HW# 3
Introduction to Neural Networks (CpE 520)
Due date: Sept. 14th , 2021

Q.1: Use the 10-class digits in MNIST data-set and calculate the global PCA for all the digits. Keep the top 20 eigenvectors with the largest eigenvalues.
1. Display all 20 eigenvectors as images.
2. For each digit (0 to 9) take one example and project it onto the top
   a) 2 PCA eigenvectors and then reconstruct + calculate the MSE between original and reconstructed.
   b) 5 PCA eigenvectors and then reconstruct + calculate the MSE .
   c) 10 PCA eigenvectors and then reconstruct + calculate the MSE .
   d) 20 PCA eigenvectors and then reconstruct + + calculate the MSE.

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

Read My notes + pp. 389-404 from "Machine Learning" by Kevin P. Murphy, MIT Press

HW# 4
Introduction to Neural Networks (CpE 520)
Due date: Sept. 21st , 2021

Q.1: Implement unsupervised K-means algorithm on MNIST dataset. Remember K-means is an unsupervised clustering technique you do not need the labels.

1. Generate 5 centroids (of size 28x28) and display them as images. (see my notes on K-means, VQ)
2. Generate 10 centroids (of size 28x28) and display them as images.
3. Generate 20 centroids (of size 28x28) and display them as images.

Comment on you results. what can you deduct when you display centroids as images. **Also compare with your global PCA eigenvectors from previous HW#3.**

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

Read My notes + pp. 354-361 from "Machine Learning" by Kevin P. Murphy, MIT Press