Automated handwritten digit recognition by using multi-class logistic regression and Neural Network

Automated handwritten digit recognition is widely used today - from recognizing zip codes (postal codes) on mail envelopes to recognizing amounts written on bank checks.

Two ways of implementation:

1) Implementation of logistic regression
2) Neural Network

Programming Language Used : Octave

Dataset :

- There are 5000 training examples. where each training example is a 20 pixel by 20 pixel grayscale image of the digit.
- Each pixel is represented by a floating point number indicating the grayscale intensity at that location.
- The 20 by 20 grid of pixels is unrolled into a 400 dimensional vector. Each of these training examples becomes a single row in our data matrix X.
- This gives us a 5000 by 400 matrix X where every row is a training example for a handwritten digit image.

# Visualizing the data
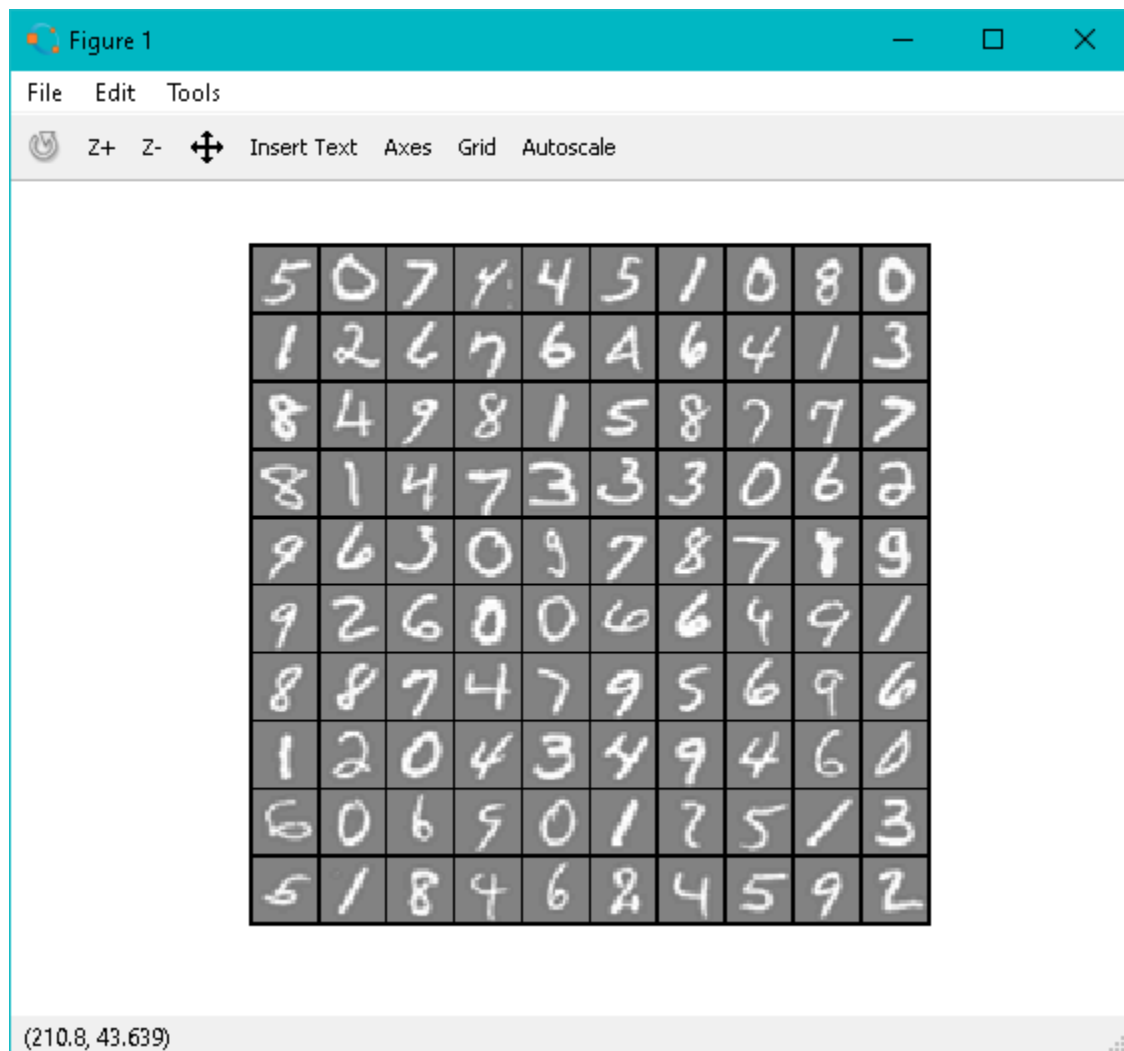
Logistic Regression Output

```
Loading and Visualizing Data ...
Program paused. Press enter to continue.

Testing lrCostFunction() with regularization
Cost: 2.534819
Expected cost: 2.534819
Gradients:
 0.146561
 -0.548558
 0.724722
 1.398003
Expected gradients:
 0.146561
 -0.548558
 0.724722
 1.398003
Program paused. Press enter to continue.

Training One-vs-All Logistic Regression...
Iteration    50 | Cost: 1.382279e-02
Iteration    50 | Cost: 5.725249e-02
Iteration    50 | Cost: 6.337081e-02
Iteration    50 | Cost: 3.633286e-02
Iteration    50 | Cost: 6.185420e-02
Iteration    50 | Cost: 2.168973e-02
Iteration    50 | Cost: 3.350932e-02
Iteration    50 | Cost: 8.554597e-02
Iteration    50 | Cost: 8.370398e-02
Iteration    50 | Cost: 9.911007e-03
Program paused. Press enter to continue.

Training Set Accuracy: 95.000000
>>
```

Neural Network Output
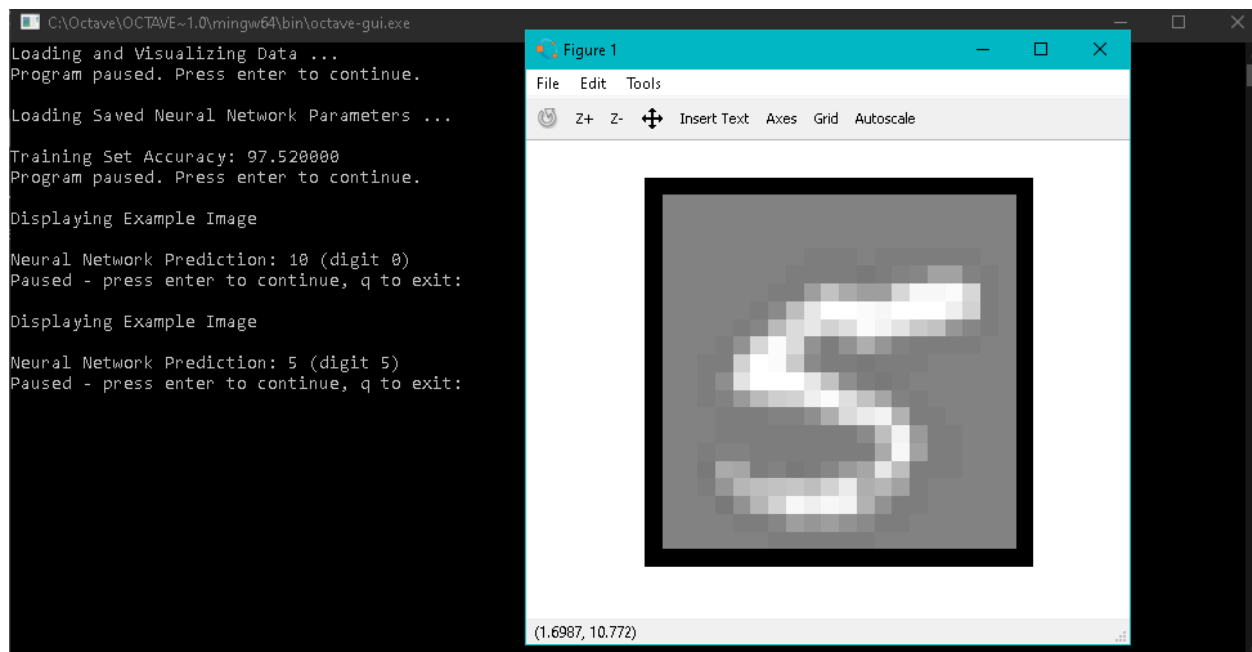


Contact :  Rajik Ahamed M (mmsrajikahamed@gmail.com)