IT 350 Data Analytics
Lab 4: Feed-Forward Neural Networks

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Feed forward neural networks are primarily used for supervised learning in cases where the data to be learned is neither sequential nor time-dependent. They compute a function f on fixed size input x such that f(x)≈y for training pair (x, y).

Principal Component Analysis (PCA) is one of the most popular linear dimension reduction. It is a projection-based method which transforms the data by projecting it onto a set of orthogonal axes.

In this assignment, a simple feedforward neural network has been used on MNIST and Yelp reviews datasets.

MNIST dataset

First the data was scaled and normalized. Then PCA was applied. PCA used with number of components=300. Stochastic gradient descent was used. Number of classes = 10

Type	**Accuracy**
Normal	**99%**
With PCA	**90.3%**

Yelp dataset

Since the input was text data, first preprocessing was done by removing stop words and punctuations. Text field feature extraction was done on the Text field using Count Vectorizer to get numerical data. Then PCA used with number of components=3. Stochastic gradient descent was used. The target field to be predicted is the number of stars: ranging from 1-5. This was Label Encoded to get in the range 0-4 for passing to model.

Type	**Accuracy**
Normal	**78.1%**
With PCA	**76.9%**

Optimizer used was stochastic gradient descent, activation function was sigmoid and learning rate of 0.1 and 2 hidden layers were used. Final prediction was obtained by using a softmax layer and taking the argmax value.

Overall, using PCA for dimensionality reduction lowered the accuracy.