HW#9
Application of Neural Network (CPE 520)
Due date: Nov. 16th , 2021

Read pp. 367-415 on PCA from Neural Networks and Machine Learning, Simon Haykin

Q.1: Use a 3-layer perceptron auto-encoder to perform dimensionality reduction on MNIST data-set.

1. Investigate the number of hidden unites on reconstruction performance (try 5,10, 30, 60 etc).
2. For 5 and 10 hidden unites display the set of weights converging to each neuron as an image (similar to PCA basis).
3. Use any classifier you like and train a 10-class classifier (i.e., 10-way softmax, SVM) on the output of the hidden layer say for 5, 10, 30, 60 hidden unites, try different number and plot classification performance vs # of hidden unites.
4. Provide the confusion matrices for your classifier with different hidden unites auto-encoder.
5. Compare the set of weights from an autoencoder with only 10 and 30 hidden unites with your results from HW#3 (K-means centroids) and HW#4 (PCA eigenvectors).

http://yann.lecun.com/exdb/mnist/