

Python 3.6.2 |Anaconda custom (64-bit)| (default, Sep 19 2017, 08:03:39) [MSC v.1900 64 bit (AMD64)]

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IPython 6.1.0 -- An enhanced Interactive Python.

```
In [1]: runfile('C:/Users/raven/Google Drive/MSEE/EE 258/Projects/Project 1/MLP-2
hidden layer.py', wdir='C:/Users/raven/Google Drive/MSEE/EE 258/Projects/Project
1')
```

Iteration 1, loss = 1.04344908

Iteration 2, loss = 0.38803863

Iteration 3, loss = 0.30212741

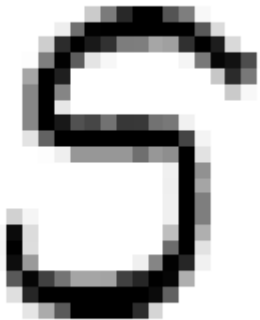
Iteration 4, loss = 0.27532567

Iteration 5, loss = 0.26436421

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packages\sklearn\normal_network\multilayer_perceptron.py:564: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (5) reached and the optimization hasn't
converged yet.

```
% self.max_iter, ConvergenceWarning)
```



prediction is [5.]

label is 5.0

Predicted Labels for Test Images: [0. 3. 6. ..., 9. 0. 2.]

The Models Accuracy is 0.9233

Iteration 1, loss = 1.29899655

Iteration 2, loss = 0.48442251

Iteration 3, loss = 0.35626186

Iteration 4, loss = 0.31399727

Iteration 5, loss = 0.29299273

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packages\sklearn\normal_network\multilayer_perceptron.py:564: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (5) reached and the optimization hasn't
converged yet.

```
% self.max_iter, ConvergenceWarning)
```

Iteration 1, loss = 1.29856245

```

Iteration 2, loss = 0.49719416
Iteration 3, loss = 0.36146449
Iteration 4, loss = 0.32016874
Iteration 5, loss = 0.29622042
C:\Users\raven\Anaconda3\lib\site-
packages\sklearn\neural_network\multilayer_perceptron.py:564: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (5) reached and the optimization hasn't
converged yet.
  % self.max_iter, ConvergenceWarning)
Iteration 1, loss = 1.29803650
Iteration 2, loss = 0.48971094
Iteration 3, loss = 0.36045210
Iteration 4, loss = 0.31560915
Iteration 5, loss = 0.28782489
C:\Users\raven\Anaconda3\lib\site-
packages\sklearn\neural_network\multilayer_perceptron.py:564: ConvergenceWarning:
Stochastic Optimizer: Maximum iterations (5) reached and the optimization hasn't
converged yet.
  % self.max_iter, ConvergenceWarning)

```

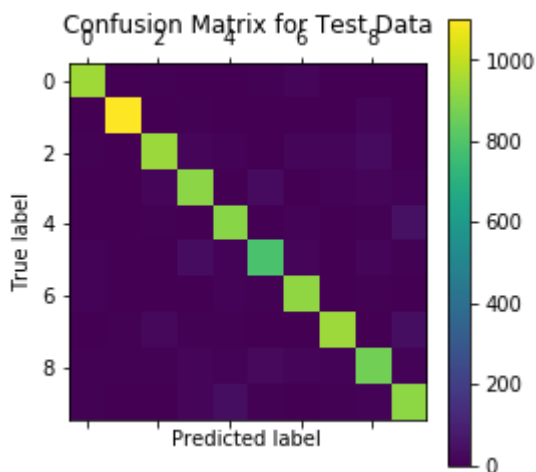
The Cross-Validation score is [0.91341732 0.919946 0.91803771]

The Confusion Matrix for Test Data:

```

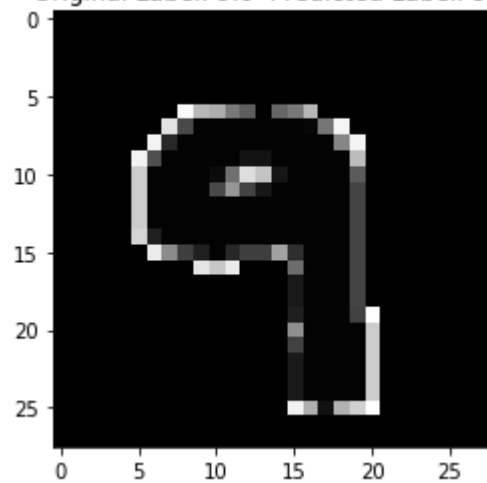
[[ 944    0    8    2    1    5   13    3    4    0]
 [   0 1103    4    8    1    1    4    0   13    1]
 [   8    1  935   13   10    0   14   15   34    2]
 [   3    0   16  913    3   32    4   12   16   11]
 [   0    0    5    0  909    1   12    0    7   48]
 [  10    2    3   38   12  785   17    4   15    6]
 [   9    2    4    0    9    8  921    0    5    0]
 [   2    6   25    7    5    0    0  940    2   41]
 [   7    5    8   17    9   26   13   10  867   12]
 [   8    4    2   13   40    6    3    8    9  916]]

```

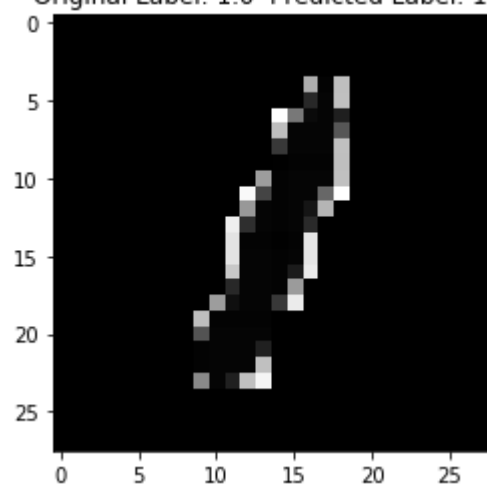


The test error for Linear Classifier is 13503.0

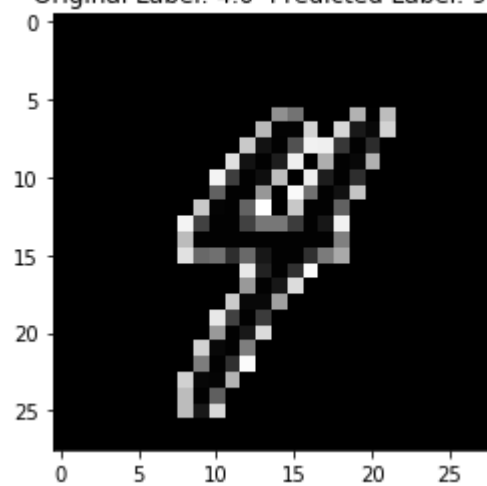
Original Label: 9.0 Predicted Label: 9.0



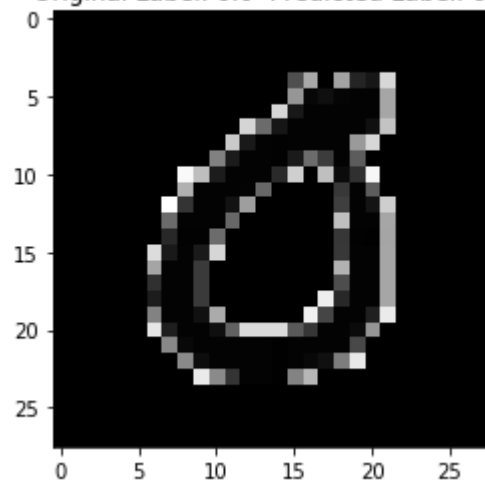
Original Label: 1.0 Predicted Label: 1.0



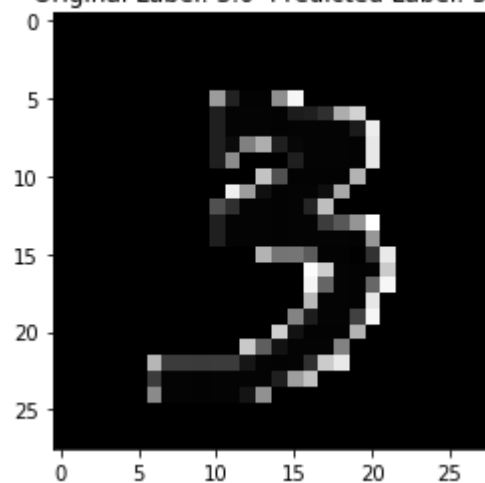
Original Label: 4.0 Predicted Label: 9.0



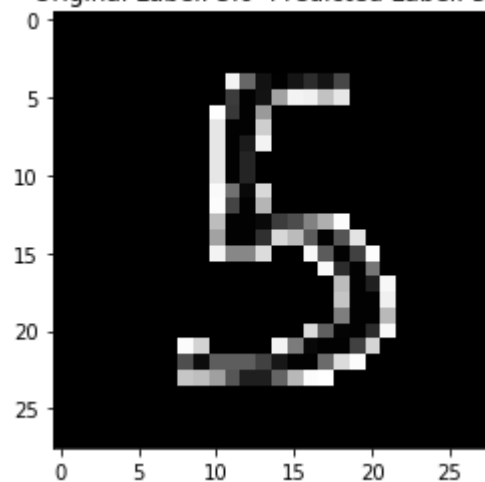
Original Label: 0.0 Predicted Label: 0.0



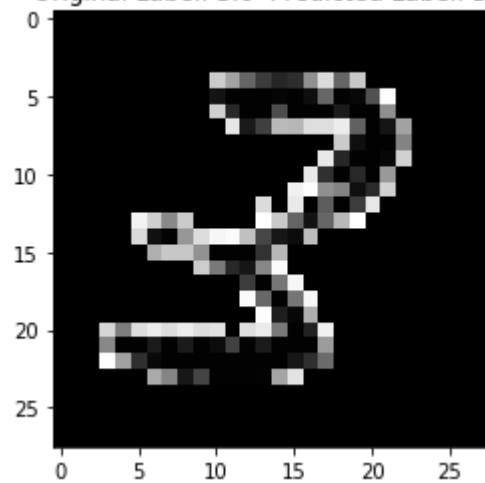
Original Label: 3.0 Predicted Label: 3.0



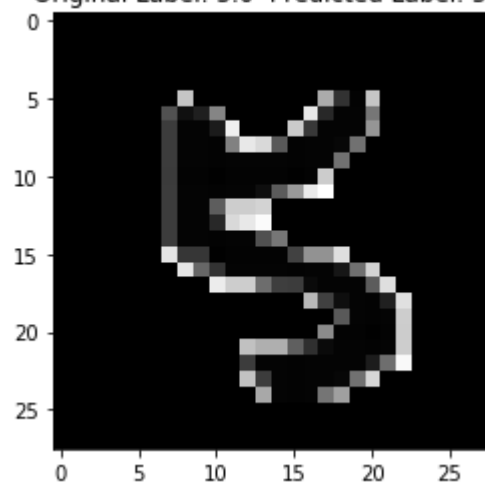
Original Label: 5.0 Predicted Label: 5.0



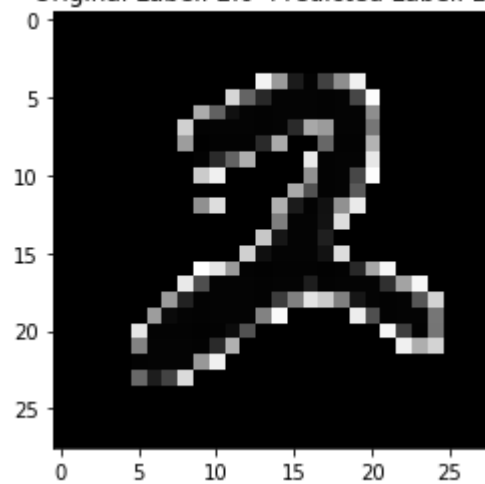
Original Label: 3.0 Predicted Label: 3.0



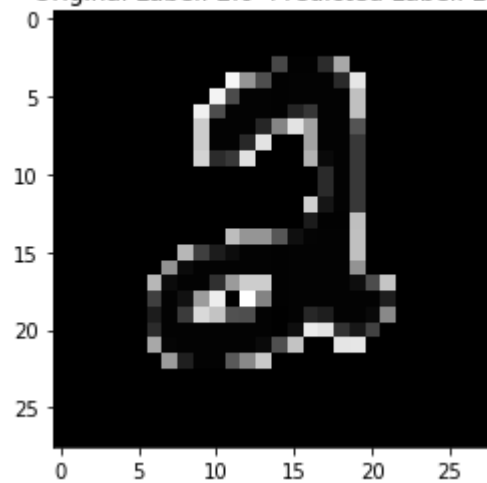
Original Label: 5.0 Predicted Label: 5.0



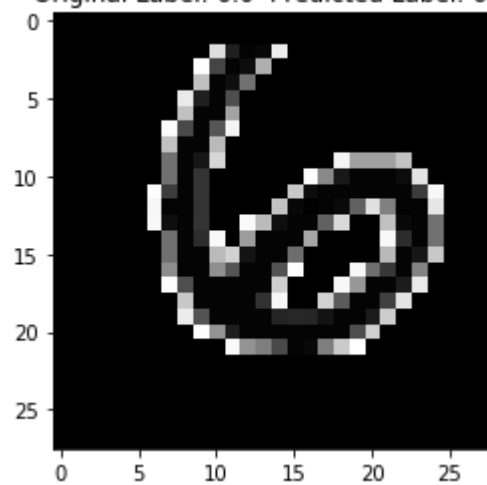
Original Label: 2.0 Predicted Label: 2.0



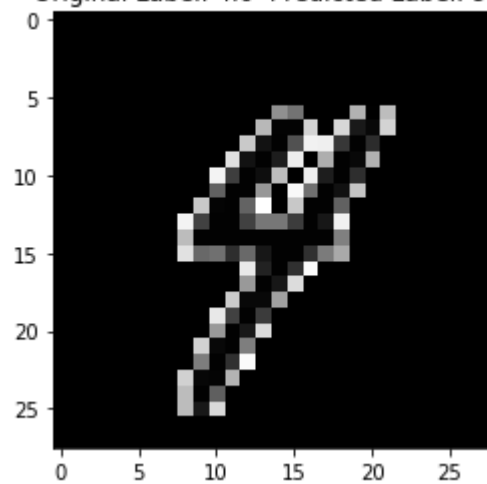
Original Label: 2.0 Predicted Label: 2.0



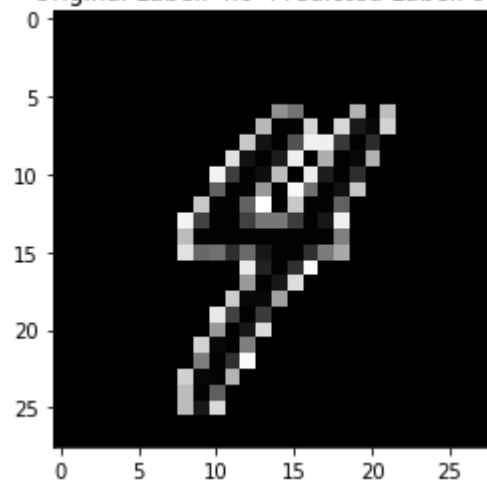
Original Label: 6.0 Predicted Label: 6.0



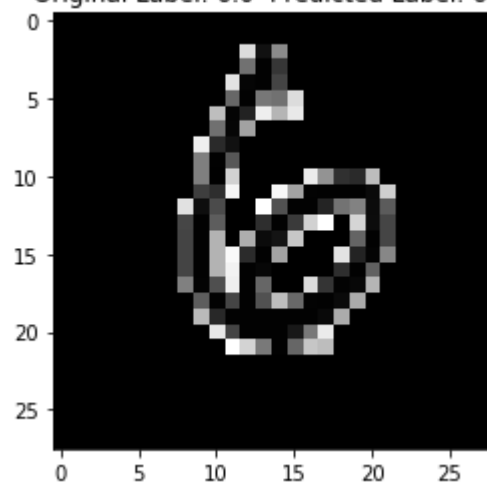
Original Label: 4.0 Predicted Label: 9.0



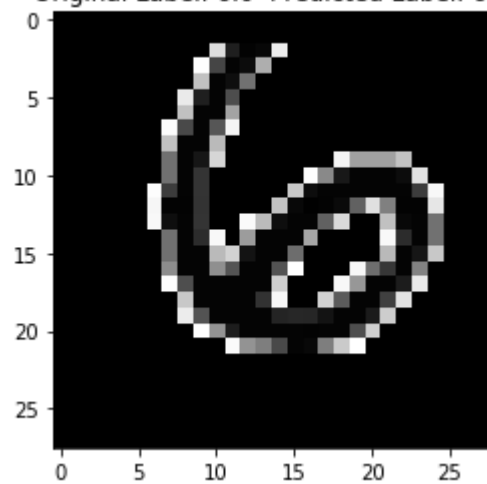
Original Label: 4.0 Predicted Label: 9.0



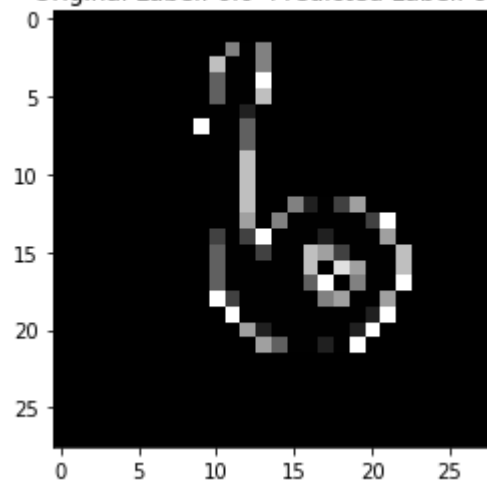
Original Label: 6.0 Predicted Label: 6.0



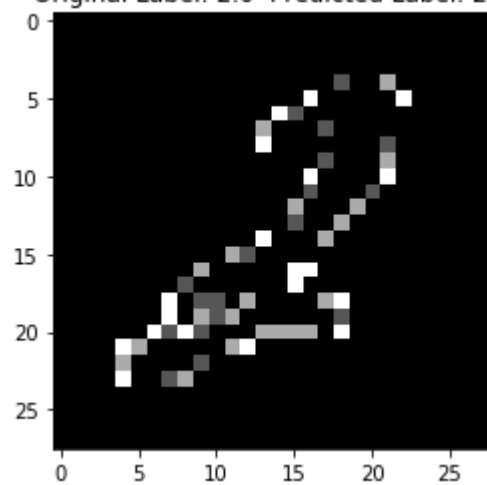
Original Label: 6.0 Predicted Label: 6.0



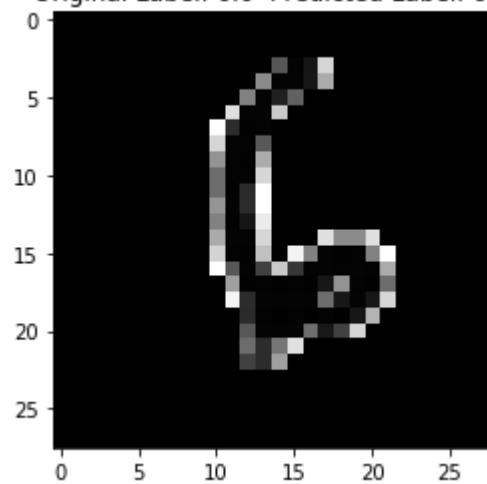
Original Label: 6.0 Predicted Label: 6.0



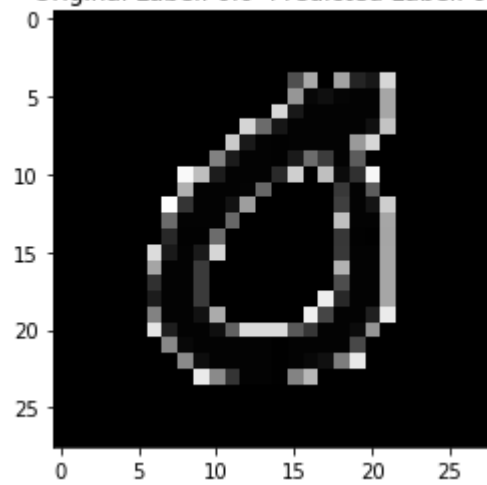
Original Label: 2.0 Predicted Label: 2.0



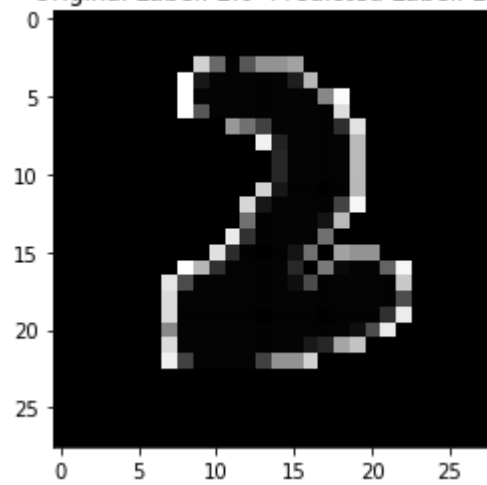
Original Label: 6.0 Predicted Label: 6.0



Original Label: 0.0 Predicted Label: 0.0



Original Label: 2.0 Predicted Label: 2.0



In [2]: