: 6, Iteration 200, loss = 0.6334

Epoch: 6, Iteration 300, loss = 0.7414

Epoch: 6, Iteration 400, loss = 0.5848

Epoch: 6, Iteration 500, loss = 0.4268

Epoch: 6, Iteration 600, loss = 0.7574

Epoch: 6, Iteration 700, loss = 0.6004

766
Epoch: 7, Iteration 0, loss = 0.5996

Epoch: 7, Iteration 100, loss = 0.6203

Epoch: 7, Iteration 200, loss = 0.5860

Epoch: 7, Iteration 300, loss = 0.3861

Epoch: 7, Iteration 400, loss = 0.4512

Epoch: 7, Iteration 500, loss = 0.6834

Epoch: 7, Iteration 600, loss = 0.5661

Epoch: 7, Iteration 700, loss = 0.4902

766
Epoch: 8, Iteration 0, loss = 0.4905

Epoch: 8, Iteration 100, loss = 0.5776

Epoch: 8, Iteration 200, loss = 0.4862

Epoch: 8, Iteration 300, loss = 0.7179

Epoch: 8, Iteration 400, loss = 0.4977
```

```
Epoch: 8, Iteration 500, loss = 0.3454

Epoch: 8, Iteration 600, loss = 0.5161

Epoch: 8, Iteration 700, loss = 0.5944

766
Epoch: 9, Iteration 0, loss = 0.3990

Epoch: 9, Iteration 100, loss = 0.4425

Epoch: 9, Iteration 200, loss = 0.4498

Epoch: 9, Iteration 300, loss = 0.7687

Epoch: 9, Iteration 400, loss = 0.4281

Epoch: 9, Iteration 500, loss = 0.3201

Epoch: 9, Iteration 600, loss = 0.6686

Epoch: 9, Iteration 700, loss = 0.4585

Checking accuracy on test set
Got 8381 / 10000 correct (83.81)
```

1.4.3 Method 1 Result

Method 1 Accuracy is 83.81 %.

Then I add learning rate scheduler trying to get a better model.

[ ]:
```
import GPyOpt
def Bayes_Opt2(parameters):
    lr = parameters[0, 0]
    gamma = parameters[0, 1]
    print("---- New lr = %.5f  and gamma = %.3f ----"% (lr, gamma))
    model = ResNet18()
    optimizer = optim.Adam(model.parameters(),lr = lr)
    scheduler = optim.lr_scheduler.MultiStepLR(optimizer, milestones=[5, 9],␣
 ↪gamma=gamma)
    train_part2(model, optimizer, epochs = 10, scheduler = scheduler)
    return check_accuracy(loader_val, model)

domain = [  {'name' : 'lr', 'type': 'continuous', 'domain': (0.0001, 0.005)},
        {'name': 'gamma', 'type': 'continuous', 'domain': (0.1, 0.2)},  ]
```

```
opt2 = GPyOpt.methods.BayesianOptimization(f = Bayes_Opt2,domain =␣
↪domain,acquisition_type ='LCB', acquisition_weight = 0.1, maximize = True)


opt2.run_optimization( max_iter = 10)
```

```
---- New lr = 0.00491  and gamma = 0.103 ----
766
Epoch: 0, Iteration 0, loss = 3.4908
Checking accuracy on validation set
Got 87 / 1000 correct (8.70)

Epoch: 0, Iteration 100, loss = 1.9779
Checking accuracy on validation set
Got 261 / 1000 correct (26.10)

Epoch: 0, Iteration 200, loss = 1.8863
Checking accuracy on validation set
Got 278 / 1000 correct (27.80)

Epoch: 0, Iteration 300, loss = 2.0314
Checking accuracy on validation set
Got 397 / 1000 correct (39.70)

Epoch: 0, Iteration 400, loss = 1.5723
Checking accuracy on validation set
Got 372 / 1000 correct (37.20)

Epoch: 0, Iteration 500, loss = 1.5974
Checking accuracy on validation set
Got 421 / 1000 correct (42.10)

Epoch: 0, Iteration 600, loss = 1.5917
Checking accuracy on validation set
Got 452 / 1000 correct (45.20)

Epoch: 0, Iteration 700, loss = 1.5624
Checking accuracy on validation set
Got 490 / 1000 correct (49.00)

766
Epoch: 1, Iteration 0, loss = 1.4231
Checking accuracy on validation set
Got 475 / 1000 correct (47.50)

Epoch: 1, Iteration 100, loss = 1.3586
Checking accuracy on validation set
Got 486 / 1000 correct (48.60)
```

```
Epoch: 1, Iteration 200, loss = 1.6096
Checking accuracy on validation set
Got 525 / 1000 correct (52.50)

Epoch: 1, Iteration 300, loss = 1.2357
Checking accuracy on validation set
Got 563 / 1000 correct (56.30)

Epoch: 1, Iteration 400, loss = 1.1306
Checking accuracy on validation set
Got 572 / 1000 correct (57.20)

Epoch: 1, Iteration 500, loss = 1.4168
Checking accuracy on validation set
Got 583 / 1000 correct (58.30)

Epoch: 1, Iteration 600, loss = 0.8847
Checking accuracy on validation set
Got 616 / 1000 correct (61.60)

Epoch: 1, Iteration 700, loss = 1.3069
Checking accuracy on validation set
Got 648 / 1000 correct (64.80)

766
Epoch: 2, Iteration 0, loss = 0.9494
Checking accuracy on validation set
Got 600 / 1000 correct (60.00)

Epoch: 2, Iteration 100, loss = 1.0113
Checking accuracy on validation set
Got 642 / 1000 correct (64.20)

Epoch: 2, Iteration 200, loss = 1.1501
Checking accuracy on validation set
Got 677 / 1000 correct (67.70)

Epoch: 2, Iteration 300, loss = 0.9163
Checking accuracy on validation set
Got 643 / 1000 correct (64.30)

Epoch: 2, Iteration 400, loss = 1.1084
Checking accuracy on validation set
Got 689 / 1000 correct (68.90)

Epoch: 2, Iteration 500, loss = 1.1930
Checking accuracy on validation set
```

```
Got 681 / 1000 correct (68.10)

Epoch: 2, Iteration 600, loss = 0.8687
Checking accuracy on validation set
Got 652 / 1000 correct (65.20)

Epoch: 2, Iteration 700, loss = 0.8604
Checking accuracy on validation set
Got 690 / 1000 correct (69.00)

766
Epoch: 3, Iteration 0, loss = 0.8512
Checking accuracy on validation set
Got 713 / 1000 correct (71.30)

Epoch: 3, Iteration 100, loss = 1.0329
Checking accuracy on validation set
Got 663 / 1000 correct (66.30)

Epoch: 3, Iteration 200, loss = 0.9070
Checking accuracy on validation set
Got 701 / 1000 correct (70.10)

Epoch: 3, Iteration 300, loss = 0.7286
Checking accuracy on validation set
Got 718 / 1000 correct (71.80)

Epoch: 3, Iteration 400, loss = 0.9888
Checking accuracy on validation set
Got 719 / 1000 correct (71.90)

Epoch: 3, Iteration 500, loss = 0.6579
Checking accuracy on validation set
Got 720 / 1000 correct (72.00)

Epoch: 3, Iteration 600, loss = 0.9349
Checking accuracy on validation set
Got 685 / 1000 correct (68.50)

Epoch: 3, Iteration 700, loss = 0.5492
Checking accuracy on validation set
Got 729 / 1000 correct (72.90)

766
Epoch: 4, Iteration 0, loss = 0.7818
Checking accuracy on validation set
Got 720 / 1000 correct (72.00)
```

```
Epoch: 4, Iteration 100, loss = 0.5941
Checking accuracy on validation set
Got 720 / 1000 correct (72.00)

Epoch: 4, Iteration 200, loss = 0.6460
Checking accuracy on validation set
Got 741 / 1000 correct (74.10)

Epoch: 4, Iteration 300, loss = 0.8928
Checking accuracy on validation set
Got 759 / 1000 correct (75.90)

Epoch: 4, Iteration 400, loss = 0.6071
Checking accuracy on validation set
Got 758 / 1000 correct (75.80)

Epoch: 4, Iteration 500, loss = 0.8448
Checking accuracy on validation set
Got 767 / 1000 correct (76.70)

Epoch: 4, Iteration 600, loss = 0.5390
Checking accuracy on validation set
Got 747 / 1000 correct (74.70)

Epoch: 4, Iteration 700, loss = 0.6977
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

766
Epoch: 5, Iteration 0, loss = 0.7904
Checking accuracy on validation set
Got 787 / 1000 correct (78.70)

Epoch: 5, Iteration 100, loss = 0.5483
Checking accuracy on validation set
Got 825 / 1000 correct (82.50)

Epoch: 5, Iteration 200, loss = 0.5887
Checking accuracy on validation set
Got 827 / 1000 correct (82.70)

Epoch: 5, Iteration 300, loss = 0.4090
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 5, Iteration 400, loss = 0.4997
Checking accuracy on validation set
Got 838 / 1000 correct (83.80)
```

```
Epoch: 5, Iteration 500, loss = 0.6901
Checking accuracy on validation set
Got 836 / 1000 correct (83.60)

Epoch: 5, Iteration 600, loss = 0.5862
Checking accuracy on validation set
Got 834 / 1000 correct (83.40)

Epoch: 5, Iteration 700, loss = 0.5732
Checking accuracy on validation set
Got 847 / 1000 correct (84.70)

766
Epoch: 6, Iteration 0, loss = 0.5505
Checking accuracy on validation set
Got 848 / 1000 correct (84.80)

Epoch: 6, Iteration 100, loss = 0.6043
Checking accuracy on validation set
Got 851 / 1000 correct (85.10)

Epoch: 6, Iteration 200, loss = 0.6065
Checking accuracy on validation set
Got 844 / 1000 correct (84.40)

Epoch: 6, Iteration 300, loss = 0.5492
Checking accuracy on validation set
Got 839 / 1000 correct (83.90)

Epoch: 6, Iteration 400, loss = 0.6615
Checking accuracy on validation set
Got 840 / 1000 correct (84.00)

Epoch: 6, Iteration 500, loss = 0.4306
Checking accuracy on validation set
Got 852 / 1000 correct (85.20)

Epoch: 6, Iteration 600, loss = 0.4407
Checking accuracy on validation set
Got 850 / 1000 correct (85.00)

Epoch: 6, Iteration 700, loss = 0.5397
Checking accuracy on validation set
Got 847 / 1000 correct (84.70)

766
Epoch: 7, Iteration 0, loss = 0.4170
```

```
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

Epoch: 7, Iteration 100, loss = 0.5742
Checking accuracy on validation set
Got 851 / 1000 correct (85.10)

Epoch: 7, Iteration 200, loss = 0.4968
Checking accuracy on validation set
Got 851 / 1000 correct (85.10)

Epoch: 7, Iteration 300, loss = 0.5642
Checking accuracy on validation set
Got 847 / 1000 correct (84.70)

Epoch: 7, Iteration 400, loss = 0.3527
Checking accuracy on validation set
Got 846 / 1000 correct (84.60)

Epoch: 7, Iteration 500, loss = 0.4670
Checking accuracy on validation set
Got 854 / 1000 correct (85.40)

Epoch: 7, Iteration 600, loss = 0.4621
Checking accuracy on validation set
Got 857 / 1000 correct (85.70)

Epoch: 7, Iteration 700, loss = 0.5971
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

766
Epoch: 8, Iteration 0, loss = 0.3926
Checking accuracy on validation set
Got 851 / 1000 correct (85.10)

Epoch: 8, Iteration 100, loss = 0.2852
Checking accuracy on validation set
Got 857 / 1000 correct (85.70)

Epoch: 8, Iteration 200, loss = 0.5670
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

Epoch: 8, Iteration 300, loss = 0.3422
Checking accuracy on validation set
Got 854 / 1000 correct (85.40)
```

```
Epoch: 8, Iteration 400, loss = 0.3374
Checking accuracy on validation set
Got 851 / 1000 correct (85.10)

Epoch: 8, Iteration 500, loss = 0.5653
Checking accuracy on validation set
Got 861 / 1000 correct (86.10)

Epoch: 8, Iteration 600, loss = 0.3743
Checking accuracy on validation set
Got 842 / 1000 correct (84.20)

Epoch: 8, Iteration 700, loss = 0.4100
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

766
Epoch: 9, Iteration 0, loss = 0.6381
Checking accuracy on validation set
Got 856 / 1000 correct (85.60)

Epoch: 9, Iteration 100, loss = 0.3007
Checking accuracy on validation set
Got 862 / 1000 correct (86.20)

Epoch: 9, Iteration 200, loss = 0.3193
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 9, Iteration 300, loss = 0.3022
Checking accuracy on validation set
Got 858 / 1000 correct (85.80)

Epoch: 9, Iteration 400, loss = 0.3831
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

Epoch: 9, Iteration 500, loss = 0.5464
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

Epoch: 9, Iteration 600, loss = 0.5951
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 9, Iteration 700, loss = 0.4095
Checking accuracy on validation set
Got 861 / 1000 correct (86.10)
```

```
Checking accuracy on validation set
Got 865 / 1000 correct (86.50)
---- New lr = 0.00328  and gamma = 0.110 ----
766
Epoch: 0, Iteration 0, loss = 3.7827
Checking accuracy on validation set
Got 112 / 1000 correct (11.20)

Epoch: 0, Iteration 100, loss = 2.1240
Checking accuracy on validation set
Got 306 / 1000 correct (30.60)

Epoch: 0, Iteration 200, loss = 1.6856
Checking accuracy on validation set
Got 374 / 1000 correct (37.40)

Epoch: 0, Iteration 300, loss = 2.0650
Checking accuracy on validation set
Got 377 / 1000 correct (37.70)

Epoch: 0, Iteration 400, loss = 1.4062
Checking accuracy on validation set
Got 414 / 1000 correct (41.40)

Epoch: 0, Iteration 500, loss = 1.5591
Checking accuracy on validation set
Got 460 / 1000 correct (46.00)

Epoch: 0, Iteration 600, loss = 1.6131
Checking accuracy on validation set
Got 461 / 1000 correct (46.10)

Epoch: 0, Iteration 700, loss = 1.3579
Checking accuracy on validation set
Got 485 / 1000 correct (48.50)

766
Epoch: 1, Iteration 0, loss = 1.5374
Checking accuracy on validation set
Got 502 / 1000 correct (50.20)

Epoch: 1, Iteration 100, loss = 1.5503
Checking accuracy on validation set
Got 459 / 1000 correct (45.90)

Epoch: 1, Iteration 200, loss = 1.5506
Checking accuracy on validation set
```

```
Got 516 / 1000 correct (51.60)

Epoch: 1, Iteration 300, loss = 1.7249
Checking accuracy on validation set
Got 529 / 1000 correct (52.90)

Epoch: 1, Iteration 400, loss = 1.2105
Checking accuracy on validation set
Got 492 / 1000 correct (49.20)

Epoch: 1, Iteration 500, loss = 0.9550
Checking accuracy on validation set
Got 629 / 1000 correct (62.90)

Epoch: 1, Iteration 600, loss = 1.3709
Checking accuracy on validation set
Got 604 / 1000 correct (60.40)

Epoch: 1, Iteration 700, loss = 1.0338
Checking accuracy on validation set
Got 600 / 1000 correct (60.00)

766
Epoch: 2, Iteration 0, loss = 1.2700
Checking accuracy on validation set
Got 607 / 1000 correct (60.70)

Epoch: 2, Iteration 100, loss = 1.0416
Checking accuracy on validation set
Got 668 / 1000 correct (66.80)

Epoch: 2, Iteration 200, loss = 1.2548
Checking accuracy on validation set
Got 645 / 1000 correct (64.50)

Epoch: 2, Iteration 300, loss = 1.2854
Checking accuracy on validation set
Got 654 / 1000 correct (65.40)

Epoch: 2, Iteration 400, loss = 1.1765
Checking accuracy on validation set
Got 631 / 1000 correct (63.10)

Epoch: 2, Iteration 500, loss = 0.9371
Checking accuracy on validation set
Got 676 / 1000 correct (67.60)

Epoch: 2, Iteration 600, loss = 0.7726
```

```
Checking accuracy on validation set
Got 689 / 1000 correct (68.90)

Epoch: 2, Iteration 700, loss = 0.8469
Checking accuracy on validation set
Got 688 / 1000 correct (68.80)

766
Epoch: 3, Iteration 0, loss = 0.7750
Checking accuracy on validation set
Got 704 / 1000 correct (70.40)

Epoch: 3, Iteration 100, loss = 1.0219
Checking accuracy on validation set
Got 688 / 1000 correct (68.80)

Epoch: 3, Iteration 200, loss = 0.7910
Checking accuracy on validation set
Got 722 / 1000 correct (72.20)

Epoch: 3, Iteration 300, loss = 0.8571
Checking accuracy on validation set
Got 730 / 1000 correct (73.00)

Epoch: 3, Iteration 400, loss = 0.7197
Checking accuracy on validation set
Got 703 / 1000 correct (70.30)

Epoch: 3, Iteration 500, loss = 1.0258
Checking accuracy on validation set
Got 718 / 1000 correct (71.80)

Epoch: 3, Iteration 600, loss = 0.5649
Checking accuracy on validation set
Got 738 / 1000 correct (73.80)

Epoch: 3, Iteration 700, loss = 0.7147
Checking accuracy on validation set
Got 774 / 1000 correct (77.40)

766
Epoch: 4, Iteration 0, loss = 0.7924
Checking accuracy on validation set
Got 755 / 1000 correct (75.50)

Epoch: 4, Iteration 100, loss = 0.6863
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)
```

```
Epoch: 4, Iteration 200, loss = 0.6870
Checking accuracy on validation set
Got 728 / 1000 correct (72.80)

Epoch: 4, Iteration 300, loss = 0.7050
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 4, Iteration 400, loss = 0.7424
Checking accuracy on validation set
Got 774 / 1000 correct (77.40)

Epoch: 4, Iteration 500, loss = 0.7331
Checking accuracy on validation set
Got 788 / 1000 correct (78.80)

Epoch: 4, Iteration 600, loss = 0.5645
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)

Epoch: 4, Iteration 700, loss = 0.8589
Checking accuracy on validation set
Got 787 / 1000 correct (78.70)

766
Epoch: 5, Iteration 0, loss = 0.8163
Checking accuracy on validation set
Got 774 / 1000 correct (77.40)

Epoch: 5, Iteration 100, loss = 0.6936
Checking accuracy on validation set
Got 823 / 1000 correct (82.30)

Epoch: 5, Iteration 200, loss = 0.3809
Checking accuracy on validation set
Got 841 / 1000 correct (84.10)

Epoch: 5, Iteration 300, loss = 0.6409
Checking accuracy on validation set
Got 855 / 1000 correct (85.50)

Epoch: 5, Iteration 400, loss = 0.4780
Checking accuracy on validation set
Got 843 / 1000 correct (84.30)

Epoch: 5, Iteration 500, loss = 0.4866
Checking accuracy on validation set
```

```
Got 853 / 1000 correct (85.30)

Epoch: 5, Iteration 600, loss = 0.6618
Checking accuracy on validation set
Got 856 / 1000 correct (85.60)

Epoch: 5, Iteration 700, loss = 0.5149
Checking accuracy on validation set
Got 851 / 1000 correct (85.10)

766
Epoch: 6, Iteration 0, loss = 0.6829
Checking accuracy on validation set
Got 850 / 1000 correct (85.00)

Epoch: 6, Iteration 100, loss = 0.4299
Checking accuracy on validation set
Got 856 / 1000 correct (85.60)

Epoch: 6, Iteration 200, loss = 0.4458
Checking accuracy on validation set
Got 849 / 1000 correct (84.90)

Epoch: 6, Iteration 300, loss = 0.5115
Checking accuracy on validation set
Got 862 / 1000 correct (86.20)

Epoch: 6, Iteration 400, loss = 0.4966
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

Epoch: 6, Iteration 500, loss = 0.6518
Checking accuracy on validation set
Got 861 / 1000 correct (86.10)

Epoch: 6, Iteration 600, loss = 0.3672
Checking accuracy on validation set
Got 844 / 1000 correct (84.40)

Epoch: 6, Iteration 700, loss = 0.4238
Checking accuracy on validation set
Got 860 / 1000 correct (86.00)

766
Epoch: 7, Iteration 0, loss = 0.4353
Checking accuracy on validation set
Got 864 / 1000 correct (86.40)
```

```
Epoch: 7, Iteration 100, loss = 0.3724
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 7, Iteration 200, loss = 0.5217
Checking accuracy on validation set
Got 856 / 1000 correct (85.60)

Epoch: 7, Iteration 300, loss = 0.4400
Checking accuracy on validation set
Got 865 / 1000 correct (86.50)

Epoch: 7, Iteration 400, loss = 0.5062
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 7, Iteration 500, loss = 0.5645
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

Epoch: 7, Iteration 600, loss = 0.4511
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)

Epoch: 7, Iteration 700, loss = 0.4194
Checking accuracy on validation set
Got 854 / 1000 correct (85.40)

766
Epoch: 8, Iteration 0, loss = 0.5277
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 8, Iteration 100, loss = 0.4581
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)

Epoch: 8, Iteration 200, loss = 0.2421
Checking accuracy on validation set
Got 860 / 1000 correct (86.00)

Epoch: 8, Iteration 300, loss = 0.3511
Checking accuracy on validation set
Got 864 / 1000 correct (86.40)

Epoch: 8, Iteration 400, loss = 0.5542
Checking accuracy on validation set
Got 860 / 1000 correct (86.00)
```

```
Epoch: 8, Iteration 500, loss = 0.3182
Checking accuracy on validation set
Got 864 / 1000 correct (86.40)

Epoch: 8, Iteration 600, loss = 0.4455
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)

Epoch: 8, Iteration 700, loss = 0.4730
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

766
Epoch: 9, Iteration 0, loss = 0.3804
Checking accuracy on validation set
Got 870 / 1000 correct (87.00)

Epoch: 9, Iteration 100, loss = 0.2445
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 9, Iteration 200, loss = 0.6847
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 9, Iteration 300, loss = 0.2880
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

Epoch: 9, Iteration 400, loss = 0.4479
Checking accuracy on validation set
Got 876 / 1000 correct (87.60)

Epoch: 9, Iteration 500, loss = 0.2952
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

Epoch: 9, Iteration 600, loss = 0.3778
Checking accuracy on validation set
Got 881 / 1000 correct (88.10)

Epoch: 9, Iteration 700, loss = 0.2819
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Checking accuracy on validation set
Got 881 / 1000 correct (88.10)
```

```
---- New lr = 0.00029  and gamma = 0.157 ----
766
Epoch: 0, Iteration 0, loss = 3.5967
Checking accuracy on validation set
Got 124 / 1000 correct (12.40)

Epoch: 0, Iteration 100, loss = 1.8172
Checking accuracy on validation set
Got 377 / 1000 correct (37.70)

Epoch: 0, Iteration 200, loss = 1.5712
Checking accuracy on validation set
Got 449 / 1000 correct (44.90)

Epoch: 0, Iteration 300, loss = 1.4319
Checking accuracy on validation set
Got 449 / 1000 correct (44.90)

Epoch: 0, Iteration 400, loss = 1.2919
Checking accuracy on validation set
Got 492 / 1000 correct (49.20)

Epoch: 0, Iteration 500, loss = 1.7838
Checking accuracy on validation set
Got 510 / 1000 correct (51.00)

Epoch: 0, Iteration 600, loss = 1.4226
Checking accuracy on validation set
Got 578 / 1000 correct (57.80)

Epoch: 0, Iteration 700, loss = 1.1799
Checking accuracy on validation set
Got 568 / 1000 correct (56.80)

766
Epoch: 1, Iteration 0, loss = 1.3552
Checking accuracy on validation set
Got 611 / 1000 correct (61.10)

Epoch: 1, Iteration 100, loss = 1.2660
Checking accuracy on validation set
Got 646 / 1000 correct (64.60)

Epoch: 1, Iteration 200, loss = 1.0093
Checking accuracy on validation set
Got 638 / 1000 correct (63.80)

Epoch: 1, Iteration 300, loss = 1.0531
```

```
Checking accuracy on validation set
Got 702 / 1000 correct (70.20)

Epoch: 1, Iteration 400, loss = 0.8785
Checking accuracy on validation set
Got 634 / 1000 correct (63.40)

Epoch: 1, Iteration 500, loss = 1.1385
Checking accuracy on validation set
Got 691 / 1000 correct (69.10)

Epoch: 1, Iteration 600, loss = 1.2019
Checking accuracy on validation set
Got 714 / 1000 correct (71.40)

Epoch: 1, Iteration 700, loss = 1.1474
Checking accuracy on validation set
Got 725 / 1000 correct (72.50)

766
Epoch: 2, Iteration 0, loss = 0.9164
Checking accuracy on validation set
Got 692 / 1000 correct (69.20)

Epoch: 2, Iteration 100, loss = 0.8589
Checking accuracy on validation set
Got 734 / 1000 correct (73.40)

Epoch: 2, Iteration 200, loss = 0.8384
Checking accuracy on validation set
Got 735 / 1000 correct (73.50)

Epoch: 2, Iteration 300, loss = 0.9310
Checking accuracy on validation set
Got 741 / 1000 correct (74.10)

Epoch: 2, Iteration 400, loss = 0.7051
Checking accuracy on validation set
Got 763 / 1000 correct (76.30)

Epoch: 2, Iteration 500, loss = 0.7350
Checking accuracy on validation set
Got 768 / 1000 correct (76.80)

Epoch: 2, Iteration 600, loss = 0.6549
Checking accuracy on validation set
Got 758 / 1000 correct (75.80)
```

```
Epoch: 2, Iteration 700, loss = 0.7526
Checking accuracy on validation set
Got 757 / 1000 correct (75.70)

766
Epoch: 3, Iteration 0, loss = 0.7654
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 3, Iteration 100, loss = 0.7137
Checking accuracy on validation set
Got 768 / 1000 correct (76.80)

Epoch: 3, Iteration 200, loss = 0.7581
Checking accuracy on validation set
Got 795 / 1000 correct (79.50)

Epoch: 3, Iteration 300, loss = 0.5569
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 3, Iteration 400, loss = 0.4707
Checking accuracy on validation set
Got 793 / 1000 correct (79.30)

Epoch: 3, Iteration 500, loss = 0.5827
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 3, Iteration 600, loss = 0.4977
Checking accuracy on validation set
Got 799 / 1000 correct (79.90)

Epoch: 3, Iteration 700, loss = 0.5013
Checking accuracy on validation set
Got 820 / 1000 correct (82.00)

766
Epoch: 4, Iteration 0, loss = 0.6611
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 4, Iteration 100, loss = 0.7710
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

Epoch: 4, Iteration 200, loss = 0.6295
Checking accuracy on validation set
```

```
Got 808 / 1000 correct (80.80)

Epoch: 4, Iteration 300, loss = 0.8087
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 4, Iteration 400, loss = 0.6450
Checking accuracy on validation set
Got 814 / 1000 correct (81.40)

Epoch: 4, Iteration 500, loss = 0.3922
Checking accuracy on validation set
Got 792 / 1000 correct (79.20)

Epoch: 4, Iteration 600, loss = 0.4490
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 4, Iteration 700, loss = 0.4873
Checking accuracy on validation set
Got 835 / 1000 correct (83.50)

766
Epoch: 5, Iteration 0, loss = 0.5894
Checking accuracy on validation set
Got 837 / 1000 correct (83.70)

Epoch: 5, Iteration 100, loss = 0.2466
Checking accuracy on validation set
Got 861 / 1000 correct (86.10)

Epoch: 5, Iteration 200, loss = 0.3827
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

Epoch: 5, Iteration 300, loss = 0.4328
Checking accuracy on validation set
Got 875 / 1000 correct (87.50)

Epoch: 5, Iteration 400, loss = 0.3347
Checking accuracy on validation set
Got 870 / 1000 correct (87.00)

Epoch: 5, Iteration 500, loss = 0.3762
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 5, Iteration 600, loss = 0.3710
```

```
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 5, Iteration 700, loss = 0.4074
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

766
Epoch: 6, Iteration 0, loss = 0.2718
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)

Epoch: 6, Iteration 100, loss = 0.6100
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 6, Iteration 200, loss = 0.2685
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 6, Iteration 300, loss = 0.4034
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 6, Iteration 400, loss = 0.4388
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)

Epoch: 6, Iteration 500, loss = 0.3998
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)

Epoch: 6, Iteration 600, loss = 0.4225
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 6, Iteration 700, loss = 0.2468
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

766
Epoch: 7, Iteration 0, loss = 0.4635
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 7, Iteration 100, loss = 0.2883
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)
```

```
Epoch: 7, Iteration 200, loss = 0.3579
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

Epoch: 7, Iteration 300, loss = 0.2532
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 7, Iteration 400, loss = 0.4276
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Epoch: 7, Iteration 500, loss = 0.3791
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 7, Iteration 600, loss = 0.4328
Checking accuracy on validation set
Got 876 / 1000 correct (87.60)

Epoch: 7, Iteration 700, loss = 0.3544
Checking accuracy on validation set
Got 883 / 1000 correct (88.30)

766
Epoch: 8, Iteration 0, loss = 0.2344
Checking accuracy on validation set
Got 876 / 1000 correct (87.60)

Epoch: 8, Iteration 100, loss = 0.4699
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)

Epoch: 8, Iteration 200, loss = 0.4633
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 8, Iteration 300, loss = 0.5331
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

Epoch: 8, Iteration 400, loss = 0.2811
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

Epoch: 8, Iteration 500, loss = 0.3937
Checking accuracy on validation set
```

```
Got 892 / 1000 correct (89.20)

Epoch: 8, Iteration 600, loss = 0.3763
Checking accuracy on validation set
Got 894 / 1000 correct (89.40)

Epoch: 8, Iteration 700, loss = 0.2790
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

766
Epoch: 9, Iteration 0, loss = 0.2548
Checking accuracy on validation set
Got 891 / 1000 correct (89.10)

Epoch: 9, Iteration 100, loss = 0.4839
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 9, Iteration 200, loss = 0.2110
Checking accuracy on validation set
Got 894 / 1000 correct (89.40)

Epoch: 9, Iteration 300, loss = 0.2991
Checking accuracy on validation set
Got 893 / 1000 correct (89.30)

Epoch: 9, Iteration 400, loss = 0.4862
Checking accuracy on validation set
Got 892 / 1000 correct (89.20)

Epoch: 9, Iteration 500, loss = 0.2107
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 9, Iteration 600, loss = 0.3681
Checking accuracy on validation set
Got 894 / 1000 correct (89.40)

Epoch: 9, Iteration 700, loss = 0.2887
Checking accuracy on validation set
Got 893 / 1000 correct (89.30)

Checking accuracy on validation set
Got 892 / 1000 correct (89.20)
---- New lr = 0.00212  and gamma = 0.106 ----
766
Epoch: 0, Iteration 0, loss = 3.1316
```

```
Checking accuracy on validation set
Got 79 / 1000 correct (7.90)

Epoch: 0, Iteration 100, loss = 2.1216
Checking accuracy on validation set
Got 267 / 1000 correct (26.70)

Epoch: 0, Iteration 200, loss = 1.7866
Checking accuracy on validation set
Got 372 / 1000 correct (37.20)

Epoch: 0, Iteration 300, loss = 2.0431
Checking accuracy on validation set
Got 255 / 1000 correct (25.50)

Epoch: 0, Iteration 400, loss = 1.6054
Checking accuracy on validation set
Got 462 / 1000 correct (46.20)

Epoch: 0, Iteration 500, loss = 1.9709
Checking accuracy on validation set
Got 455 / 1000 correct (45.50)

Epoch: 0, Iteration 600, loss = 1.6421
Checking accuracy on validation set
Got 455 / 1000 correct (45.50)

Epoch: 0, Iteration 700, loss = 1.4080
Checking accuracy on validation set
Got 431 / 1000 correct (43.10)

766
Epoch: 1, Iteration 0, loss = 1.2347
Checking accuracy on validation set
Got 483 / 1000 correct (48.30)

Epoch: 1, Iteration 100, loss = 1.2290
Checking accuracy on validation set
Got 575 / 1000 correct (57.50)

Epoch: 1, Iteration 200, loss = 1.4810
Checking accuracy on validation set
Got 534 / 1000 correct (53.40)

Epoch: 1, Iteration 300, loss = 1.0287
Checking accuracy on validation set
Got 546 / 1000 correct (54.60)
```

```
Epoch: 1, Iteration 400, loss = 1.3628
Checking accuracy on validation set
Got 588 / 1000 correct (58.80)

Epoch: 1, Iteration 500, loss = 1.1625
Checking accuracy on validation set
Got 576 / 1000 correct (57.60)

Epoch: 1, Iteration 600, loss = 1.0348
Checking accuracy on validation set
Got 575 / 1000 correct (57.50)

Epoch: 1, Iteration 700, loss = 0.9100
Checking accuracy on validation set
Got 565 / 1000 correct (56.50)

766
Epoch: 2, Iteration 0, loss = 1.1923
Checking accuracy on validation set
Got 638 / 1000 correct (63.80)

Epoch: 2, Iteration 100, loss = 1.0303
Checking accuracy on validation set
Got 645 / 1000 correct (64.50)

Epoch: 2, Iteration 200, loss = 0.8979
Checking accuracy on validation set
Got 623 / 1000 correct (62.30)

Epoch: 2, Iteration 300, loss = 1.3692
Checking accuracy on validation set
Got 634 / 1000 correct (63.40)

Epoch: 2, Iteration 400, loss = 0.9920
Checking accuracy on validation set
Got 635 / 1000 correct (63.50)

Epoch: 2, Iteration 500, loss = 0.9063
Checking accuracy on validation set
Got 673 / 1000 correct (67.30)

Epoch: 2, Iteration 600, loss = 0.7681
Checking accuracy on validation set
Got 697 / 1000 correct (69.70)

Epoch: 2, Iteration 700, loss = 0.9267
Checking accuracy on validation set
Got 699 / 1000 correct (69.90)
```

```
766
Epoch: 3, Iteration 0, loss = 0.9494
Checking accuracy on validation set
Got 701 / 1000 correct (70.10)

Epoch: 3, Iteration 100, loss = 0.8988
Checking accuracy on validation set
Got 729 / 1000 correct (72.90)

Epoch: 3, Iteration 200, loss = 0.8179
Checking accuracy on validation set
Got 729 / 1000 correct (72.90)

Epoch: 3, Iteration 300, loss = 0.6385
Checking accuracy on validation set
Got 694 / 1000 correct (69.40)

Epoch: 3, Iteration 400, loss = 0.9039
Checking accuracy on validation set
Got 728 / 1000 correct (72.80)

Epoch: 3, Iteration 500, loss = 0.6882
Checking accuracy on validation set
Got 703 / 1000 correct (70.30)

Epoch: 3, Iteration 600, loss = 0.7006
Checking accuracy on validation set
Got 728 / 1000 correct (72.80)

Epoch: 3, Iteration 700, loss = 0.6911
Checking accuracy on validation set
Got 657 / 1000 correct (65.70)

766
Epoch: 4, Iteration 0, loss = 0.6731
Checking accuracy on validation set
Got 769 / 1000 correct (76.90)

Epoch: 4, Iteration 100, loss = 0.8246
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

Epoch: 4, Iteration 200, loss = 0.9289
Checking accuracy on validation set
Got 804 / 1000 correct (80.40)

Epoch: 4, Iteration 300, loss = 0.4502
```

```
Checking accuracy on validation set
Got 759 / 1000 correct (75.90)

Epoch: 4, Iteration 400, loss = 0.8024
Checking accuracy on validation set
Got 771 / 1000 correct (77.10)

Epoch: 4, Iteration 500, loss = 0.7689
Checking accuracy on validation set
Got 760 / 1000 correct (76.00)

Epoch: 4, Iteration 600, loss = 1.0922
Checking accuracy on validation set
Got 774 / 1000 correct (77.40)

Epoch: 4, Iteration 700, loss = 0.6704
Checking accuracy on validation set
Got 781 / 1000 correct (78.10)

766
Epoch: 5, Iteration 0, loss = 0.4867
Checking accuracy on validation set
Got 793 / 1000 correct (79.30)

Epoch: 5, Iteration 100, loss = 0.4918
Checking accuracy on validation set
Got 843 / 1000 correct (84.30)

Epoch: 5, Iteration 200, loss = 0.4816
Checking accuracy on validation set
Got 839 / 1000 correct (83.90)

Epoch: 5, Iteration 300, loss = 0.4710
Checking accuracy on validation set
Got 842 / 1000 correct (84.20)

Epoch: 5, Iteration 400, loss = 0.6817
Checking accuracy on validation set
Got 861 / 1000 correct (86.10)

Epoch: 5, Iteration 500, loss = 0.5950
Checking accuracy on validation set
Got 847 / 1000 correct (84.70)

Epoch: 5, Iteration 600, loss = 0.4737
Checking accuracy on validation set
Got 854 / 1000 correct (85.40)
```

```
Epoch: 5, Iteration 700, loss = 0.4765
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

766
Epoch: 6, Iteration 0, loss = 0.4118
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

Epoch: 6, Iteration 100, loss = 0.5081
Checking accuracy on validation set
Got 861 / 1000 correct (86.10)

Epoch: 6, Iteration 200, loss = 0.4249
Checking accuracy on validation set
Got 857 / 1000 correct (85.70)

Epoch: 6, Iteration 300, loss = 0.4300
Checking accuracy on validation set
Got 865 / 1000 correct (86.50)

Epoch: 6, Iteration 400, loss = 0.6371
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 6, Iteration 500, loss = 0.4426
Checking accuracy on validation set
Got 869 / 1000 correct (86.90)

Epoch: 6, Iteration 600, loss = 0.3462
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

Epoch: 6, Iteration 700, loss = 0.2572
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

766
Epoch: 7, Iteration 0, loss = 0.4955
Checking accuracy on validation set
Got 855 / 1000 correct (85.50)

Epoch: 7, Iteration 100, loss = 0.3551
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 7, Iteration 200, loss = 0.5904
Checking accuracy on validation set
```

```
Got 877 / 1000 correct (87.70)

Epoch: 7, Iteration 300, loss = 0.4397
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 7, Iteration 400, loss = 0.3383
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 7, Iteration 500, loss = 0.4422
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

Epoch: 7, Iteration 600, loss = 0.4094
Checking accuracy on validation set
Got 862 / 1000 correct (86.20)

Epoch: 7, Iteration 700, loss = 0.3240
Checking accuracy on validation set
Got 869 / 1000 correct (86.90)

766
Epoch: 8, Iteration 0, loss = 0.4988
Checking accuracy on validation set
Got 864 / 1000 correct (86.40)

Epoch: 8, Iteration 100, loss = 0.2640
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 8, Iteration 200, loss = 0.4774
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 8, Iteration 300, loss = 0.2791
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

Epoch: 8, Iteration 400, loss = 0.3446
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 8, Iteration 500, loss = 0.3399
Checking accuracy on validation set
Got 881 / 1000 correct (88.10)

Epoch: 8, Iteration 600, loss = 0.4702
```

```
Checking accuracy on validation set
Got 875 / 1000 correct (87.50)

Epoch: 8, Iteration 700, loss = 0.3868
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

766
Epoch: 9, Iteration 0, loss = 0.3312
Checking accuracy on validation set
Got 881 / 1000 correct (88.10)

Epoch: 9, Iteration 100, loss = 0.4338
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)

Epoch: 9, Iteration 200, loss = 0.2987
Checking accuracy on validation set
Got 888 / 1000 correct (88.80)

Epoch: 9, Iteration 300, loss = 0.4251
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Epoch: 9, Iteration 400, loss = 0.4932
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 9, Iteration 500, loss = 0.3390
Checking accuracy on validation set
Got 883 / 1000 correct (88.30)

Epoch: 9, Iteration 600, loss = 0.4782
Checking accuracy on validation set
Got 888 / 1000 correct (88.80)

Epoch: 9, Iteration 700, loss = 0.5245
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Checking accuracy on validation set
Got 886 / 1000 correct (88.60)
---- New lr = 0.00173  and gamma = 0.150 ----
766
Epoch: 0, Iteration 0, loss = 3.4751
Checking accuracy on validation set
Got 119 / 1000 correct (11.90)
```

```
Epoch: 0, Iteration 100, loss = 1.9029
Checking accuracy on validation set
Got 300 / 1000 correct (30.00)

Epoch: 0, Iteration 200, loss = 1.8446
Checking accuracy on validation set
Got 384 / 1000 correct (38.40)

Epoch: 0, Iteration 300, loss = 1.9407
Checking accuracy on validation set
Got 394 / 1000 correct (39.40)

Epoch: 0, Iteration 400, loss = 1.8898
Checking accuracy on validation set
Got 407 / 1000 correct (40.70)

Epoch: 0, Iteration 500, loss = 1.9139
Checking accuracy on validation set
Got 448 / 1000 correct (44.80)

Epoch: 0, Iteration 600, loss = 1.4882
Checking accuracy on validation set
Got 452 / 1000 correct (45.20)

Epoch: 0, Iteration 700, loss = 1.4849
Checking accuracy on validation set
Got 493 / 1000 correct (49.30)

766
Epoch: 1, Iteration 0, loss = 1.4339
Checking accuracy on validation set
Got 512 / 1000 correct (51.20)

Epoch: 1, Iteration 100, loss = 1.5095
Checking accuracy on validation set
Got 517 / 1000 correct (51.70)

Epoch: 1, Iteration 200, loss = 1.3235
Checking accuracy on validation set
Got 536 / 1000 correct (53.60)

Epoch: 1, Iteration 300, loss = 1.1312
Checking accuracy on validation set
Got 569 / 1000 correct (56.90)

Epoch: 1, Iteration 400, loss = 1.2431
Checking accuracy on validation set
Got 582 / 1000 correct (58.20)
```

```
Epoch: 1, Iteration 500, loss = 0.9272
Checking accuracy on validation set
Got 587 / 1000 correct (58.70)

Epoch: 1, Iteration 600, loss = 1.0039
Checking accuracy on validation set
Got 646 / 1000 correct (64.60)

Epoch: 1, Iteration 700, loss = 1.2936
Checking accuracy on validation set
Got 620 / 1000 correct (62.00)

766
Epoch: 2, Iteration 0, loss = 1.1144
Checking accuracy on validation set
Got 597 / 1000 correct (59.70)

Epoch: 2, Iteration 100, loss = 1.3048
Checking accuracy on validation set
Got 637 / 1000 correct (63.70)

Epoch: 2, Iteration 200, loss = 0.8679
Checking accuracy on validation set
Got 645 / 1000 correct (64.50)

Epoch: 2, Iteration 300, loss = 1.2361
Checking accuracy on validation set
Got 660 / 1000 correct (66.00)

Epoch: 2, Iteration 400, loss = 0.6617
Checking accuracy on validation set
Got 667 / 1000 correct (66.70)

Epoch: 2, Iteration 500, loss = 1.0003
Checking accuracy on validation set
Got 696 / 1000 correct (69.60)

Epoch: 2, Iteration 600, loss = 1.1792
Checking accuracy on validation set
Got 684 / 1000 correct (68.40)

Epoch: 2, Iteration 700, loss = 0.7483
Checking accuracy on validation set
Got 693 / 1000 correct (69.30)

766
Epoch: 3, Iteration 0, loss = 0.8898
```

```
Checking accuracy on validation set
Got 704 / 1000 correct (70.40)

Epoch: 3, Iteration 100, loss = 0.8265
Checking accuracy on validation set
Got 721 / 1000 correct (72.10)

Epoch: 3, Iteration 200, loss = 0.7055
Checking accuracy on validation set
Got 686 / 1000 correct (68.60)

Epoch: 3, Iteration 300, loss = 0.8557
Checking accuracy on validation set
Got 723 / 1000 correct (72.30)

Epoch: 3, Iteration 400, loss = 0.7421
Checking accuracy on validation set
Got 740 / 1000 correct (74.00)

Epoch: 3, Iteration 500, loss = 1.2978
Checking accuracy on validation set
Got 734 / 1000 correct (73.40)

Epoch: 3, Iteration 600, loss = 0.6813
Checking accuracy on validation set
Got 696 / 1000 correct (69.60)

Epoch: 3, Iteration 700, loss = 0.8648
Checking accuracy on validation set
Got 717 / 1000 correct (71.70)

766
Epoch: 4, Iteration 0, loss = 0.6326
Checking accuracy on validation set
Got 757 / 1000 correct (75.70)

Epoch: 4, Iteration 100, loss = 0.8266
Checking accuracy on validation set
Got 728 / 1000 correct (72.80)

Epoch: 4, Iteration 200, loss = 0.8983
Checking accuracy on validation set
Got 751 / 1000 correct (75.10)

Epoch: 4, Iteration 300, loss = 0.8363
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)
```

```
Epoch: 4, Iteration 400, loss = 0.7216
Checking accuracy on validation set
Got 787 / 1000 correct (78.70)

Epoch: 4, Iteration 500, loss = 0.7817
Checking accuracy on validation set
Got 746 / 1000 correct (74.60)

Epoch: 4, Iteration 600, loss = 0.8122
Checking accuracy on validation set
Got 788 / 1000 correct (78.80)

Epoch: 4, Iteration 700, loss = 0.7207
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

766
Epoch: 5, Iteration 0, loss = 0.7926
Checking accuracy on validation set
Got 762 / 1000 correct (76.20)

Epoch: 5, Iteration 100, loss = 0.5898
Checking accuracy on validation set
Got 827 / 1000 correct (82.70)

Epoch: 5, Iteration 200, loss = 0.4040
Checking accuracy on validation set
Got 839 / 1000 correct (83.90)

Epoch: 5, Iteration 300, loss = 0.6447
Checking accuracy on validation set
Got 843 / 1000 correct (84.30)

Epoch: 5, Iteration 400, loss = 0.4707
Checking accuracy on validation set
Got 843 / 1000 correct (84.30)

Epoch: 5, Iteration 500, loss = 0.3317
Checking accuracy on validation set
Got 850 / 1000 correct (85.00)

Epoch: 5, Iteration 600, loss = 0.4963
Checking accuracy on validation set
Got 844 / 1000 correct (84.40)

Epoch: 5, Iteration 700, loss = 0.7133
Checking accuracy on validation set
Got 839 / 1000 correct (83.90)
```

```
766
Epoch: 6, Iteration 0, loss = 0.5046
Checking accuracy on validation set
Got 840 / 1000 correct (84.00)

Epoch: 6, Iteration 100, loss = 0.4456
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

Epoch: 6, Iteration 200, loss = 0.3964
Checking accuracy on validation set
Got 856 / 1000 correct (85.60)

Epoch: 6, Iteration 300, loss = 0.3075
Checking accuracy on validation set
Got 854 / 1000 correct (85.40)

Epoch: 6, Iteration 400, loss = 0.4242
Checking accuracy on validation set
Got 845 / 1000 correct (84.50)

Epoch: 6, Iteration 500, loss = 0.4490
Checking accuracy on validation set
Got 862 / 1000 correct (86.20)

Epoch: 6, Iteration 600, loss = 0.5258
Checking accuracy on validation set
Got 855 / 1000 correct (85.50)

Epoch: 6, Iteration 700, loss = 0.5954
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

766
Epoch: 7, Iteration 0, loss = 0.5758
Checking accuracy on validation set
Got 857 / 1000 correct (85.70)

Epoch: 7, Iteration 100, loss = 0.4514
Checking accuracy on validation set
Got 857 / 1000 correct (85.70)

Epoch: 7, Iteration 200, loss = 0.5223
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

Epoch: 7, Iteration 300, loss = 0.3769
```

```
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 7, Iteration 400, loss = 0.5434
Checking accuracy on validation set
Got 860 / 1000 correct (86.00)

Epoch: 7, Iteration 500, loss = 0.4132
Checking accuracy on validation set
Got 866 / 1000 correct (86.60)

Epoch: 7, Iteration 600, loss = 0.4822
Checking accuracy on validation set
Got 864 / 1000 correct (86.40)

Epoch: 7, Iteration 700, loss = 0.3455
Checking accuracy on validation set
Got 865 / 1000 correct (86.50)

766
Epoch: 8, Iteration 0, loss = 0.3441
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 8, Iteration 100, loss = 0.3791
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 8, Iteration 200, loss = 0.4796
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 8, Iteration 300, loss = 0.3259
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 8, Iteration 400, loss = 0.3054
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)

Epoch: 8, Iteration 500, loss = 0.3345
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 8, Iteration 600, loss = 0.3371
Checking accuracy on validation set
Got 869 / 1000 correct (86.90)
```

```
Epoch: 8, Iteration 700, loss = 0.5068
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)

766
Epoch: 9, Iteration 0, loss = 0.5104
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 9, Iteration 100, loss = 0.2198
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 9, Iteration 200, loss = 0.3055
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)

Epoch: 9, Iteration 300, loss = 0.5864
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Epoch: 9, Iteration 400, loss = 0.2931
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

Epoch: 9, Iteration 500, loss = 0.2711
Checking accuracy on validation set
Got 883 / 1000 correct (88.30)

Epoch: 9, Iteration 600, loss = 0.4161
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

Epoch: 9, Iteration 700, loss = 0.4150
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)

Checking accuracy on validation set
Got 881 / 1000 correct (88.10)
---- New lr = 0.00224  and gamma = 0.200 ----
766
Epoch: 0, Iteration 0, loss = 3.3400
Checking accuracy on validation set
Got 79 / 1000 correct (7.90)

Epoch: 0, Iteration 100, loss = 2.0673
Checking accuracy on validation set
Got 264 / 1000 correct (26.40)
```

```
Epoch: 0, Iteration 200, loss = 1.6844
Checking accuracy on validation set
Got 351 / 1000 correct (35.10)

Epoch: 0, Iteration 300, loss = 1.4802
Checking accuracy on validation set
Got 391 / 1000 correct (39.10)

Epoch: 0, Iteration 400, loss = 1.7347
Checking accuracy on validation set
Got 420 / 1000 correct (42.00)

Epoch: 0, Iteration 500, loss = 1.3526
Checking accuracy on validation set
Got 443 / 1000 correct (44.30)

Epoch: 0, Iteration 600, loss = 2.0143
Checking accuracy on validation set
Got 384 / 1000 correct (38.40)

Epoch: 0, Iteration 700, loss = 1.4733
Checking accuracy on validation set
Got 455 / 1000 correct (45.50)

766
Epoch: 1, Iteration 0, loss = 1.6008
Checking accuracy on validation set
Got 449 / 1000 correct (44.90)

Epoch: 1, Iteration 100, loss = 1.4484
Checking accuracy on validation set
Got 517 / 1000 correct (51.70)

Epoch: 1, Iteration 200, loss = 1.4111
Checking accuracy on validation set
Got 501 / 1000 correct (50.10)

Epoch: 1, Iteration 300, loss = 1.3083
Checking accuracy on validation set
Got 554 / 1000 correct (55.40)

Epoch: 1, Iteration 400, loss = 1.4190
Checking accuracy on validation set
Got 570 / 1000 correct (57.00)

Epoch: 1, Iteration 500, loss = 1.0279
Checking accuracy on validation set
```

```
Got 620 / 1000 correct (62.00)

Epoch: 1, Iteration 600, loss = 1.0156
Checking accuracy on validation set
Got 618 / 1000 correct (61.80)

Epoch: 1, Iteration 700, loss = 1.0270
Checking accuracy on validation set
Got 631 / 1000 correct (63.10)

766
Epoch: 2, Iteration 0, loss = 0.7607
Checking accuracy on validation set
Got 648 / 1000 correct (64.80)

Epoch: 2, Iteration 100, loss = 1.0502
Checking accuracy on validation set
Got 637 / 1000 correct (63.70)

Epoch: 2, Iteration 200, loss = 1.2713
Checking accuracy on validation set
Got 648 / 1000 correct (64.80)

Epoch: 2, Iteration 300, loss = 0.9643
Checking accuracy on validation set
Got 655 / 1000 correct (65.50)

Epoch: 2, Iteration 400, loss = 1.0713
Checking accuracy on validation set
Got 665 / 1000 correct (66.50)

Epoch: 2, Iteration 500, loss = 0.9282
Checking accuracy on validation set
Got 714 / 1000 correct (71.40)

Epoch: 2, Iteration 600, loss = 0.8041
Checking accuracy on validation set
Got 721 / 1000 correct (72.10)

Epoch: 2, Iteration 700, loss = 1.0561
Checking accuracy on validation set
Got 679 / 1000 correct (67.90)

766
Epoch: 3, Iteration 0, loss = 0.7627
Checking accuracy on validation set
Got 702 / 1000 correct (70.20)
```

```
Epoch: 3, Iteration 100, loss = 0.9045
Checking accuracy on validation set
Got 671 / 1000 correct (67.10)

Epoch: 3, Iteration 200, loss = 0.8641
Checking accuracy on validation set
Got 659 / 1000 correct (65.90)

Epoch: 3, Iteration 300, loss = 0.8158
Checking accuracy on validation set
Got 738 / 1000 correct (73.80)

Epoch: 3, Iteration 400, loss = 0.9471
Checking accuracy on validation set
Got 725 / 1000 correct (72.50)

Epoch: 3, Iteration 500, loss = 0.7963
Checking accuracy on validation set
Got 719 / 1000 correct (71.90)

Epoch: 3, Iteration 600, loss = 1.0158
Checking accuracy on validation set
Got 750 / 1000 correct (75.00)

Epoch: 3, Iteration 700, loss = 1.1738
Checking accuracy on validation set
Got 764 / 1000 correct (76.40)

766
Epoch: 4, Iteration 0, loss = 0.7115
Checking accuracy on validation set
Got 744 / 1000 correct (74.40)

Epoch: 4, Iteration 100, loss = 0.8255
Checking accuracy on validation set
Got 761 / 1000 correct (76.10)

Epoch: 4, Iteration 200, loss = 0.6834
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

Epoch: 4, Iteration 300, loss = 0.5801
Checking accuracy on validation set
Got 787 / 1000 correct (78.70)

Epoch: 4, Iteration 400, loss = 0.5836
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)
```

```
Epoch: 4, Iteration 500, loss = 0.6806
Checking accuracy on validation set
Got 776 / 1000 correct (77.60)

Epoch: 4, Iteration 600, loss = 0.7339
Checking accuracy on validation set
Got 775 / 1000 correct (77.50)

Epoch: 4, Iteration 700, loss = 0.8451
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

766
Epoch: 5, Iteration 0, loss = 0.6451
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 5, Iteration 100, loss = 0.4476
Checking accuracy on validation set
Got 832 / 1000 correct (83.20)

Epoch: 5, Iteration 200, loss = 0.2803
Checking accuracy on validation set
Got 833 / 1000 correct (83.30)

Epoch: 5, Iteration 300, loss = 0.4305
Checking accuracy on validation set
Got 838 / 1000 correct (83.80)

Epoch: 5, Iteration 400, loss = 0.4481
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

Epoch: 5, Iteration 500, loss = 0.3994
Checking accuracy on validation set
Got 845 / 1000 correct (84.50)

Epoch: 5, Iteration 600, loss = 0.4655
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 5, Iteration 700, loss = 0.7997
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

766
Epoch: 6, Iteration 0, loss = 0.3839
```

```
Checking accuracy on validation set
Got 847 / 1000 correct (84.70)

Epoch: 6, Iteration 100, loss = 0.6031
Checking accuracy on validation set
Got 857 / 1000 correct (85.70)

Epoch: 6, Iteration 200, loss = 0.5790
Checking accuracy on validation set
Got 852 / 1000 correct (85.20)

Epoch: 6, Iteration 300, loss = 0.4635
Checking accuracy on validation set
Got 850 / 1000 correct (85.00)

Epoch: 6, Iteration 400, loss = 0.4370
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 6, Iteration 500, loss = 0.4937
Checking accuracy on validation set
Got 855 / 1000 correct (85.50)

Epoch: 6, Iteration 600, loss = 0.4296
Checking accuracy on validation set
Got 841 / 1000 correct (84.10)

Epoch: 6, Iteration 700, loss = 0.4188
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

766
Epoch: 7, Iteration 0, loss = 0.3501
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

Epoch: 7, Iteration 100, loss = 0.4365
Checking accuracy on validation set
Got 862 / 1000 correct (86.20)

Epoch: 7, Iteration 200, loss = 0.2846
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

Epoch: 7, Iteration 300, loss = 0.5365
Checking accuracy on validation set
Got 855 / 1000 correct (85.50)
```

```
Epoch: 7, Iteration 400, loss = 0.4087
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

Epoch: 7, Iteration 500, loss = 0.3588
Checking accuracy on validation set
Got 875 / 1000 correct (87.50)

Epoch: 7, Iteration 600, loss = 0.3979
Checking accuracy on validation set
Got 865 / 1000 correct (86.50)

Epoch: 7, Iteration 700, loss = 0.4056
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

766
Epoch: 8, Iteration 0, loss = 0.2877
Checking accuracy on validation set
Got 861 / 1000 correct (86.10)

Epoch: 8, Iteration 100, loss = 0.3343
Checking accuracy on validation set
Got 860 / 1000 correct (86.00)

Epoch: 8, Iteration 200, loss = 0.5482
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 8, Iteration 300, loss = 0.3078
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)

Epoch: 8, Iteration 400, loss = 0.4083
Checking accuracy on validation set
Got 854 / 1000 correct (85.40)

Epoch: 8, Iteration 500, loss = 0.4440
Checking accuracy on validation set
Got 869 / 1000 correct (86.90)

Epoch: 8, Iteration 600, loss = 0.3905
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 8, Iteration 700, loss = 0.5507
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)
```

```
766
Epoch: 9, Iteration 0, loss = 0.4986
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

Epoch: 9, Iteration 100, loss = 0.3605
Checking accuracy on validation set
Got 885 / 1000 correct (88.50)

Epoch: 9, Iteration 200, loss = 0.4014
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Epoch: 9, Iteration 300, loss = 0.2548
Checking accuracy on validation set
Got 890 / 1000 correct (89.00)

Epoch: 9, Iteration 400, loss = 0.2906
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 9, Iteration 500, loss = 0.2563
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 9, Iteration 600, loss = 0.3032
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

Epoch: 9, Iteration 700, loss = 0.3767
Checking accuracy on validation set
Got 890 / 1000 correct (89.00)

Checking accuracy on validation set
Got 893 / 1000 correct (89.30)
---- New lr = 0.00399  and gamma = 0.200 ----
766
Epoch: 0, Iteration 0, loss = 3.3441
Checking accuracy on validation set
Got 98 / 1000 correct (9.80)

Epoch: 0, Iteration 100, loss = 2.0383
Checking accuracy on validation set
Got 237 / 1000 correct (23.70)

Epoch: 0, Iteration 200, loss = 1.9783
Checking accuracy on validation set
```

```
Got 320 / 1000 correct (32.00)

Epoch: 0, Iteration 300, loss = 1.7798
Checking accuracy on validation set
Got 387 / 1000 correct (38.70)

Epoch: 0, Iteration 400, loss = 1.9845
Checking accuracy on validation set
Got 403 / 1000 correct (40.30)

Epoch: 0, Iteration 500, loss = 1.6205
Checking accuracy on validation set
Got 423 / 1000 correct (42.30)

Epoch: 0, Iteration 600, loss = 1.4477
Checking accuracy on validation set
Got 404 / 1000 correct (40.40)

Epoch: 0, Iteration 700, loss = 1.4039
Checking accuracy on validation set
Got 458 / 1000 correct (45.80)

766
Epoch: 1, Iteration 0, loss = 1.6623
Checking accuracy on validation set
Got 467 / 1000 correct (46.70)

Epoch: 1, Iteration 100, loss = 1.3914
Checking accuracy on validation set
Got 521 / 1000 correct (52.10)

Epoch: 1, Iteration 200, loss = 1.5173
Checking accuracy on validation set
Got 470 / 1000 correct (47.00)

Epoch: 1, Iteration 300, loss = 1.4042
Checking accuracy on validation set
Got 521 / 1000 correct (52.10)

Epoch: 1, Iteration 400, loss = 1.3632
Checking accuracy on validation set
Got 561 / 1000 correct (56.10)

Epoch: 1, Iteration 500, loss = 1.2489
Checking accuracy on validation set
Got 594 / 1000 correct (59.40)

Epoch: 1, Iteration 600, loss = 0.8850
```

```
Checking accuracy on validation set
Got 568 / 1000 correct (56.80)

Epoch: 1, Iteration 700, loss = 1.1263
Checking accuracy on validation set
Got 628 / 1000 correct (62.80)

766
Epoch: 2, Iteration 0, loss = 1.1349
Checking accuracy on validation set
Got 656 / 1000 correct (65.60)

Epoch: 2, Iteration 100, loss = 1.0982
Checking accuracy on validation set
Got 594 / 1000 correct (59.40)

Epoch: 2, Iteration 200, loss = 1.1382
Checking accuracy on validation set
Got 651 / 1000 correct (65.10)

Epoch: 2, Iteration 300, loss = 1.0693
Checking accuracy on validation set
Got 663 / 1000 correct (66.30)

Epoch: 2, Iteration 400, loss = 0.9793
Checking accuracy on validation set
Got 650 / 1000 correct (65.00)

Epoch: 2, Iteration 500, loss = 0.9308
Checking accuracy on validation set
Got 668 / 1000 correct (66.80)

Epoch: 2, Iteration 600, loss = 1.1331
Checking accuracy on validation set
Got 717 / 1000 correct (71.70)

Epoch: 2, Iteration 700, loss = 1.1032
Checking accuracy on validation set
Got 678 / 1000 correct (67.80)

766
Epoch: 3, Iteration 0, loss = 0.7419
Checking accuracy on validation set
Got 680 / 1000 correct (68.00)

Epoch: 3, Iteration 100, loss = 1.3553
Checking accuracy on validation set
Got 710 / 1000 correct (71.00)
```

```
Epoch: 3, Iteration 200, loss = 0.8757
Checking accuracy on validation set
Got 725 / 1000 correct (72.50)

Epoch: 3, Iteration 300, loss = 0.8168
Checking accuracy on validation set
Got 720 / 1000 correct (72.00)

Epoch: 3, Iteration 400, loss = 0.8909
Checking accuracy on validation set
Got 705 / 1000 correct (70.50)

Epoch: 3, Iteration 500, loss = 0.8957
Checking accuracy on validation set
Got 733 / 1000 correct (73.30)

Epoch: 3, Iteration 600, loss = 0.8328
Checking accuracy on validation set
Got 674 / 1000 correct (67.40)

Epoch: 3, Iteration 700, loss = 0.9733
Checking accuracy on validation set
Got 722 / 1000 correct (72.20)

766
Epoch: 4, Iteration 0, loss = 0.6503
Checking accuracy on validation set
Got 750 / 1000 correct (75.00)

Epoch: 4, Iteration 100, loss = 0.8042
Checking accuracy on validation set
Got 756 / 1000 correct (75.60)

Epoch: 4, Iteration 200, loss = 0.7708
Checking accuracy on validation set
Got 748 / 1000 correct (74.80)

Epoch: 4, Iteration 300, loss = 0.7363
Checking accuracy on validation set
Got 663 / 1000 correct (66.30)

Epoch: 4, Iteration 400, loss = 1.0033
Checking accuracy on validation set
Got 763 / 1000 correct (76.30)

Epoch: 4, Iteration 500, loss = 0.8366
Checking accuracy on validation set
```

```
Got 769 / 1000 correct (76.90)

Epoch: 4, Iteration 600, loss = 0.8341
Checking accuracy on validation set
Got 731 / 1000 correct (73.10)

Epoch: 4, Iteration 700, loss = 0.6722
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

766
Epoch: 5, Iteration 0, loss = 0.5519
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 5, Iteration 100, loss = 0.6087
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 5, Iteration 200, loss = 0.5493
Checking accuracy on validation set
Got 825 / 1000 correct (82.50)

Epoch: 5, Iteration 300, loss = 0.4529
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 5, Iteration 400, loss = 0.4955
Checking accuracy on validation set
Got 828 / 1000 correct (82.80)

Epoch: 5, Iteration 500, loss = 0.5173
Checking accuracy on validation set
Got 817 / 1000 correct (81.70)

Epoch: 5, Iteration 600, loss = 0.6498
Checking accuracy on validation set
Got 843 / 1000 correct (84.30)

Epoch: 5, Iteration 700, loss = 0.4708
Checking accuracy on validation set
Got 836 / 1000 correct (83.60)

766
Epoch: 6, Iteration 0, loss = 0.3194
Checking accuracy on validation set
Got 843 / 1000 correct (84.30)
```

```
Epoch: 6, Iteration 100, loss = 0.4300
Checking accuracy on validation set
Got 842 / 1000 correct (84.20)

Epoch: 6, Iteration 200, loss = 0.3447
Checking accuracy on validation set
Got 842 / 1000 correct (84.20)

Epoch: 6, Iteration 300, loss = 0.2981
Checking accuracy on validation set
Got 846 / 1000 correct (84.60)

Epoch: 6, Iteration 400, loss = 0.3843
Checking accuracy on validation set
Got 840 / 1000 correct (84.00)

Epoch: 6, Iteration 500, loss = 0.4544
Checking accuracy on validation set
Got 838 / 1000 correct (83.80)

Epoch: 6, Iteration 600, loss = 0.5354
Checking accuracy on validation set
Got 847 / 1000 correct (84.70)

Epoch: 6, Iteration 700, loss = 0.4964
Checking accuracy on validation set
Got 847 / 1000 correct (84.70)

766
Epoch: 7, Iteration 0, loss = 0.5417
Checking accuracy on validation set
Got 845 / 1000 correct (84.50)

Epoch: 7, Iteration 100, loss = 0.4589
Checking accuracy on validation set
Got 849 / 1000 correct (84.90)

Epoch: 7, Iteration 200, loss = 0.5187
Checking accuracy on validation set
Got 852 / 1000 correct (85.20)

Epoch: 7, Iteration 300, loss = 0.2976
Checking accuracy on validation set
Got 858 / 1000 correct (85.80)

Epoch: 7, Iteration 400, loss = 0.3887
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)
```

```
Epoch: 7, Iteration 500, loss = 0.4260
Checking accuracy on validation set
Got 851 / 1000 correct (85.10)

Epoch: 7, Iteration 600, loss = 0.4061
Checking accuracy on validation set
Got 857 / 1000 correct (85.70)

Epoch: 7, Iteration 700, loss = 0.3330
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

766
Epoch: 8, Iteration 0, loss = 0.4170
Checking accuracy on validation set
Got 864 / 1000 correct (86.40)

Epoch: 8, Iteration 100, loss = 0.4547
Checking accuracy on validation set
Got 850 / 1000 correct (85.00)

Epoch: 8, Iteration 200, loss = 0.4136
Checking accuracy on validation set
Got 865 / 1000 correct (86.50)

Epoch: 8, Iteration 300, loss = 0.3343
Checking accuracy on validation set
Got 870 / 1000 correct (87.00)

Epoch: 8, Iteration 400, loss = 0.3868
Checking accuracy on validation set
Got 865 / 1000 correct (86.50)

Epoch: 8, Iteration 500, loss = 0.3472
Checking accuracy on validation set
Got 858 / 1000 correct (85.80)

Epoch: 8, Iteration 600, loss = 0.5305
Checking accuracy on validation set
Got 855 / 1000 correct (85.50)

Epoch: 8, Iteration 700, loss = 0.4608
Checking accuracy on validation set
Got 860 / 1000 correct (86.00)

766
Epoch: 9, Iteration 0, loss = 0.3239
```

```
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

Epoch: 9, Iteration 100, loss = 0.2941
Checking accuracy on validation set
Got 881 / 1000 correct (88.10)

Epoch: 9, Iteration 200, loss = 0.2810
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 9, Iteration 300, loss = 0.2725
Checking accuracy on validation set
Got 869 / 1000 correct (86.90)

Epoch: 9, Iteration 400, loss = 0.2608
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

Epoch: 9, Iteration 500, loss = 0.4872
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 9, Iteration 600, loss = 0.2028
Checking accuracy on validation set
Got 883 / 1000 correct (88.30)

Epoch: 9, Iteration 700, loss = 0.3407
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Checking accuracy on validation set
Got 885 / 1000 correct (88.50)
---- New lr = 0.00235  and gamma = 0.200 ----
766
Epoch: 0, Iteration 0, loss = 4.3808
Checking accuracy on validation set
Got 119 / 1000 correct (11.90)

Epoch: 0, Iteration 100, loss = 1.7424
Checking accuracy on validation set
Got 287 / 1000 correct (28.70)

Epoch: 0, Iteration 200, loss = 1.6634
Checking accuracy on validation set
Got 408 / 1000 correct (40.80)

Epoch: 0, Iteration 300, loss = 1.6876
```

```
Checking accuracy on validation set
Got 414 / 1000 correct (41.40)

Epoch: 0, Iteration 400, loss = 1.5370
Checking accuracy on validation set
Got 413 / 1000 correct (41.30)

Epoch: 0, Iteration 500, loss = 1.7662
Checking accuracy on validation set
Got 423 / 1000 correct (42.30)

Epoch: 0, Iteration 600, loss = 1.5063
Checking accuracy on validation set
Got 458 / 1000 correct (45.80)

Epoch: 0, Iteration 700, loss = 1.3563
Checking accuracy on validation set
Got 544 / 1000 correct (54.40)

766
Epoch: 1, Iteration 0, loss = 1.3317
Checking accuracy on validation set
Got 479 / 1000 correct (47.90)

Epoch: 1, Iteration 100, loss = 1.2209
Checking accuracy on validation set
Got 527 / 1000 correct (52.70)

Epoch: 1, Iteration 200, loss = 1.1528
Checking accuracy on validation set
Got 537 / 1000 correct (53.70)

Epoch: 1, Iteration 300, loss = 1.1037
Checking accuracy on validation set
Got 592 / 1000 correct (59.20)

Epoch: 1, Iteration 400, loss = 1.3538
Checking accuracy on validation set
Got 596 / 1000 correct (59.60)

Epoch: 1, Iteration 500, loss = 1.0600
Checking accuracy on validation set
Got 646 / 1000 correct (64.60)

Epoch: 1, Iteration 600, loss = 1.2763
Checking accuracy on validation set
Got 605 / 1000 correct (60.50)
```

```
Epoch: 1, Iteration 700, loss = 1.0419
Checking accuracy on validation set
Got 635 / 1000 correct (63.50)

766
Epoch: 2, Iteration 0, loss = 0.9005
Checking accuracy on validation set
Got 666 / 1000 correct (66.60)

Epoch: 2, Iteration 100, loss = 1.1208
Checking accuracy on validation set
Got 621 / 1000 correct (62.10)

Epoch: 2, Iteration 200, loss = 0.8994
Checking accuracy on validation set
Got 700 / 1000 correct (70.00)

Epoch: 2, Iteration 300, loss = 1.1205
Checking accuracy on validation set
Got 602 / 1000 correct (60.20)

Epoch: 2, Iteration 400, loss = 0.8429
Checking accuracy on validation set
Got 656 / 1000 correct (65.60)

Epoch: 2, Iteration 500, loss = 0.7491
Checking accuracy on validation set
Got 716 / 1000 correct (71.60)

Epoch: 2, Iteration 600, loss = 1.0532
Checking accuracy on validation set
Got 706 / 1000 correct (70.60)

Epoch: 2, Iteration 700, loss = 0.8063
Checking accuracy on validation set
Got 716 / 1000 correct (71.60)

766
Epoch: 3, Iteration 0, loss = 1.0231
Checking accuracy on validation set
Got 711 / 1000 correct (71.10)

Epoch: 3, Iteration 100, loss = 0.6705
Checking accuracy on validation set
Got 719 / 1000 correct (71.90)

Epoch: 3, Iteration 200, loss = 1.1768
Checking accuracy on validation set
```

```
Got 720 / 1000 correct (72.00)

Epoch: 3, Iteration 300, loss = 0.6276
Checking accuracy on validation set
Got 749 / 1000 correct (74.90)

Epoch: 3, Iteration 400, loss = 0.6319
Checking accuracy on validation set
Got 758 / 1000 correct (75.80)

Epoch: 3, Iteration 500, loss = 0.8928
Checking accuracy on validation set
Got 742 / 1000 correct (74.20)

Epoch: 3, Iteration 600, loss = 0.8681
Checking accuracy on validation set
Got 760 / 1000 correct (76.00)

Epoch: 3, Iteration 700, loss = 0.6440
Checking accuracy on validation set
Got 735 / 1000 correct (73.50)

766
Epoch: 4, Iteration 0, loss = 0.6910
Checking accuracy on validation set
Got 745 / 1000 correct (74.50)

Epoch: 4, Iteration 100, loss = 0.7559
Checking accuracy on validation set
Got 757 / 1000 correct (75.70)

Epoch: 4, Iteration 200, loss = 0.6109
Checking accuracy on validation set
Got 764 / 1000 correct (76.40)

Epoch: 4, Iteration 300, loss = 0.7437
Checking accuracy on validation set
Got 768 / 1000 correct (76.80)

Epoch: 4, Iteration 400, loss = 0.5569
Checking accuracy on validation set
Got 789 / 1000 correct (78.90)

Epoch: 4, Iteration 500, loss = 0.5803
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 4, Iteration 600, loss = 0.5346
```

```
Checking accuracy on validation set
Got 796 / 1000 correct (79.60)

Epoch: 4, Iteration 700, loss = 0.4527
Checking accuracy on validation set
Got 774 / 1000 correct (77.40)

766
Epoch: 5, Iteration 0, loss = 0.7097
Checking accuracy on validation set
Got 801 / 1000 correct (80.10)

Epoch: 5, Iteration 100, loss = 0.5696
Checking accuracy on validation set
Got 844 / 1000 correct (84.40)

Epoch: 5, Iteration 200, loss = 0.4183
Checking accuracy on validation set
Got 846 / 1000 correct (84.60)

Epoch: 5, Iteration 300, loss = 0.4147
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

Epoch: 5, Iteration 400, loss = 0.5540
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

Epoch: 5, Iteration 500, loss = 0.4827
Checking accuracy on validation set
Got 848 / 1000 correct (84.80)

Epoch: 5, Iteration 600, loss = 0.5464
Checking accuracy on validation set
Got 864 / 1000 correct (86.40)

Epoch: 5, Iteration 700, loss = 0.6117
Checking accuracy on validation set
Got 854 / 1000 correct (85.40)

766
Epoch: 6, Iteration 0, loss = 0.3822
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 6, Iteration 100, loss = 0.5609
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)
```

```
Epoch: 6, Iteration 200, loss = 0.7965
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)

Epoch: 6, Iteration 300, loss = 0.4345
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

Epoch: 6, Iteration 400, loss = 0.5589
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 6, Iteration 500, loss = 0.4401
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 6, Iteration 600, loss = 0.4306
Checking accuracy on validation set
Got 865 / 1000 correct (86.50)

Epoch: 6, Iteration 700, loss = 0.3084
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

766
Epoch: 7, Iteration 0, loss = 0.2984
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

Epoch: 7, Iteration 100, loss = 0.7324
Checking accuracy on validation set
Got 875 / 1000 correct (87.50)

Epoch: 7, Iteration 200, loss = 0.4246
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)

Epoch: 7, Iteration 300, loss = 0.2730
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)

Epoch: 7, Iteration 400, loss = 0.3995
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

Epoch: 7, Iteration 500, loss = 0.3483
Checking accuracy on validation set
```

```
Got 873 / 1000 correct (87.30)

Epoch: 7, Iteration 600, loss = 0.3674
Checking accuracy on validation set
Got 866 / 1000 correct (86.60)

Epoch: 7, Iteration 700, loss = 0.4345
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)

766
Epoch: 8, Iteration 0, loss = 0.3267
Checking accuracy on validation set
Got 857 / 1000 correct (85.70)

Epoch: 8, Iteration 100, loss = 0.2322
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 8, Iteration 200, loss = 0.4576
Checking accuracy on validation set
Got 862 / 1000 correct (86.20)

Epoch: 8, Iteration 300, loss = 0.3227
Checking accuracy on validation set
Got 876 / 1000 correct (87.60)

Epoch: 8, Iteration 400, loss = 0.3256
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)

Epoch: 8, Iteration 500, loss = 0.2883
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

Epoch: 8, Iteration 600, loss = 0.5129
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)

Epoch: 8, Iteration 700, loss = 0.6178
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

766
Epoch: 9, Iteration 0, loss = 0.5951
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)
```

```
Epoch: 9, Iteration 100, loss = 0.2867
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

Epoch: 9, Iteration 200, loss = 0.2024
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 9, Iteration 300, loss = 0.3340
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 9, Iteration 400, loss = 0.3103
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 9, Iteration 500, loss = 0.3712
Checking accuracy on validation set
Got 895 / 1000 correct (89.50)

Epoch: 9, Iteration 600, loss = 0.4006
Checking accuracy on validation set
Got 901 / 1000 correct (90.10)

Epoch: 9, Iteration 700, loss = 0.3149
Checking accuracy on validation set
Got 890 / 1000 correct (89.00)

Checking accuracy on validation set
Got 891 / 1000 correct (89.10)
---- New lr = 0.00170  and gamma = 0.200 ----
766
Epoch: 0, Iteration 0, loss = 3.5384
Checking accuracy on validation set
Got 114 / 1000 correct (11.40)

Epoch: 0, Iteration 100, loss = 1.7893
Checking accuracy on validation set
Got 307 / 1000 correct (30.70)

Epoch: 0, Iteration 200, loss = 1.7394
Checking accuracy on validation set
Got 363 / 1000 correct (36.30)

Epoch: 0, Iteration 300, loss = 1.5583
Checking accuracy on validation set
Got 388 / 1000 correct (38.80)
```

```
Epoch: 0, Iteration 400, loss = 1.6195
Checking accuracy on validation set
Got 435 / 1000 correct (43.50)

Epoch: 0, Iteration 500, loss = 1.5559
Checking accuracy on validation set
Got 455 / 1000 correct (45.50)

Epoch: 0, Iteration 600, loss = 1.5190
Checking accuracy on validation set
Got 485 / 1000 correct (48.50)

Epoch: 0, Iteration 700, loss = 1.4212
Checking accuracy on validation set
Got 490 / 1000 correct (49.00)

766
Epoch: 1, Iteration 0, loss = 1.3042
Checking accuracy on validation set
Got 511 / 1000 correct (51.10)

Epoch: 1, Iteration 100, loss = 1.2058
Checking accuracy on validation set
Got 450 / 1000 correct (45.00)

Epoch: 1, Iteration 200, loss = 1.6638
Checking accuracy on validation set
Got 595 / 1000 correct (59.50)

Epoch: 1, Iteration 300, loss = 1.1053
Checking accuracy on validation set
Got 604 / 1000 correct (60.40)

Epoch: 1, Iteration 400, loss = 1.1026
Checking accuracy on validation set
Got 601 / 1000 correct (60.10)

Epoch: 1, Iteration 500, loss = 1.1718
Checking accuracy on validation set
Got 600 / 1000 correct (60.00)

Epoch: 1, Iteration 600, loss = 0.9558
Checking accuracy on validation set
Got 654 / 1000 correct (65.40)

Epoch: 1, Iteration 700, loss = 1.1013
Checking accuracy on validation set
Got 639 / 1000 correct (63.90)
```

```
766
Epoch: 2, Iteration 0, loss = 0.8864
Checking accuracy on validation set
Got 623 / 1000 correct (62.30)

Epoch: 2, Iteration 100, loss = 1.0272
Checking accuracy on validation set
Got 680 / 1000 correct (68.00)

Epoch: 2, Iteration 200, loss = 1.0119
Checking accuracy on validation set
Got 685 / 1000 correct (68.50)

Epoch: 2, Iteration 300, loss = 0.7593
Checking accuracy on validation set
Got 700 / 1000 correct (70.00)

Epoch: 2, Iteration 400, loss = 0.6974
Checking accuracy on validation set
Got 713 / 1000 correct (71.30)

Epoch: 2, Iteration 500, loss = 1.0174
Checking accuracy on validation set
Got 680 / 1000 correct (68.00)

Epoch: 2, Iteration 600, loss = 1.0014
Checking accuracy on validation set
Got 711 / 1000 correct (71.10)

Epoch: 2, Iteration 700, loss = 0.8271
Checking accuracy on validation set
Got 631 / 1000 correct (63.10)

766
Epoch: 3, Iteration 0, loss = 0.9375
Checking accuracy on validation set
Got 705 / 1000 correct (70.50)

Epoch: 3, Iteration 100, loss = 0.7072
Checking accuracy on validation set
Got 721 / 1000 correct (72.10)

Epoch: 3, Iteration 200, loss = 1.0054
Checking accuracy on validation set
Got 699 / 1000 correct (69.90)

Epoch: 3, Iteration 300, loss = 1.0299
```

```
Checking accuracy on validation set
Got 727 / 1000 correct (72.70)

Epoch: 3, Iteration 400, loss = 0.8531
Checking accuracy on validation set
Got 714 / 1000 correct (71.40)

Epoch: 3, Iteration 500, loss = 0.8423
Checking accuracy on validation set
Got 736 / 1000 correct (73.60)

Epoch: 3, Iteration 600, loss = 0.7333
Checking accuracy on validation set
Got 724 / 1000 correct (72.40)

Epoch: 3, Iteration 700, loss = 0.6610
Checking accuracy on validation set
Got 757 / 1000 correct (75.70)

766
Epoch: 4, Iteration 0, loss = 0.8058
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 4, Iteration 100, loss = 0.7237
Checking accuracy on validation set
Got 768 / 1000 correct (76.80)

Epoch: 4, Iteration 200, loss = 0.8137
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)

Epoch: 4, Iteration 300, loss = 0.7372
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 4, Iteration 400, loss = 0.5923
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

Epoch: 4, Iteration 500, loss = 0.5019
Checking accuracy on validation set
Got 788 / 1000 correct (78.80)

Epoch: 4, Iteration 600, loss = 0.7827
Checking accuracy on validation set
Got 777 / 1000 correct (77.70)
```

```
Epoch: 4, Iteration 700, loss = 0.5961
Checking accuracy on validation set
Got 786 / 1000 correct (78.60)

766
Epoch: 5, Iteration 0, loss = 0.5461
Checking accuracy on validation set
Got 799 / 1000 correct (79.90)

Epoch: 5, Iteration 100, loss = 0.5473
Checking accuracy on validation set
Got 843 / 1000 correct (84.30)

Epoch: 5, Iteration 200, loss = 0.4395
Checking accuracy on validation set
Got 838 / 1000 correct (83.80)

Epoch: 5, Iteration 300, loss = 0.6015
Checking accuracy on validation set
Got 851 / 1000 correct (85.10)

Epoch: 5, Iteration 400, loss = 0.5580
Checking accuracy on validation set
Got 847 / 1000 correct (84.70)

Epoch: 5, Iteration 500, loss = 0.3356
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

Epoch: 5, Iteration 600, loss = 0.5910
Checking accuracy on validation set
Got 858 / 1000 correct (85.80)

Epoch: 5, Iteration 700, loss = 0.4744
Checking accuracy on validation set
Got 854 / 1000 correct (85.40)

766
Epoch: 6, Iteration 0, loss = 0.2364
Checking accuracy on validation set
Got 850 / 1000 correct (85.00)

Epoch: 6, Iteration 100, loss = 0.3937
Checking accuracy on validation set
Got 861 / 1000 correct (86.10)

Epoch: 6, Iteration 200, loss = 0.5067
Checking accuracy on validation set
```

```
Got 860 / 1000 correct (86.00)

Epoch: 6, Iteration 300, loss = 0.6344
Checking accuracy on validation set
Got 861 / 1000 correct (86.10)

Epoch: 6, Iteration 400, loss = 0.4568
Checking accuracy on validation set
Got 864 / 1000 correct (86.40)

Epoch: 6, Iteration 500, loss = 0.5547
Checking accuracy on validation set
Got 855 / 1000 correct (85.50)

Epoch: 6, Iteration 600, loss = 0.5102
Checking accuracy on validation set
Got 866 / 1000 correct (86.60)

Epoch: 6, Iteration 700, loss = 0.5799
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

766
Epoch: 7, Iteration 0, loss = 0.4153
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 7, Iteration 100, loss = 0.1640
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 7, Iteration 200, loss = 0.4151
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 7, Iteration 300, loss = 0.4356
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)

Epoch: 7, Iteration 400, loss = 0.3498
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 7, Iteration 500, loss = 0.4946
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 7, Iteration 600, loss = 0.4006
```

```
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 7, Iteration 700, loss = 0.7344
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

766
Epoch: 8, Iteration 0, loss = 0.3042
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)

Epoch: 8, Iteration 100, loss = 0.3870
Checking accuracy on validation set
Got 876 / 1000 correct (87.60)

Epoch: 8, Iteration 200, loss = 0.2733
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 8, Iteration 300, loss = 0.2195
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)

Epoch: 8, Iteration 400, loss = 0.3259
Checking accuracy on validation set
Got 870 / 1000 correct (87.00)

Epoch: 8, Iteration 500, loss = 0.6561
Checking accuracy on validation set
Got 864 / 1000 correct (86.40)

Epoch: 8, Iteration 600, loss = 0.5186
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)

Epoch: 8, Iteration 700, loss = 0.2954
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

766
Epoch: 9, Iteration 0, loss = 0.2349
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 9, Iteration 100, loss = 0.2311
Checking accuracy on validation set
Got 881 / 1000 correct (88.10)
```

```
Epoch: 9, Iteration 200, loss = 0.4278
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 9, Iteration 300, loss = 0.2860
Checking accuracy on validation set
Got 890 / 1000 correct (89.00)

Epoch: 9, Iteration 400, loss = 0.3067
Checking accuracy on validation set
Got 891 / 1000 correct (89.10)

Epoch: 9, Iteration 500, loss = 0.3143
Checking accuracy on validation set
Got 890 / 1000 correct (89.00)

Epoch: 9, Iteration 600, loss = 0.2801
Checking accuracy on validation set
Got 888 / 1000 correct (88.80)

Epoch: 9, Iteration 700, loss = 0.1832
Checking accuracy on validation set
Got 890 / 1000 correct (89.00)

Checking accuracy on validation set
Got 891 / 1000 correct (89.10)
---- New lr = 0.00028  and gamma = 0.157 ----
766
Epoch: 0, Iteration 0, loss = 4.3223
Checking accuracy on validation set
Got 126 / 1000 correct (12.60)

Epoch: 0, Iteration 100, loss = 1.9050
Checking accuracy on validation set
Got 363 / 1000 correct (36.30)

Epoch: 0, Iteration 200, loss = 1.8971
Checking accuracy on validation set
Got 454 / 1000 correct (45.40)

Epoch: 0, Iteration 300, loss = 1.2633
Checking accuracy on validation set
Got 505 / 1000 correct (50.50)

Epoch: 0, Iteration 400, loss = 1.3635
Checking accuracy on validation set
Got 534 / 1000 correct (53.40)
```

```
Epoch: 0, Iteration 500, loss = 1.6452
Checking accuracy on validation set
Got 539 / 1000 correct (53.90)

Epoch: 0, Iteration 600, loss = 1.2916
Checking accuracy on validation set
Got 596 / 1000 correct (59.60)

Epoch: 0, Iteration 700, loss = 1.0500
Checking accuracy on validation set
Got 591 / 1000 correct (59.10)

766
Epoch: 1, Iteration 0, loss = 1.0049
Checking accuracy on validation set
Got 624 / 1000 correct (62.40)

Epoch: 1, Iteration 100, loss = 1.0560
Checking accuracy on validation set
Got 643 / 1000 correct (64.30)

Epoch: 1, Iteration 200, loss = 0.6617
Checking accuracy on validation set
Got 658 / 1000 correct (65.80)

Epoch: 1, Iteration 300, loss = 1.0707
Checking accuracy on validation set
Got 698 / 1000 correct (69.80)

Epoch: 1, Iteration 400, loss = 0.8459
Checking accuracy on validation set
Got 681 / 1000 correct (68.10)

Epoch: 1, Iteration 500, loss = 0.7423
Checking accuracy on validation set
Got 712 / 1000 correct (71.20)

Epoch: 1, Iteration 600, loss = 0.9377
Checking accuracy on validation set
Got 700 / 1000 correct (70.00)

Epoch: 1, Iteration 700, loss = 0.7620
Checking accuracy on validation set
Got 734 / 1000 correct (73.40)

766
Epoch: 2, Iteration 0, loss = 0.6666
```

```
Checking accuracy on validation set
Got 718 / 1000 correct (71.80)

Epoch: 2, Iteration 100, loss = 0.8997
Checking accuracy on validation set
Got 764 / 1000 correct (76.40)

Epoch: 2, Iteration 200, loss = 0.5957
Checking accuracy on validation set
Got 763 / 1000 correct (76.30)

Epoch: 2, Iteration 300, loss = 1.0742
Checking accuracy on validation set
Got 758 / 1000 correct (75.80)

Epoch: 2, Iteration 400, loss = 0.6781
Checking accuracy on validation set
Got 759 / 1000 correct (75.90)

Epoch: 2, Iteration 500, loss = 0.7096
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

Epoch: 2, Iteration 600, loss = 0.8003
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 2, Iteration 700, loss = 0.7257
Checking accuracy on validation set
Got 724 / 1000 correct (72.40)

766
Epoch: 3, Iteration 0, loss = 0.8673
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

Epoch: 3, Iteration 100, loss = 0.5970
Checking accuracy on validation set
Got 817 / 1000 correct (81.70)

Epoch: 3, Iteration 200, loss = 0.4027
Checking accuracy on validation set
Got 771 / 1000 correct (77.10)

Epoch: 3, Iteration 300, loss = 0.6468
Checking accuracy on validation set
Got 783 / 1000 correct (78.30)
```

```
Epoch: 3, Iteration 400, loss = 0.7374
Checking accuracy on validation set
Got 823 / 1000 correct (82.30)

Epoch: 3, Iteration 500, loss = 0.7456
Checking accuracy on validation set
Got 826 / 1000 correct (82.60)

Epoch: 3, Iteration 600, loss = 0.8067
Checking accuracy on validation set
Got 809 / 1000 correct (80.90)

Epoch: 3, Iteration 700, loss = 0.3778
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

766
Epoch: 4, Iteration 0, loss = 0.5895
Checking accuracy on validation set
Got 793 / 1000 correct (79.30)

Epoch: 4, Iteration 100, loss = 0.7542
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 4, Iteration 200, loss = 0.4184
Checking accuracy on validation set
Got 832 / 1000 correct (83.20)

Epoch: 4, Iteration 300, loss = 0.5718
Checking accuracy on validation set
Got 828 / 1000 correct (82.80)

Epoch: 4, Iteration 400, loss = 0.5560
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

Epoch: 4, Iteration 500, loss = 0.3611
Checking accuracy on validation set
Got 835 / 1000 correct (83.50)

Epoch: 4, Iteration 600, loss = 0.7504
Checking accuracy on validation set
Got 830 / 1000 correct (83.00)

Epoch: 4, Iteration 700, loss = 0.3494
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)
```

```
766
Epoch: 5, Iteration 0, loss = 0.5284
Checking accuracy on validation set
Got 842 / 1000 correct (84.20)

Epoch: 5, Iteration 100, loss = 0.5334
Checking accuracy on validation set
Got 855 / 1000 correct (85.50)

Epoch: 5, Iteration 200, loss = 0.4535
Checking accuracy on validation set
Got 855 / 1000 correct (85.50)

Epoch: 5, Iteration 300, loss = 0.4226
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 5, Iteration 400, loss = 0.4338
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 5, Iteration 500, loss = 0.5324
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 5, Iteration 600, loss = 0.3418
Checking accuracy on validation set
Got 869 / 1000 correct (86.90)

Epoch: 5, Iteration 700, loss = 0.3848
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

766
Epoch: 6, Iteration 0, loss = 0.3739
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 6, Iteration 100, loss = 0.4791
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)

Epoch: 6, Iteration 200, loss = 0.3140
Checking accuracy on validation set
Got 866 / 1000 correct (86.60)

Epoch: 6, Iteration 300, loss = 0.3110
```

```
Checking accuracy on validation set
Got 875 / 1000 correct (87.50)

Epoch: 6, Iteration 400, loss = 0.6300
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 6, Iteration 500, loss = 0.3704
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 6, Iteration 600, loss = 0.3339
Checking accuracy on validation set
Got 881 / 1000 correct (88.10)

Epoch: 6, Iteration 700, loss = 0.3635
Checking accuracy on validation set
Got 876 / 1000 correct (87.60)

766
Epoch: 7, Iteration 0, loss = 0.3913
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 7, Iteration 100, loss = 0.4652
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 7, Iteration 200, loss = 0.2616
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 7, Iteration 300, loss = 0.3416
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 7, Iteration 400, loss = 0.4999
Checking accuracy on validation set
Got 881 / 1000 correct (88.10)

Epoch: 7, Iteration 500, loss = 0.2048
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)

Epoch: 7, Iteration 600, loss = 0.4366
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)
```

```
Epoch: 7, Iteration 700, loss = 0.2647
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

766
Epoch: 8, Iteration 0, loss = 0.2614
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)

Epoch: 8, Iteration 100, loss = 0.2582
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 8, Iteration 200, loss = 0.3439
Checking accuracy on validation set
Got 888 / 1000 correct (88.80)

Epoch: 8, Iteration 300, loss = 0.3465
Checking accuracy on validation set
Got 876 / 1000 correct (87.60)

Epoch: 8, Iteration 400, loss = 0.4282
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

Epoch: 8, Iteration 500, loss = 0.2055
Checking accuracy on validation set
Got 888 / 1000 correct (88.80)

Epoch: 8, Iteration 600, loss = 0.4031
Checking accuracy on validation set
Got 891 / 1000 correct (89.10)

Epoch: 8, Iteration 700, loss = 0.2775
Checking accuracy on validation set
Got 892 / 1000 correct (89.20)

766
Epoch: 9, Iteration 0, loss = 0.4034
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Epoch: 9, Iteration 100, loss = 0.3101
Checking accuracy on validation set
Got 892 / 1000 correct (89.20)

Epoch: 9, Iteration 200, loss = 0.2920
Checking accuracy on validation set
```

```
Got 891 / 1000 correct (89.10)

Epoch: 9, Iteration 300, loss = 0.3061
Checking accuracy on validation set
Got 894 / 1000 correct (89.40)

Epoch: 9, Iteration 400, loss = 0.3022
Checking accuracy on validation set
Got 896 / 1000 correct (89.60)

Epoch: 9, Iteration 500, loss = 0.3115
Checking accuracy on validation set
Got 891 / 1000 correct (89.10)

Epoch: 9, Iteration 600, loss = 0.2317
Checking accuracy on validation set
Got 893 / 1000 correct (89.30)

Epoch: 9, Iteration 700, loss = 0.3365
Checking accuracy on validation set
Got 893 / 1000 correct (89.30)

Checking accuracy on validation set
Got 897 / 1000 correct (89.70)
---- New lr = 0.00024  and gamma = 0.157 ----
766
Epoch: 0, Iteration 0, loss = 3.2529
Checking accuracy on validation set
Got 92 / 1000 correct (9.20)

Epoch: 0, Iteration 100, loss = 2.0868
Checking accuracy on validation set
Got 386 / 1000 correct (38.60)

Epoch: 0, Iteration 200, loss = 1.5951
Checking accuracy on validation set
Got 422 / 1000 correct (42.20)

Epoch: 0, Iteration 300, loss = 1.2398
Checking accuracy on validation set
Got 483 / 1000 correct (48.30)

Epoch: 0, Iteration 400, loss = 1.3089
Checking accuracy on validation set
Got 521 / 1000 correct (52.10)

Epoch: 0, Iteration 500, loss = 1.2073
Checking accuracy on validation set
```

```
Got 541 / 1000 correct (54.10)

Epoch: 0, Iteration 600, loss = 1.3923
Checking accuracy on validation set
Got 563 / 1000 correct (56.30)

Epoch: 0, Iteration 700, loss = 1.4038
Checking accuracy on validation set
Got 617 / 1000 correct (61.70)

766
Epoch: 1, Iteration 0, loss = 1.1073
Checking accuracy on validation set
Got 576 / 1000 correct (57.60)

Epoch: 1, Iteration 100, loss = 1.0259
Checking accuracy on validation set
Got 653 / 1000 correct (65.30)

Epoch: 1, Iteration 200, loss = 1.0741
Checking accuracy on validation set
Got 633 / 1000 correct (63.30)

Epoch: 1, Iteration 300, loss = 1.1376
Checking accuracy on validation set
Got 653 / 1000 correct (65.30)

Epoch: 1, Iteration 400, loss = 1.1907
Checking accuracy on validation set
Got 659 / 1000 correct (65.90)

Epoch: 1, Iteration 500, loss = 0.9305
Checking accuracy on validation set
Got 708 / 1000 correct (70.80)

Epoch: 1, Iteration 600, loss = 0.6608
Checking accuracy on validation set
Got 710 / 1000 correct (71.00)

Epoch: 1, Iteration 700, loss = 0.7672
Checking accuracy on validation set
Got 720 / 1000 correct (72.00)

766
Epoch: 2, Iteration 0, loss = 1.0357
Checking accuracy on validation set
Got 722 / 1000 correct (72.20)
```

```
Epoch: 2, Iteration 100, loss = 0.7181
Checking accuracy on validation set
Got 729 / 1000 correct (72.90)

Epoch: 2, Iteration 200, loss = 0.6848
Checking accuracy on validation set
Got 733 / 1000 correct (73.30)

Epoch: 2, Iteration 300, loss = 0.5542
Checking accuracy on validation set
Got 755 / 1000 correct (75.50)

Epoch: 2, Iteration 400, loss = 0.6745
Checking accuracy on validation set
Got 723 / 1000 correct (72.30)

Epoch: 2, Iteration 500, loss = 0.6984
Checking accuracy on validation set
Got 763 / 1000 correct (76.30)

Epoch: 2, Iteration 600, loss = 0.6557
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)

Epoch: 2, Iteration 700, loss = 0.8747
Checking accuracy on validation set
Got 738 / 1000 correct (73.80)

766
Epoch: 3, Iteration 0, loss = 0.6127
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

Epoch: 3, Iteration 100, loss = 0.7351
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 3, Iteration 200, loss = 0.8717
Checking accuracy on validation set
Got 768 / 1000 correct (76.80)

Epoch: 3, Iteration 300, loss = 0.5615
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 3, Iteration 400, loss = 0.7351
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)
```

```
Epoch: 3, Iteration 500, loss = 0.4598
Checking accuracy on validation set
Got 816 / 1000 correct (81.60)

Epoch: 3, Iteration 600, loss = 0.4240
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

Epoch: 3, Iteration 700, loss = 0.5211
Checking accuracy on validation set
Got 809 / 1000 correct (80.90)

766
Epoch: 4, Iteration 0, loss = 0.6100
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 4, Iteration 100, loss = 0.5908
Checking accuracy on validation set
Got 820 / 1000 correct (82.00)

Epoch: 4, Iteration 200, loss = 0.5752
Checking accuracy on validation set
Got 804 / 1000 correct (80.40)

Epoch: 4, Iteration 300, loss = 0.5732
Checking accuracy on validation set
Got 805 / 1000 correct (80.50)

Epoch: 4, Iteration 400, loss = 0.6937
Checking accuracy on validation set
Got 761 / 1000 correct (76.10)

Epoch: 4, Iteration 500, loss = 0.8447
Checking accuracy on validation set
Got 786 / 1000 correct (78.60)

Epoch: 4, Iteration 600, loss = 0.6927
Checking accuracy on validation set
Got 794 / 1000 correct (79.40)

Epoch: 4, Iteration 700, loss = 0.5873
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

766
Epoch: 5, Iteration 0, loss = 0.8131
```

```
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

Epoch: 5, Iteration 100, loss = 0.4744
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

Epoch: 5, Iteration 200, loss = 0.4309
Checking accuracy on validation set
Got 851 / 1000 correct (85.10)

Epoch: 5, Iteration 300, loss = 0.2917
Checking accuracy on validation set
Got 860 / 1000 correct (86.00)

Epoch: 5, Iteration 400, loss = 0.5513
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

Epoch: 5, Iteration 500, loss = 0.3585
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

Epoch: 5, Iteration 600, loss = 0.2208
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 5, Iteration 700, loss = 0.1595
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)

766
Epoch: 6, Iteration 0, loss = 0.4061
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 6, Iteration 100, loss = 0.5259
Checking accuracy on validation set
Got 869 / 1000 correct (86.90)

Epoch: 6, Iteration 200, loss = 0.4616
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 6, Iteration 300, loss = 0.3907
Checking accuracy on validation set
Got 869 / 1000 correct (86.90)
```

```
Epoch: 6, Iteration 400, loss = 0.3680
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

Epoch: 6, Iteration 500, loss = 0.4195
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 6, Iteration 600, loss = 0.4059
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 6, Iteration 700, loss = 0.5927
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

766
Epoch: 7, Iteration 0, loss = 0.3025
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 7, Iteration 100, loss = 0.2992
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 7, Iteration 200, loss = 0.3503
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)

Epoch: 7, Iteration 300, loss = 0.4944
Checking accuracy on validation set
Got 875 / 1000 correct (87.50)

Epoch: 7, Iteration 400, loss = 0.2631
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 7, Iteration 500, loss = 0.4459
Checking accuracy on validation set
Got 870 / 1000 correct (87.00)

Epoch: 7, Iteration 600, loss = 0.2598
Checking accuracy on validation set
Got 883 / 1000 correct (88.30)

Epoch: 7, Iteration 700, loss = 0.4285
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)
```

```
766
Epoch: 8, Iteration 0, loss = 0.3171
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

Epoch: 8, Iteration 100, loss = 0.3878
Checking accuracy on validation set
Got 869 / 1000 correct (86.90)

Epoch: 8, Iteration 200, loss = 0.4071
Checking accuracy on validation set
Got 875 / 1000 correct (87.50)

Epoch: 8, Iteration 300, loss = 0.3048
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 8, Iteration 400, loss = 0.2519
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 8, Iteration 500, loss = 0.4327
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 8, Iteration 600, loss = 0.2929
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)

Epoch: 8, Iteration 700, loss = 0.4176
Checking accuracy on validation set
Got 876 / 1000 correct (87.60)

766
Epoch: 9, Iteration 0, loss = 0.2854
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Epoch: 9, Iteration 100, loss = 0.3639
Checking accuracy on validation set
Got 883 / 1000 correct (88.30)

Epoch: 9, Iteration 200, loss = 0.2505
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 9, Iteration 300, loss = 0.3558
```

```
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 9, Iteration 400, loss = 0.2580
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 9, Iteration 500, loss = 0.2672
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 9, Iteration 600, loss = 0.3460
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 9, Iteration 700, loss = 0.2265
Checking accuracy on validation set
Got 891 / 1000 correct (89.10)

Checking accuracy on validation set
Got 887 / 1000 correct (88.70)
---- New lr = 0.00040  and gamma = 0.156 ----
766
Epoch: 0, Iteration 0, loss = 3.0041
Checking accuracy on validation set
Got 113 / 1000 correct (11.30)

Epoch: 0, Iteration 100, loss = 1.5552
Checking accuracy on validation set
Got 387 / 1000 correct (38.70)

Epoch: 0, Iteration 200, loss = 1.7383
Checking accuracy on validation set
Got 417 / 1000 correct (41.70)

Epoch: 0, Iteration 300, loss = 1.4862
Checking accuracy on validation set
Got 470 / 1000 correct (47.00)

Epoch: 0, Iteration 400, loss = 1.4768
Checking accuracy on validation set
Got 527 / 1000 correct (52.70)

Epoch: 0, Iteration 500, loss = 1.4985
Checking accuracy on validation set
Got 505 / 1000 correct (50.50)

Epoch: 0, Iteration 600, loss = 1.2593
```

```
Checking accuracy on validation set
Got 505 / 1000 correct (50.50)

Epoch: 0, Iteration 700, loss = 1.0072
Checking accuracy on validation set
Got 598 / 1000 correct (59.80)

766
Epoch: 1, Iteration 0, loss = 1.0785
Checking accuracy on validation set
Got 626 / 1000 correct (62.60)

Epoch: 1, Iteration 100, loss = 0.8680
Checking accuracy on validation set
Got 611 / 1000 correct (61.10)

Epoch: 1, Iteration 200, loss = 1.1844
Checking accuracy on validation set
Got 641 / 1000 correct (64.10)

Epoch: 1, Iteration 300, loss = 0.8719
Checking accuracy on validation set
Got 639 / 1000 correct (63.90)

Epoch: 1, Iteration 400, loss = 0.8579
Checking accuracy on validation set
Got 668 / 1000 correct (66.80)

Epoch: 1, Iteration 500, loss = 1.1585
Checking accuracy on validation set
Got 682 / 1000 correct (68.20)

Epoch: 1, Iteration 600, loss = 0.9654
Checking accuracy on validation set
Got 711 / 1000 correct (71.10)

Epoch: 1, Iteration 700, loss = 0.8875
Checking accuracy on validation set
Got 720 / 1000 correct (72.00)

766
Epoch: 2, Iteration 0, loss = 0.8991
Checking accuracy on validation set
Got 730 / 1000 correct (73.00)

Epoch: 2, Iteration 100, loss = 0.7952
Checking accuracy on validation set
Got 762 / 1000 correct (76.20)
```

```
Epoch: 2, Iteration 200, loss = 0.9639
Checking accuracy on validation set
Got 721 / 1000 correct (72.10)

Epoch: 2, Iteration 300, loss = 0.7576
Checking accuracy on validation set
Got 759 / 1000 correct (75.90)

Epoch: 2, Iteration 400, loss = 0.8674
Checking accuracy on validation set
Got 773 / 1000 correct (77.30)

Epoch: 2, Iteration 500, loss = 1.1443
Checking accuracy on validation set
Got 775 / 1000 correct (77.50)

Epoch: 2, Iteration 600, loss = 0.7992
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 2, Iteration 700, loss = 0.6768
Checking accuracy on validation set
Got 763 / 1000 correct (76.30)

766
Epoch: 3, Iteration 0, loss = 0.6827
Checking accuracy on validation set
Got 782 / 1000 correct (78.20)

Epoch: 3, Iteration 100, loss = 0.3276
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)

Epoch: 3, Iteration 200, loss = 0.6353
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

Epoch: 3, Iteration 300, loss = 0.6028
Checking accuracy on validation set
Got 797 / 1000 correct (79.70)

Epoch: 3, Iteration 400, loss = 0.9329
Checking accuracy on validation set
Got 803 / 1000 correct (80.30)

Epoch: 3, Iteration 500, loss = 0.7284
Checking accuracy on validation set
```

```
Got 801 / 1000 correct (80.10)

Epoch: 3, Iteration 600, loss = 0.8372
Checking accuracy on validation set
Got 769 / 1000 correct (76.90)

Epoch: 3, Iteration 700, loss = 0.8380
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

766
Epoch: 4, Iteration 0, loss = 0.5812
Checking accuracy on validation set
Got 795 / 1000 correct (79.50)

Epoch: 4, Iteration 100, loss = 0.4398
Checking accuracy on validation set
Got 822 / 1000 correct (82.20)

Epoch: 4, Iteration 200, loss = 0.5337
Checking accuracy on validation set
Got 755 / 1000 correct (75.50)

Epoch: 4, Iteration 300, loss = 0.4700
Checking accuracy on validation set
Got 809 / 1000 correct (80.90)

Epoch: 4, Iteration 400, loss = 0.3529
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 4, Iteration 500, loss = 0.8105
Checking accuracy on validation set
Got 828 / 1000 correct (82.80)

Epoch: 4, Iteration 600, loss = 0.5171
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 4, Iteration 700, loss = 0.7219
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

766
Epoch: 5, Iteration 0, loss = 0.4878
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)
```

```
Epoch: 5, Iteration 100, loss = 0.3926
Checking accuracy on validation set
Got 858 / 1000 correct (85.80)

Epoch: 5, Iteration 200, loss = 0.4768
Checking accuracy on validation set
Got 870 / 1000 correct (87.00)

Epoch: 5, Iteration 300, loss = 0.4254
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 5, Iteration 400, loss = 0.4326
Checking accuracy on validation set
Got 875 / 1000 correct (87.50)

Epoch: 5, Iteration 500, loss = 0.4648
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 5, Iteration 600, loss = 0.3744
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 5, Iteration 700, loss = 0.4712
Checking accuracy on validation set
Got 881 / 1000 correct (88.10)

766
Epoch: 6, Iteration 0, loss = 0.4701
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)

Epoch: 6, Iteration 100, loss = 0.2807
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

Epoch: 6, Iteration 200, loss = 0.4050
Checking accuracy on validation set
Got 881 / 1000 correct (88.10)

Epoch: 6, Iteration 300, loss = 0.3388
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

Epoch: 6, Iteration 400, loss = 0.3830
Checking accuracy on validation set
Got 876 / 1000 correct (87.60)
```

```
Epoch: 6, Iteration 500, loss = 0.1982
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

Epoch: 6, Iteration 600, loss = 0.4662
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)

Epoch: 6, Iteration 700, loss = 0.4765
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

766
Epoch: 7, Iteration 0, loss = 0.4249
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Epoch: 7, Iteration 100, loss = 0.3685
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Epoch: 7, Iteration 200, loss = 0.4917
Checking accuracy on validation set
Got 892 / 1000 correct (89.20)

Epoch: 7, Iteration 300, loss = 0.2847
Checking accuracy on validation set
Got 892 / 1000 correct (89.20)

Epoch: 7, Iteration 400, loss = 0.4112
Checking accuracy on validation set
Got 890 / 1000 correct (89.00)

Epoch: 7, Iteration 500, loss = 0.2419
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 7, Iteration 600, loss = 0.3290
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 7, Iteration 700, loss = 0.3393
Checking accuracy on validation set
Got 892 / 1000 correct (89.20)

766
Epoch: 8, Iteration 0, loss = 0.2138
```

```
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 8, Iteration 100, loss = 0.3025
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 8, Iteration 200, loss = 0.2061
Checking accuracy on validation set
Got 885 / 1000 correct (88.50)

Epoch: 8, Iteration 300, loss = 0.4583
Checking accuracy on validation set
Got 892 / 1000 correct (89.20)

Epoch: 8, Iteration 400, loss = 0.4827
Checking accuracy on validation set
Got 888 / 1000 correct (88.80)

Epoch: 8, Iteration 500, loss = 0.3224
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 8, Iteration 600, loss = 0.2801
Checking accuracy on validation set
Got 892 / 1000 correct (89.20)

Epoch: 8, Iteration 700, loss = 0.2194
Checking accuracy on validation set
Got 885 / 1000 correct (88.50)

766
Epoch: 9, Iteration 0, loss = 0.3916
Checking accuracy on validation set
Got 892 / 1000 correct (89.20)

Epoch: 9, Iteration 100, loss = 0.1828
Checking accuracy on validation set
Got 894 / 1000 correct (89.40)

Epoch: 9, Iteration 200, loss = 0.2793
Checking accuracy on validation set
Got 900 / 1000 correct (90.00)

Epoch: 9, Iteration 300, loss = 0.3837
Checking accuracy on validation set
Got 898 / 1000 correct (89.80)
```

```
Epoch: 9, Iteration 400, loss = 0.3561
Checking accuracy on validation set
Got 900 / 1000 correct (90.00)

Epoch: 9, Iteration 500, loss = 0.2297
Checking accuracy on validation set
Got 901 / 1000 correct (90.10)

Epoch: 9, Iteration 600, loss = 0.3085
Checking accuracy on validation set
Got 901 / 1000 correct (90.10)

Epoch: 9, Iteration 700, loss = 0.2498
Checking accuracy on validation set
Got 901 / 1000 correct (90.10)

Checking accuracy on validation set
Got 900 / 1000 correct (90.00)
---- New lr = 0.00046  and gamma = 0.156 ----
766
Epoch: 0, Iteration 0, loss = 4.6236
Checking accuracy on validation set
Got 106 / 1000 correct (10.60)

Epoch: 0, Iteration 100, loss = 1.6401
Checking accuracy on validation set
Got 408 / 1000 correct (40.80)

Epoch: 0, Iteration 200, loss = 1.4711
Checking accuracy on validation set
Got 453 / 1000 correct (45.30)

Epoch: 0, Iteration 300, loss = 1.5340
Checking accuracy on validation set
Got 523 / 1000 correct (52.30)

Epoch: 0, Iteration 400, loss = 1.5806
Checking accuracy on validation set
Got 539 / 1000 correct (53.90)

Epoch: 0, Iteration 500, loss = 1.2615
Checking accuracy on validation set
Got 515 / 1000 correct (51.50)

Epoch: 0, Iteration 600, loss = 1.1840
Checking accuracy on validation set
Got 545 / 1000 correct (54.50)
```

```
Epoch: 0, Iteration 700, loss = 1.0978
Checking accuracy on validation set
Got 616 / 1000 correct (61.60)

766
Epoch: 1, Iteration 0, loss = 0.9700
Checking accuracy on validation set
Got 588 / 1000 correct (58.80)

Epoch: 1, Iteration 100, loss = 1.1454
Checking accuracy on validation set
Got 667 / 1000 correct (66.70)

Epoch: 1, Iteration 200, loss = 0.8481
Checking accuracy on validation set
Got 577 / 1000 correct (57.70)

Epoch: 1, Iteration 300, loss = 1.5319
Checking accuracy on validation set
Got 630 / 1000 correct (63.00)

Epoch: 1, Iteration 400, loss = 0.8632
Checking accuracy on validation set
Got 686 / 1000 correct (68.60)

Epoch: 1, Iteration 500, loss = 0.7830
Checking accuracy on validation set
Got 704 / 1000 correct (70.40)

Epoch: 1, Iteration 600, loss = 0.8413
Checking accuracy on validation set
Got 678 / 1000 correct (67.80)

Epoch: 1, Iteration 700, loss = 0.8573
Checking accuracy on validation set
Got 700 / 1000 correct (70.00)

766
Epoch: 2, Iteration 0, loss = 0.7530
Checking accuracy on validation set
Got 744 / 1000 correct (74.40)

Epoch: 2, Iteration 100, loss = 0.6313
Checking accuracy on validation set
Got 736 / 1000 correct (73.60)

Epoch: 2, Iteration 200, loss = 0.6904
Checking accuracy on validation set
```

```
Got 722 / 1000 correct (72.20)

Epoch: 2, Iteration 300, loss = 0.8144
Checking accuracy on validation set
Got 757 / 1000 correct (75.70)

Epoch: 2, Iteration 400, loss = 0.5430
Checking accuracy on validation set
Got 752 / 1000 correct (75.20)

Epoch: 2, Iteration 500, loss = 0.9902
Checking accuracy on validation set
Got 734 / 1000 correct (73.40)

Epoch: 2, Iteration 600, loss = 0.7443
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

Epoch: 2, Iteration 700, loss = 1.0529
Checking accuracy on validation set
Got 760 / 1000 correct (76.00)

766
Epoch: 3, Iteration 0, loss = 0.7189
Checking accuracy on validation set
Got 792 / 1000 correct (79.20)

Epoch: 3, Iteration 100, loss = 0.5933
Checking accuracy on validation set
Got 811 / 1000 correct (81.10)

Epoch: 3, Iteration 200, loss = 0.5509
Checking accuracy on validation set
Got 796 / 1000 correct (79.60)

Epoch: 3, Iteration 300, loss = 0.7412
Checking accuracy on validation set
Got 799 / 1000 correct (79.90)

Epoch: 3, Iteration 400, loss = 0.5749
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 3, Iteration 500, loss = 0.4909
Checking accuracy on validation set
Got 795 / 1000 correct (79.50)

Epoch: 3, Iteration 600, loss = 0.4808
```

```
Checking accuracy on validation set
Got 803 / 1000 correct (80.30)

Epoch: 3, Iteration 700, loss = 0.5429
Checking accuracy on validation set
Got 827 / 1000 correct (82.70)

766
Epoch: 4, Iteration 0, loss = 0.4815
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

Epoch: 4, Iteration 100, loss = 0.7286
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

Epoch: 4, Iteration 200, loss = 0.5562
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 4, Iteration 300, loss = 0.3004
Checking accuracy on validation set
Got 813 / 1000 correct (81.30)

Epoch: 4, Iteration 400, loss = 0.5608
Checking accuracy on validation set
Got 821 / 1000 correct (82.10)

Epoch: 4, Iteration 500, loss = 0.5760
Checking accuracy on validation set
Got 808 / 1000 correct (80.80)

Epoch: 4, Iteration 600, loss = 0.4156
Checking accuracy on validation set
Got 825 / 1000 correct (82.50)

Epoch: 4, Iteration 700, loss = 0.5689
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

766
Epoch: 5, Iteration 0, loss = 0.5317
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 5, Iteration 100, loss = 0.4237
Checking accuracy on validation set
Got 861 / 1000 correct (86.10)
```

```
Epoch: 5, Iteration 200, loss = 0.2851
Checking accuracy on validation set
Got 865 / 1000 correct (86.50)

Epoch: 5, Iteration 300, loss = 0.4276
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 5, Iteration 400, loss = 0.3796
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 5, Iteration 500, loss = 0.4269
Checking accuracy on validation set
Got 869 / 1000 correct (86.90)

Epoch: 5, Iteration 600, loss = 0.3337
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 5, Iteration 700, loss = 0.1934
Checking accuracy on validation set
Got 870 / 1000 correct (87.00)

766
Epoch: 6, Iteration 0, loss = 0.2748
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 6, Iteration 100, loss = 0.3886
Checking accuracy on validation set
Got 875 / 1000 correct (87.50)

Epoch: 6, Iteration 200, loss = 0.4500
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Epoch: 6, Iteration 300, loss = 0.2769
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 6, Iteration 400, loss = 0.3774
Checking accuracy on validation set
Got 888 / 1000 correct (88.80)

Epoch: 6, Iteration 500, loss = 0.2222
Checking accuracy on validation set
```

```
Got 874 / 1000 correct (87.40)

Epoch: 6, Iteration 600, loss = 0.2495
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Epoch: 6, Iteration 700, loss = 0.4428
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

766
Epoch: 7, Iteration 0, loss = 0.3482
Checking accuracy on validation set
Got 885 / 1000 correct (88.50)

Epoch: 7, Iteration 100, loss = 0.3109
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 7, Iteration 200, loss = 0.4540
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 7, Iteration 300, loss = 0.3117
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

Epoch: 7, Iteration 400, loss = 0.3851
Checking accuracy on validation set
Got 871 / 1000 correct (87.10)

Epoch: 7, Iteration 500, loss = 0.2866
Checking accuracy on validation set
Got 875 / 1000 correct (87.50)

Epoch: 7, Iteration 600, loss = 0.2683
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 7, Iteration 700, loss = 0.3366
Checking accuracy on validation set
Got 870 / 1000 correct (87.00)

766
Epoch: 8, Iteration 0, loss = 0.3422
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)
```

```
Epoch: 8, Iteration 100, loss = 0.1588
Checking accuracy on validation set
Got 885 / 1000 correct (88.50)

Epoch: 8, Iteration 200, loss = 0.4600
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)

Epoch: 8, Iteration 300, loss = 0.3872
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)

Epoch: 8, Iteration 400, loss = 0.2750
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 8, Iteration 500, loss = 0.3156
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 8, Iteration 600, loss = 0.3842
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

Epoch: 8, Iteration 700, loss = 0.2145
Checking accuracy on validation set
Got 883 / 1000 correct (88.30)

766
Epoch: 9, Iteration 0, loss = 0.2250
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 9, Iteration 100, loss = 0.2751
Checking accuracy on validation set
Got 890 / 1000 correct (89.00)

Epoch: 9, Iteration 200, loss = 0.3624
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 9, Iteration 300, loss = 0.3043
Checking accuracy on validation set
Got 891 / 1000 correct (89.10)

Epoch: 9, Iteration 400, loss = 0.4484
Checking accuracy on validation set
Got 888 / 1000 correct (88.80)
```

```
Epoch: 9, Iteration 500, loss = 0.3253
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 9, Iteration 600, loss = 0.5018
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 9, Iteration 700, loss = 0.2125
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Checking accuracy on validation set
Got 887 / 1000 correct (88.70)
---- New lr = 0.00035  and gamma = 0.157 ----
766
Epoch: 0, Iteration 0, loss = 2.7029
Checking accuracy on validation set
Got 98 / 1000 correct (9.80)

Epoch: 0, Iteration 100, loss = 1.9425
Checking accuracy on validation set
Got 415 / 1000 correct (41.50)

Epoch: 0, Iteration 200, loss = 1.6426
Checking accuracy on validation set
Got 461 / 1000 correct (46.10)

Epoch: 0, Iteration 300, loss = 1.4405
Checking accuracy on validation set
Got 466 / 1000 correct (46.60)

Epoch: 0, Iteration 400, loss = 1.3201
Checking accuracy on validation set
Got 462 / 1000 correct (46.20)

Epoch: 0, Iteration 500, loss = 1.1107
Checking accuracy on validation set
Got 579 / 1000 correct (57.90)

Epoch: 0, Iteration 600, loss = 1.1979
Checking accuracy on validation set
Got 579 / 1000 correct (57.90)

Epoch: 0, Iteration 700, loss = 1.0425
Checking accuracy on validation set
Got 626 / 1000 correct (62.60)
```

```
766
Epoch: 1, Iteration 0, loss = 1.2576
Checking accuracy on validation set
Got 571 / 1000 correct (57.10)

Epoch: 1, Iteration 100, loss = 1.3173
Checking accuracy on validation set
Got 596 / 1000 correct (59.60)

Epoch: 1, Iteration 200, loss = 1.2307
Checking accuracy on validation set
Got 604 / 1000 correct (60.40)

Epoch: 1, Iteration 300, loss = 1.2469
Checking accuracy on validation set
Got 620 / 1000 correct (62.00)

Epoch: 1, Iteration 400, loss = 1.1848
Checking accuracy on validation set
Got 691 / 1000 correct (69.10)

Epoch: 1, Iteration 500, loss = 0.7335
Checking accuracy on validation set
Got 715 / 1000 correct (71.50)

Epoch: 1, Iteration 600, loss = 0.6982
Checking accuracy on validation set
Got 708 / 1000 correct (70.80)

Epoch: 1, Iteration 700, loss = 0.8714
Checking accuracy on validation set
Got 734 / 1000 correct (73.40)

766
Epoch: 2, Iteration 0, loss = 0.7631
Checking accuracy on validation set
Got 747 / 1000 correct (74.70)

Epoch: 2, Iteration 100, loss = 0.6958
Checking accuracy on validation set
Got 736 / 1000 correct (73.60)

Epoch: 2, Iteration 200, loss = 1.0073
Checking accuracy on validation set
Got 754 / 1000 correct (75.40)

Epoch: 2, Iteration 300, loss = 1.0252
```

```
Checking accuracy on validation set
Got 741 / 1000 correct (74.10)

Epoch: 2, Iteration 400, loss = 0.7239
Checking accuracy on validation set
Got 780 / 1000 correct (78.00)

Epoch: 2, Iteration 500, loss = 0.5252
Checking accuracy on validation set
Got 738 / 1000 correct (73.80)

Epoch: 2, Iteration 600, loss = 0.7515
Checking accuracy on validation set
Got 764 / 1000 correct (76.40)

Epoch: 2, Iteration 700, loss = 0.7093
Checking accuracy on validation set
Got 775 / 1000 correct (77.50)

766
Epoch: 3, Iteration 0, loss = 0.6625
Checking accuracy on validation set
Got 774 / 1000 correct (77.40)

Epoch: 3, Iteration 100, loss = 0.8363
Checking accuracy on validation set
Got 750 / 1000 correct (75.00)

Epoch: 3, Iteration 200, loss = 0.7760
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

Epoch: 3, Iteration 300, loss = 0.6631
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 3, Iteration 400, loss = 0.7225
Checking accuracy on validation set
Got 791 / 1000 correct (79.10)

Epoch: 3, Iteration 500, loss = 0.3829
Checking accuracy on validation set
Got 814 / 1000 correct (81.40)

Epoch: 3, Iteration 600, loss = 0.9196
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)
```

```
Epoch: 3, Iteration 700, loss = 0.6149
Checking accuracy on validation set
Got 785 / 1000 correct (78.50)

766
Epoch: 4, Iteration 0, loss = 0.5346
Checking accuracy on validation set
Got 820 / 1000 correct (82.00)

Epoch: 4, Iteration 100, loss = 0.6300
Checking accuracy on validation set
Got 792 / 1000 correct (79.20)

Epoch: 4, Iteration 200, loss = 0.4231
Checking accuracy on validation set
Got 818 / 1000 correct (81.80)

Epoch: 4, Iteration 300, loss = 0.4898
Checking accuracy on validation set
Got 788 / 1000 correct (78.80)

Epoch: 4, Iteration 400, loss = 0.4371
Checking accuracy on validation set
Got 832 / 1000 correct (83.20)

Epoch: 4, Iteration 500, loss = 0.4678
Checking accuracy on validation set
Got 812 / 1000 correct (81.20)

Epoch: 4, Iteration 600, loss = 0.7011
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 4, Iteration 700, loss = 0.4516
Checking accuracy on validation set
Got 857 / 1000 correct (85.70)

766
Epoch: 5, Iteration 0, loss = 0.6017
Checking accuracy on validation set
Got 836 / 1000 correct (83.60)

Epoch: 5, Iteration 100, loss = 0.4426
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

Epoch: 5, Iteration 200, loss = 0.4200
Checking accuracy on validation set
```

```
Got 869 / 1000 correct (86.90)

Epoch: 5, Iteration 300, loss = 0.4160
Checking accuracy on validation set
Got 864 / 1000 correct (86.40)

Epoch: 5, Iteration 400, loss = 0.4623
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 5, Iteration 500, loss = 0.4303
Checking accuracy on validation set
Got 866 / 1000 correct (86.60)

Epoch: 5, Iteration 600, loss = 0.3417
Checking accuracy on validation set
Got 876 / 1000 correct (87.60)

Epoch: 5, Iteration 700, loss = 0.4889
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

766
Epoch: 6, Iteration 0, loss = 0.2908
Checking accuracy on validation set
Got 867 / 1000 correct (86.70)

Epoch: 6, Iteration 100, loss = 0.4103
Checking accuracy on validation set
Got 880 / 1000 correct (88.00)

Epoch: 6, Iteration 200, loss = 0.5861
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 6, Iteration 300, loss = 0.3779
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 6, Iteration 400, loss = 0.2607
Checking accuracy on validation set
Got 883 / 1000 correct (88.30)

Epoch: 6, Iteration 500, loss = 0.5548
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 6, Iteration 600, loss = 0.2579
```

```
Checking accuracy on validation set
Got 893 / 1000 correct (89.30)

Epoch: 6, Iteration 700, loss = 0.2752
Checking accuracy on validation set
Got 893 / 1000 correct (89.30)

766
Epoch: 7, Iteration 0, loss = 0.2895
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 7, Iteration 100, loss = 0.3754
Checking accuracy on validation set
Got 884 / 1000 correct (88.40)

Epoch: 7, Iteration 200, loss = 0.4808
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 7, Iteration 300, loss = 0.5442
Checking accuracy on validation set
Got 888 / 1000 correct (88.80)

Epoch: 7, Iteration 400, loss = 0.3742
Checking accuracy on validation set
Got 896 / 1000 correct (89.60)

Epoch: 7, Iteration 500, loss = 0.3223
Checking accuracy on validation set
Got 888 / 1000 correct (88.80)

Epoch: 7, Iteration 600, loss = 0.3975
Checking accuracy on validation set
Got 885 / 1000 correct (88.50)

Epoch: 7, Iteration 700, loss = 0.5793
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

766
Epoch: 8, Iteration 0, loss = 0.2515
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 8, Iteration 100, loss = 0.3516
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)
```

```
Epoch: 8, Iteration 200, loss = 0.4826
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 8, Iteration 300, loss = 0.4186
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 8, Iteration 400, loss = 0.2660
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 8, Iteration 500, loss = 0.3845
Checking accuracy on validation set
Got 890 / 1000 correct (89.00)

Epoch: 8, Iteration 600, loss = 0.2973
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

Epoch: 8, Iteration 700, loss = 0.3523
Checking accuracy on validation set
Got 886 / 1000 correct (88.60)

766
Epoch: 9, Iteration 0, loss = 0.2452
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 9, Iteration 100, loss = 0.1537
Checking accuracy on validation set
Got 892 / 1000 correct (89.20)

Epoch: 9, Iteration 200, loss = 0.2971
Checking accuracy on validation set
Got 893 / 1000 correct (89.30)

Epoch: 9, Iteration 300, loss = 0.3346
Checking accuracy on validation set
Got 890 / 1000 correct (89.00)

Epoch: 9, Iteration 400, loss = 0.2982
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 9, Iteration 500, loss = 0.1645
Checking accuracy on validation set
```

```
Got 890 / 1000 correct (89.00)

Epoch: 9, Iteration 600, loss = 0.2138
Checking accuracy on validation set
Got 895 / 1000 correct (89.50)

Epoch: 9, Iteration 700, loss = 0.3958
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Checking accuracy on validation set
Got 888 / 1000 correct (88.80)
---- New lr = 0.00033  and gamma = 0.157 ----
766
Epoch: 0, Iteration 0, loss = 3.5074
Checking accuracy on validation set
Got 124 / 1000 correct (12.40)

Epoch: 0, Iteration 100, loss = 1.7763
Checking accuracy on validation set
Got 401 / 1000 correct (40.10)

Epoch: 0, Iteration 200, loss = 1.2754
Checking accuracy on validation set
Got 435 / 1000 correct (43.50)

Epoch: 0, Iteration 300, loss = 1.4828
Checking accuracy on validation set
Got 500 / 1000 correct (50.00)

Epoch: 0, Iteration 400, loss = 1.4539
Checking accuracy on validation set
Got 495 / 1000 correct (49.50)

Epoch: 0, Iteration 500, loss = 1.1752
Checking accuracy on validation set
Got 555 / 1000 correct (55.50)

Epoch: 0, Iteration 600, loss = 1.3656
Checking accuracy on validation set
Got 606 / 1000 correct (60.60)

Epoch: 0, Iteration 700, loss = 0.8323
Checking accuracy on validation set
Got 603 / 1000 correct (60.30)

766
Epoch: 1, Iteration 0, loss = 1.0346
```

```
Checking accuracy on validation set
Got 615 / 1000 correct (61.50)

Epoch: 1, Iteration 100, loss = 0.9869
Checking accuracy on validation set
Got 607 / 1000 correct (60.70)

Epoch: 1, Iteration 200, loss = 1.4071
Checking accuracy on validation set
Got 661 / 1000 correct (66.10)

Epoch: 1, Iteration 300, loss = 1.0342
Checking accuracy on validation set
Got 686 / 1000 correct (68.60)

Epoch: 1, Iteration 400, loss = 1.0959
Checking accuracy on validation set
Got 649 / 1000 correct (64.90)

Epoch: 1, Iteration 500, loss = 0.7572
Checking accuracy on validation set
Got 691 / 1000 correct (69.10)

Epoch: 1, Iteration 600, loss = 0.9704
Checking accuracy on validation set
Got 708 / 1000 correct (70.80)

Epoch: 1, Iteration 700, loss = 1.0783
Checking accuracy on validation set
Got 681 / 1000 correct (68.10)

766
Epoch: 2, Iteration 0, loss = 0.9335
Checking accuracy on validation set
Got 705 / 1000 correct (70.50)

Epoch: 2, Iteration 100, loss = 1.0284
Checking accuracy on validation set
Got 734 / 1000 correct (73.40)

Epoch: 2, Iteration 200, loss = 1.0286
Checking accuracy on validation set
Got 734 / 1000 correct (73.40)

Epoch: 2, Iteration 300, loss = 0.6474
Checking accuracy on validation set
Got 720 / 1000 correct (72.00)
```

```
Epoch: 2, Iteration 400, loss = 0.8375
Checking accuracy on validation set
Got 708 / 1000 correct (70.80)

Epoch: 2, Iteration 500, loss = 0.8079
Checking accuracy on validation set
Got 760 / 1000 correct (76.00)

Epoch: 2, Iteration 600, loss = 0.8748
Checking accuracy on validation set
Got 763 / 1000 correct (76.30)

Epoch: 2, Iteration 700, loss = 0.7010
Checking accuracy on validation set
Got 764 / 1000 correct (76.40)

766
Epoch: 3, Iteration 0, loss = 0.6751
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)

Epoch: 3, Iteration 100, loss = 0.7962
Checking accuracy on validation set
Got 766 / 1000 correct (76.60)

Epoch: 3, Iteration 200, loss = 0.8568
Checking accuracy on validation set
Got 792 / 1000 correct (79.20)

Epoch: 3, Iteration 300, loss = 0.5213
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 3, Iteration 400, loss = 0.4303
Checking accuracy on validation set
Got 777 / 1000 correct (77.70)

Epoch: 3, Iteration 500, loss = 0.5026
Checking accuracy on validation set
Got 795 / 1000 correct (79.50)

Epoch: 3, Iteration 600, loss = 0.7166
Checking accuracy on validation set
Got 820 / 1000 correct (82.00)

Epoch: 3, Iteration 700, loss = 0.6212
Checking accuracy on validation set
Got 803 / 1000 correct (80.30)
```

```
766
Epoch: 4, Iteration 0, loss = 0.6888
Checking accuracy on validation set
Got 770 / 1000 correct (77.00)

Epoch: 4, Iteration 100, loss = 0.5512
Checking accuracy on validation set
Got 784 / 1000 correct (78.40)

Epoch: 4, Iteration 200, loss = 0.5945
Checking accuracy on validation set
Got 803 / 1000 correct (80.30)

Epoch: 4, Iteration 300, loss = 0.5159
Checking accuracy on validation set
Got 821 / 1000 correct (82.10)

Epoch: 4, Iteration 400, loss = 0.5250
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 4, Iteration 500, loss = 0.5521
Checking accuracy on validation set
Got 788 / 1000 correct (78.80)

Epoch: 4, Iteration 600, loss = 0.6096
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 4, Iteration 700, loss = 0.7480
Checking accuracy on validation set
Got 816 / 1000 correct (81.60)

766
Epoch: 5, Iteration 0, loss = 0.6211
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 5, Iteration 100, loss = 0.3448
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 5, Iteration 200, loss = 0.4602
Checking accuracy on validation set
Got 861 / 1000 correct (86.10)

Epoch: 5, Iteration 300, loss = 0.5082
```

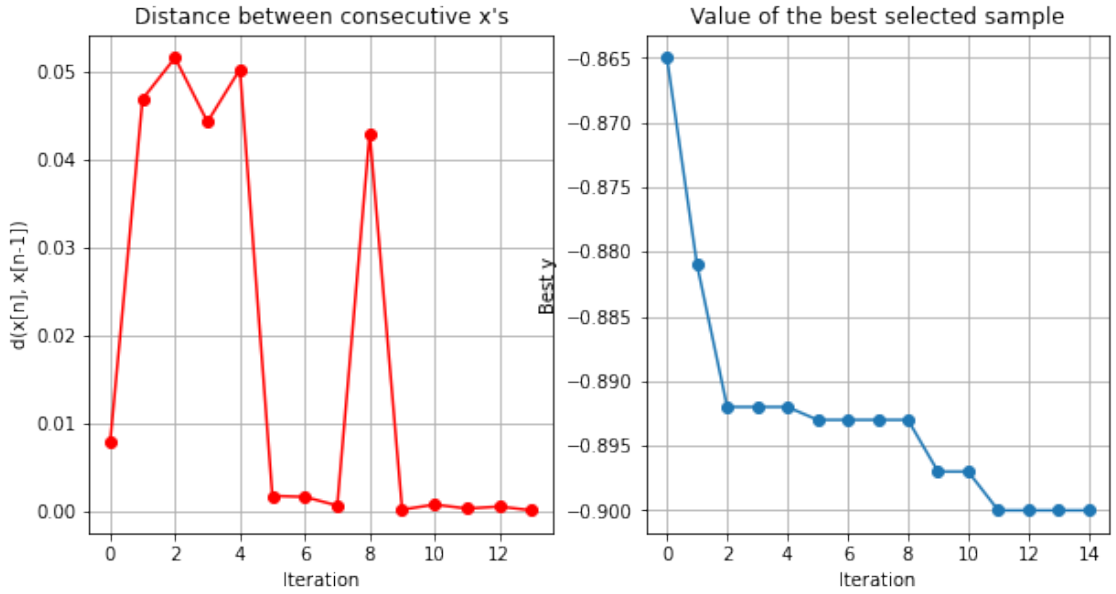
```
Checking accuracy on validation set
Got 876 / 1000 correct (87.60)

Epoch: 5, Iteration 400, loss = 0.3498
Checking accuracy on validation set
Got 874 / 1000 correct (87.40)

Epoch: 5, Iteration 500, loss = 0.4001
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 5, Iteration 600, loss = 0.3749
Checking accuracy on validation set
Got 868 / 1000 correct (86.80)

Epoch: 5, Iteration 700, loss = 0.4356
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

766
Epoch: 6, Iteration 0, loss = 0.4176
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 6, Iteration 100, loss = 0.3800
Checking accuracy on validation set
Got 881 / 1000 correct (88.10)

Epoch: 6, Iteration 200, loss = 0.3230
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 6, Iteration 300, loss = 0.3620
Checking accuracy on validation set
Got 881 / 1000 correct (88.10)

Epoch: 6, Iteration 400, loss = 0.4409
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 6, Iteration 500, loss = 0.4637
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

Epoch: 6, Iteration 600, loss = 0.3763
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)
```

```
Epoch: 6, Iteration 700, loss = 0.4510
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

766
Epoch: 7, Iteration 0, loss = 0.4608
Checking accuracy on validation set
Got 876 / 1000 correct (87.60)

Epoch: 7, Iteration 100, loss = 0.2564
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 7, Iteration 200, loss = 0.4005
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 7, Iteration 300, loss = 0.3845
Checking accuracy on validation set
Got 878 / 1000 correct (87.80)

Epoch: 7, Iteration 400, loss = 0.4020
Checking accuracy on validation set
Got 873 / 1000 correct (87.30)

Epoch: 7, Iteration 500, loss = 0.4942
Checking accuracy on validation set
Got 872 / 1000 correct (87.20)

Epoch: 7, Iteration 600, loss = 0.3363
Checking accuracy on validation set
Got 887 / 1000 correct (88.70)

Epoch: 7, Iteration 700, loss = 0.3673
Checking accuracy on validation set
Got 885 / 1000 correct (88.50)

766
Epoch: 8, Iteration 0, loss = 0.2784
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

Epoch: 8, Iteration 100, loss = 0.1946
Checking accuracy on validation set
Got 891 / 1000 correct (89.10)

Epoch: 8, Iteration 200, loss = 0.3110
Checking accuracy on validation set
```

```
Got 881 / 1000 correct (88.10)

Epoch: 8, Iteration 300, loss = 0.2592
Checking accuracy on validation set
Got 888 / 1000 correct (88.80)

Epoch: 8, Iteration 400, loss = 0.3613
Checking accuracy on validation set
Got 885 / 1000 correct (88.50)

Epoch: 8, Iteration 500, loss = 0.2231
Checking accuracy on validation set
Got 881 / 1000 correct (88.10)

Epoch: 8, Iteration 600, loss = 0.2508
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)

Epoch: 8, Iteration 700, loss = 0.4067
Checking accuracy on validation set
Got 879 / 1000 correct (87.90)

766
Epoch: 9, Iteration 0, loss = 0.3836
Checking accuracy on validation set
Got 882 / 1000 correct (88.20)

Epoch: 9, Iteration 100, loss = 0.2747
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 9, Iteration 200, loss = 0.4442
Checking accuracy on validation set
Got 892 / 1000 correct (89.20)

Epoch: 9, Iteration 300, loss = 0.2703
Checking accuracy on validation set
Got 892 / 1000 correct (89.20)

Epoch: 9, Iteration 400, loss = 0.2722
Checking accuracy on validation set
Got 893 / 1000 correct (89.30)

Epoch: 9, Iteration 500, loss = 0.4033
Checking accuracy on validation set
Got 894 / 1000 correct (89.40)

Epoch: 9, Iteration 600, loss = 0.2632
```

```
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Epoch: 9, Iteration 700, loss = 0.2515
Checking accuracy on validation set
Got 889 / 1000 correct (88.90)

Checking accuracy on validation set
Got 897 / 1000 correct (89.70)
```

[ ]:
```
opt2.plot_convergence()
print("Best Hyperparameters: ", opt2.x_opt)
print("Best Accuracy: ", opt2.fx_opt)
```




```
Best Hyperparameters:  [0.00039521 0.15641885]
Best Accuracy:  -0.9
```

[12]:
```
model = ResNet18()
optimizer = optim.Adam(model.parameters(),lr = 0.000395)
scheduler = optim.lr_scheduler.MultiStepLR(optimizer, milestones=[9, 10],␣
↪gamma=0.1564)
train_part2(model, optimizer, epochs = 10, scheduler = scheduler)

check_accuracy(loader_test, model)


# save the model
torch.save(model.state_dict(), 'model.pt')
```

```
766
Epoch: 0, Iteration 0, loss = 3.5337
Checking accuracy on validation set
Got 111 / 1000 correct (11.10)

Epoch: 0, Iteration 100, loss = 1.6355
Checking accuracy on validation set
Got 404 / 1000 correct (40.40)

Epoch: 0, Iteration 200, loss = 1.4058
Checking accuracy on validation set
Got 476 / 1000 correct (47.60)

Epoch: 0, Iteration 300, loss = 1.3713
Checking accuracy on validation set
Got 450 / 1000 correct (45.00)

Epoch: 0, Iteration 400, loss = 1.3050
Checking accuracy on validation set
Got 533 / 1000 correct (53.30)

Epoch: 0, Iteration 500, loss = 1.2080
Checking accuracy on validation set
Got 580 / 1000 correct (58.00)

Epoch: 0, Iteration 600, loss = 1.1986
Checking accuracy on validation set
Got 622 / 1000 correct (62.20)

Epoch: 0, Iteration 700, loss = 1.2054
Checking accuracy on validation set
Got 574 / 1000 correct (57.40)

766
Epoch: 1, Iteration 0, loss = 1.0314
Checking accuracy on validation set
Got 604 / 1000 correct (60.40)

Epoch: 1, Iteration 100, loss = 1.0442
Checking accuracy on validation set
Got 647 / 1000 correct (64.70)

Epoch: 1, Iteration 200, loss = 1.0622
Checking accuracy on validation set
Got 667 / 1000 correct (66.70)

Epoch: 1, Iteration 300, loss = 0.7683
Checking accuracy on validation set
```

```
Got 691 / 1000 correct (69.10)

Epoch: 1, Iteration 400, loss = 0.9047
Checking accuracy on validation set
Got 706 / 1000 correct (70.60)

Epoch: 1, Iteration 500, loss = 0.8421
Checking accuracy on validation set
Got 702 / 1000 correct (70.20)

Epoch: 1, Iteration 600, loss = 0.7493
Checking accuracy on validation set
Got 718 / 1000 correct (71.80)

Epoch: 1, Iteration 700, loss = 0.8387
Checking accuracy on validation set
Got 751 / 1000 correct (75.10)

766
Epoch: 2, Iteration 0, loss = 0.9612
Checking accuracy on validation set
Got 677 / 1000 correct (67.70)

Epoch: 2, Iteration 100, loss = 0.8154
Checking accuracy on validation set
Got 752 / 1000 correct (75.20)

Epoch: 2, Iteration 200, loss = 0.6409
Checking accuracy on validation set
Got 779 / 1000 correct (77.90)

Epoch: 2, Iteration 300, loss = 0.9355
Checking accuracy on validation set
Got 786 / 1000 correct (78.60)

Epoch: 2, Iteration 400, loss = 0.8536
Checking accuracy on validation set
Got 781 / 1000 correct (78.10)

Epoch: 2, Iteration 500, loss = 0.7979
Checking accuracy on validation set
Got 775 / 1000 correct (77.50)

Epoch: 2, Iteration 600, loss = 0.8413
Checking accuracy on validation set
Got 749 / 1000 correct (74.90)

Epoch: 2, Iteration 700, loss = 0.7854
```

```
Checking accuracy on validation set
Got 754 / 1000 correct (75.40)

766
Epoch: 3, Iteration 0, loss = 0.5875
Checking accuracy on validation set
Got 753 / 1000 correct (75.30)

Epoch: 3, Iteration 100, loss = 0.5632
Checking accuracy on validation set
Got 793 / 1000 correct (79.30)

Epoch: 3, Iteration 200, loss = 0.5337
Checking accuracy on validation set
Got 800 / 1000 correct (80.00)

Epoch: 3, Iteration 300, loss = 0.6515
Checking accuracy on validation set
Got 807 / 1000 correct (80.70)

Epoch: 3, Iteration 400, loss = 0.6055
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

Epoch: 3, Iteration 500, loss = 0.6261
Checking accuracy on validation set
Got 798 / 1000 correct (79.80)

Epoch: 3, Iteration 600, loss = 0.6996
Checking accuracy on validation set
Got 778 / 1000 correct (77.80)

Epoch: 3, Iteration 700, loss = 0.8325
Checking accuracy on validation set
Got 820 / 1000 correct (82.00)

766
Epoch: 4, Iteration 0, loss = 0.4648
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)

Epoch: 4, Iteration 100, loss = 0.8418
Checking accuracy on validation set
Got 799 / 1000 correct (79.90)

Epoch: 4, Iteration 200, loss = 0.4759
Checking accuracy on validation set
Got 810 / 1000 correct (81.00)
```

```
Epoch: 4, Iteration 300, loss = 0.7682
Checking accuracy on validation set
Got 794 / 1000 correct (79.40)

Epoch: 4, Iteration 400, loss = 0.5442
Checking accuracy on validation set
Got 819 / 1000 correct (81.90)

Epoch: 4, Iteration 500, loss = 0.6703
Checking accuracy on validation set
Got 795 / 1000 correct (79.50)

Epoch: 4, Iteration 600, loss = 0.6319
Checking accuracy on validation set
Got 802 / 1000 correct (80.20)

Epoch: 4, Iteration 700, loss = 0.5755
Checking accuracy on validation set
Got 822 / 1000 correct (82.20)

766
Epoch: 5, Iteration 0, loss = 0.4065
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

Epoch: 5, Iteration 100, loss = 0.5689
Checking accuracy on validation set
Got 827 / 1000 correct (82.70)

Epoch: 5, Iteration 200, loss = 0.5039
Checking accuracy on validation set
Got 806 / 1000 correct (80.60)

Epoch: 5, Iteration 300, loss = 0.5279
Checking accuracy on validation set
Got 790 / 1000 correct (79.00)

Epoch: 5, Iteration 400, loss = 0.4655
Checking accuracy on validation set
Got 842 / 1000 correct (84.20)

Epoch: 5, Iteration 500, loss = 0.5494
Checking accuracy on validation set
Got 824 / 1000 correct (82.40)

Epoch: 5, Iteration 600, loss = 0.6118
Checking accuracy on validation set
```

```
Got 823 / 1000 correct (82.30)

Epoch: 5, Iteration 700, loss = 0.3999
Checking accuracy on validation set
Got 825 / 1000 correct (82.50)

766
Epoch: 6, Iteration 0, loss = 0.4940
Checking accuracy on validation set
Got 846 / 1000 correct (84.60)

Epoch: 6, Iteration 100, loss = 0.4116
Checking accuracy on validation set
Got 844 / 1000 correct (84.40)

Epoch: 6, Iteration 200, loss = 0.4020
Checking accuracy on validation set
Got 833 / 1000 correct (83.30)

Epoch: 6, Iteration 300, loss = 0.3090
Checking accuracy on validation set
Got 850 / 1000 correct (85.00)

Epoch: 6, Iteration 400, loss = 0.4268
Checking accuracy on validation set
Got 850 / 1000 correct (85.00)

Epoch: 6, Iteration 500, loss = 0.3099
Checking accuracy on validation set
Got 847 / 1000 correct (84.70)

Epoch: 6, Iteration 600, loss = 0.5355
Checking accuracy on validation set
Got 844 / 1000 correct (84.40)

Epoch: 6, Iteration 700, loss = 0.3724
Checking accuracy on validation set
Got 815 / 1000 correct (81.50)

766
Epoch: 7, Iteration 0, loss = 0.3103
Checking accuracy on validation set
Got 853 / 1000 correct (85.30)

Epoch: 7, Iteration 100, loss = 0.5241
Checking accuracy on validation set
Got 858 / 1000 correct (85.80)
```

```
Epoch: 7, Iteration 200, loss = 0.2575
Checking accuracy on validation set
Got 837 / 1000 correct (83.70)

Epoch: 7, Iteration 300, loss = 0.5466
Checking accuracy on validation set
Got 861 / 1000 correct (86.10)

Epoch: 7, Iteration 400, loss = 0.4297
Checking accuracy on validation set
Got 859 / 1000 correct (85.90)

Epoch: 7, Iteration 500, loss = 0.5571
Checking accuracy on validation set
Got 863 / 1000 correct (86.30)

Epoch: 7, Iteration 600, loss = 0.3736
Checking accuracy on validation set
Got 856 / 1000 correct (85.60)

Epoch: 7, Iteration 700, loss = 0.4913
Checking accuracy on validation set
Got 857 / 1000 correct (85.70)

766
Epoch: 8, Iteration 0, loss = 0.5584
Checking accuracy on validation set
Got 858 / 1000 correct (85.80)

Epoch: 8, Iteration 100, loss = 0.2475
Checking accuracy on validation set
Got 844 / 1000 correct (84.40)

Epoch: 8, Iteration 200, loss = 0.6618
Checking accuracy on validation set
Got 849 / 1000 correct (84.90)

Epoch: 8, Iteration 300, loss = 0.5299
Checking accuracy on validation set
Got 866 / 1000 correct (86.60)

Epoch: 8, Iteration 400, loss = 0.3968
Checking accuracy on validation set
Got 854 / 1000 correct (85.40)

Epoch: 8, Iteration 500, loss = 0.3674
Checking accuracy on validation set
Got 877 / 1000 correct (87.70)
```

```
Epoch: 8, Iteration 600, loss = 0.4814
Checking accuracy on validation set
Got 843 / 1000 correct (84.30)

Epoch: 8, Iteration 700, loss = 0.3654
Checking accuracy on validation set
Got 865 / 1000 correct (86.50)

766
Epoch: 9, Iteration 0, loss = 0.4867
Checking accuracy on validation set
Got 869 / 1000 correct (86.90)

Epoch: 9, Iteration 100, loss = 0.2796
Checking accuracy on validation set
Got 890 / 1000 correct (89.00)

Epoch: 9, Iteration 200, loss = 0.2874
Checking accuracy on validation set
Got 890 / 1000 correct (89.00)

Epoch: 9, Iteration 300, loss = 0.3900
Checking accuracy on validation set
Got 904 / 1000 correct (90.40)

Epoch: 9, Iteration 400, loss = 0.2860
Checking accuracy on validation set
Got 901 / 1000 correct (90.10)

Epoch: 9, Iteration 500, loss = 0.2704
Checking accuracy on validation set
Got 903 / 1000 correct (90.30)

Epoch: 9, Iteration 600, loss = 0.2639
Checking accuracy on validation set
Got 898 / 1000 correct (89.80)

Epoch: 9, Iteration 700, loss = 0.2255
Checking accuracy on validation set
Got 899 / 1000 correct (89.90)

Checking accuracy on test set
Got 8958 / 10000 correct (89.58)
```

1.4.4 Method 2 Result

Method 2 Accuracy is 89.58 %.

1.5 Part 3

The code provided below will allow you to visualise the feature maps computed by different layers of your network. Run the code (install matplotlib if necessary) and **answer the following questions**:

1. Compare the feature maps from low-level layers to high-level layers, what do you observe?
2. Use the training log, reported test set accuracy and the feature maps, analyse the performance of your network. If you think the performance is sufficiently good, explain why; if not, what might be the problem and how can you improve the performance?
3. What are the other possible ways to analyse the performance of your network?

YOUR ANSWER FOR PART 3 HERE

A:

Q1 :

I choose the 35th image of the dataset, which looks like a kind of fish. On the lower-level layers, you can see outline of them, however with the higher-level layer, we can only see some details of images. In other words, on the higher level layers, you cannot distinguish what it is, there are only some abstract objects on the images.

Q2 :

In the Part2, I have used two methods to train the data. As for the Method 1, I just use data augmemtation, which helps generalisation of the network, and using finally, the accuracy is 83.81%, I think this result is not so bad.

However, in the Method 2, I added learning rate schedule, which can help reaching the global minimum and not getting overshooting when minimising the loss. It can be quite helpful for the accuracy can be up to 89.58%.

Actually, if we train more epochs or get more training datas or use dropout, the performance can be much better.

Q3 :

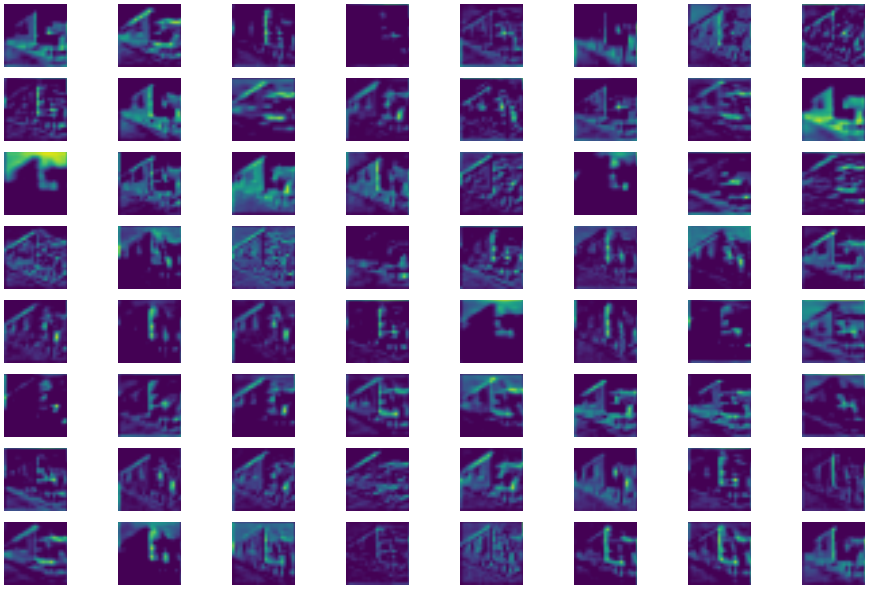
We can use confusion matrix. Actually, we can not only pay attention on the accuracy, for example, the recall, precison, f-score are all helpful to let us know the performance of my network. Maybe graphs of error rates can be used to show something like overfitting much easier.

[8]:
```
#!pip install matplotlib

import matplotlib.pyplot as plt

plt.tight_layout()
# model = ResNet18()
# model.load_state_dict(torch.load('model.pt'))
# model.to(device)
# model.eval()

activation = {}
```

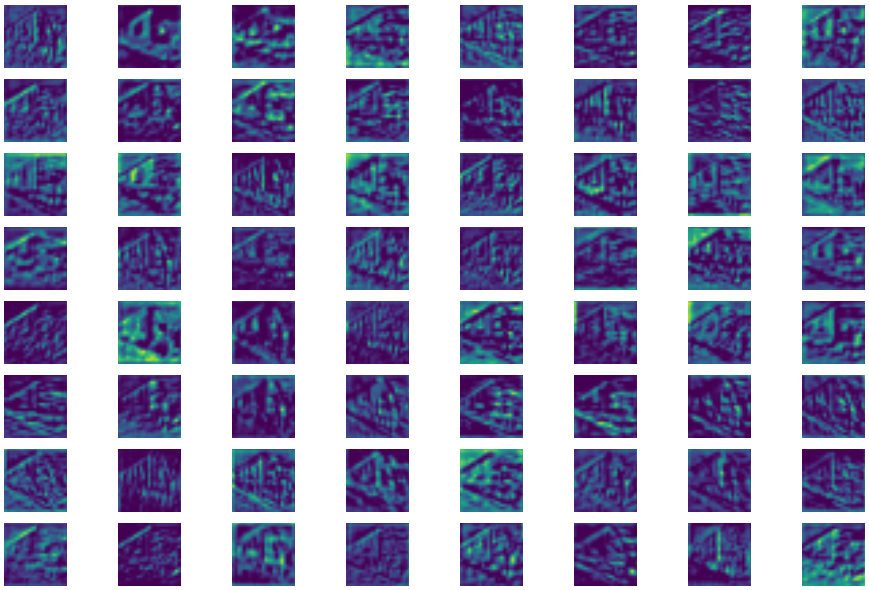
```
def get_activation(name):
    def hook(model, input, output):
        activation[name] = output.detach()
    return hook

vis_labels = ['conv1', 'layer1', 'layer2', 'layer3', 'layer4']

for l in vis_labels:

    getattr(model, l).register_forward_hook(get_activation(l))


data, _ = cifar10_test[34]
data = data.unsqueeze_(0).to(device = device, dtype = dtype)

output = model(data)



for idx, l in enumerate(vis_labels):

    act = activation[l].squeeze()

    if idx < 2:
        ncols = 8
    else:
        ncols = 32

    nrows = act.size(0) // ncols

    fig, axarr = plt.subplots(nrows, ncols)
    fig.suptitle(l)


    for i in range(nrows):
        for j in range(ncols):
            axarr[i, j].imshow(act[i * nrows + j].cpu())
            axarr[i, j].axis('off')
```

```
<Figure size 432x288 with 0 Axes>
```

conv1



layer1



layer2

layer3

layer4