Homework 5 - CS 4342

- Kushal Gandhi

Hyper Parameter Progress from validation dataset:

```
Finding Best Hyperparameters
Epochs: 50 Hidden Units: 50 Learning Rate: 0.01 Batch size: 64 Acc: 86.51666666666667
Epochs: 60 Hidden Units: 50 Learning Rate: 0.01 Batch size: 64 Acc: 86.51666666666667
Epochs: 50 Hidden Units: 50 Learning Rate: 0.01 Batch size: 128 Acc: 85.34166666666667
Epochs: 60 Hidden Units: 50 Learning Rate: 0.01 Batch size: 128 Acc: 85.55
Epochs: 50 Hidden Units: 50 Learning Rate: 0.05 Batch size: 64 Acc: 87.85833333333333
Epochs: 60 Hidden Units: 50 Learning Rate: 0.05 Batch size: 64 Acc: 88.13333333333333
Epochs: 50 Hidden Units: 50 Learning Rate: 0.05 Batch size: 128 Acc: 86.76666666666667
Epochs: 60 Hidden Units: 50 Learning Rate: 0.05 Batch size: 128 Acc: 87.1
Epochs: 50 Hidden Units: 50 Learning Rate: 0.1 Batch size: 64 Acc: 87.99166666666667
Epochs: 60 Hidden Units: 50 Learning Rate: 0.1 Batch size: 64 Acc: 87.30833333333334
Epochs: 50 Hidden Units: 50 Learning Rate: 0.1 Batch size: 128 Acc: 87.84166666666667
Epochs: 60 Hidden Units: 50 Learning Rate: 0.1 Batch size: 128 Acc: 87.05000000000001
```

Training model with best hyperparameters on training dataset:

```
Epoch: 40 Cross-Entropy Loss: 0.34124632310659364 Acc: 90.625
Epoch: 41 Cross-Entropy Loss: 0.3393163340082023 Acc: 90.625
Epoch: 42 Cross-Entropy Loss: 0.33616524243088913 Acc: 90.625
Epoch: 43 Cross-Entropy Loss: 0.3338462639797564 Acc: 90.625
Epoch: 44 Cross-Entropy Loss: 0.3321518173710306 Acc: 92.1875
Epoch: 45 Cross-Entropy Loss: 0.3277659414104387 Acc: 92.1875
Epoch: 46 Cross-Entropy Loss: 0.3266824903291262 Acc: 92.1875
Epoch: 47 Cross-Entropy Loss: 0.32521245831027 Acc: 92.1875
Epoch: 48 Cross-Entropy Loss: 0.3249132323299009 Acc: 92.1875
Epoch: 49 Cross-Entropy Loss: 0.32380286691963894 Acc: 92.1875
Epoch: 50 Cross-Entropy Loss: 0.3223552116077651 Acc: 92.1875
Epoch: 51 Cross-Entropy Loss: 0.3172098158833762 Acc: 92.1875
Epoch: 52 Cross-Entropy Loss: 0.31560980504907493 Acc: 92.1875
Epoch: 53 Cross-Entropy Loss: 0.3165810689067238 Acc: 92.1875
Epoch: 54 Cross-Entropy Loss: 0.3170407279391026 Acc: 92.1875
Epoch: 55 Cross-Entropy Loss: 0.3160671250763458 Acc: 92.1875
Epoch: 56 Cross-Entropy Loss: 0.3152752149790985 Acc: 92.1875
Epoch: 57 Cross-Entropy Loss: 0.3143123803193301 Acc: 92.1875
Epoch: 58 Cross-Entropy Loss: 0.31220121794198047 Acc: 92.1875
Epoch: 59 Cross-Entropy Loss: 0.30990866650510845 Acc: 92.1875
Epoch: 60 Cross-Entropy Loss: 0.31142975825347685 Acc: 92.1875
```

Cross-Entropy Loss and Accuracy on Test Dataset:

```
Test Set Cross Entropy Loss: 0.3636996346798579 Test Set Accuracy: 87.07000000000001
```