



# ML Assignment - 3 Report



# Statement

Implement an artificial neural network and use it to classify handwritten digits.




# Preprocessing and splitting

- No null values were present.
- The features were normalized by dividing by 255 for faster convergence in gradient descent.
- Split into train and test



# Models Used and Results



## Results for MNIST Dataset using single hidden layer of size 128

Using a single hidden layer with relu activation and an output layer with softmax activation, we have.

- After 1000 Iterations
  - Test Accuracy = 0.9338095238095239
  - Train Accuracy = 0.9355357142857142
- After 2000 Iterations
  - Test Accuracy = 0.9479761904761905
  - Train Accuracy = 0.9554761904761905




## Results for MNIST Dataset using two hidden layers of size 128 and 256 respectively

Using two hidden layer with relu activation (sizes 128 and 256), and an output layer with softmax activation, we have.

- After 1200 Iterations
  - Test Accuracy = 0.9489285714285715
- After 2200 Iterations
  - Test Accuracy = 0.9596428571428571
- After 3200 Iterations
  - Test Accuracy = 0.9638095238095238

This model was submitted to kaggle and the the corresponding score was 0.96392.



## Results for MNIST Dataset using two hidden layers of size 256 and 256 respectively

Using two hidden layer with relu activation (sizes 128 and 256), and an output layer with softmax activation, we have.

- After 1000 Iterations
  - Test Accuracy = 0.9458333333333333