

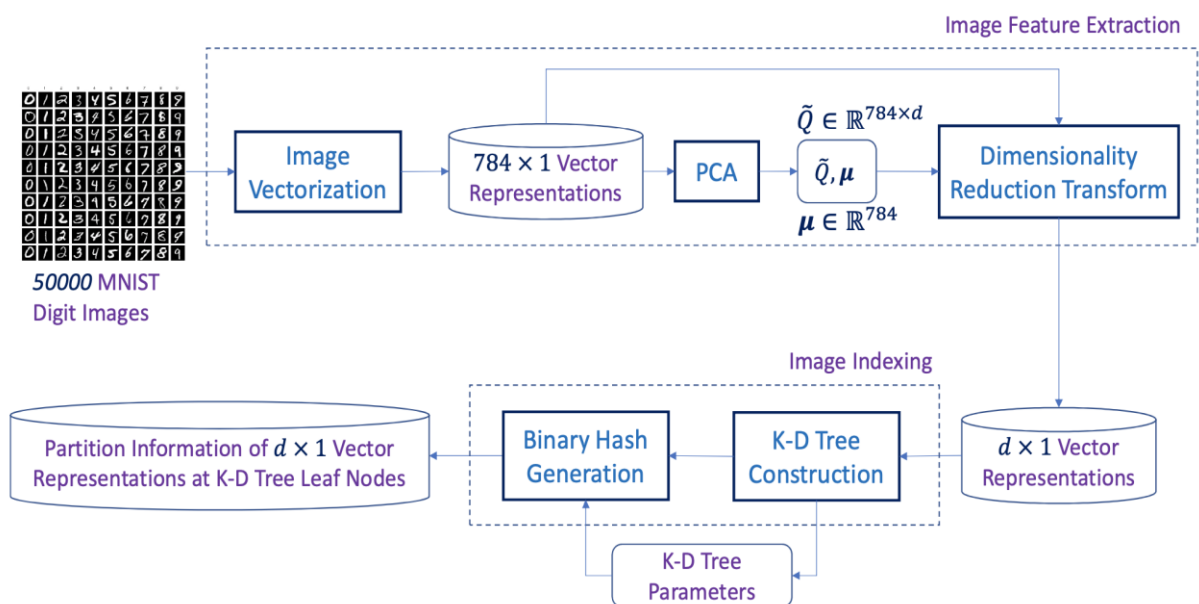
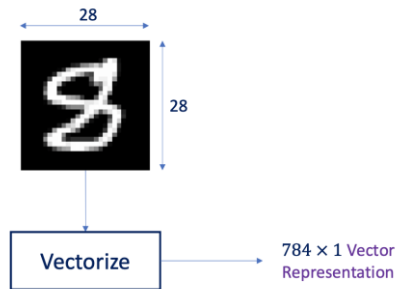
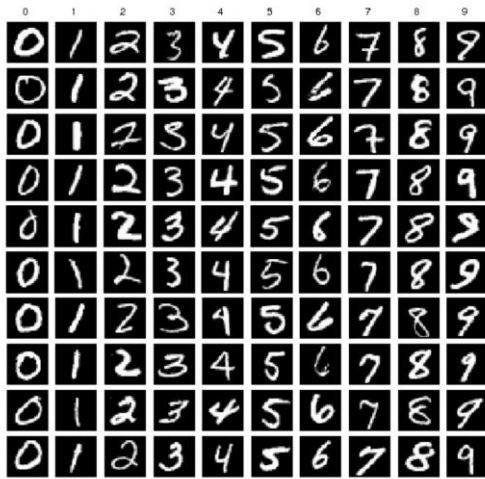
# EE 527: Machine Learning Laboratory

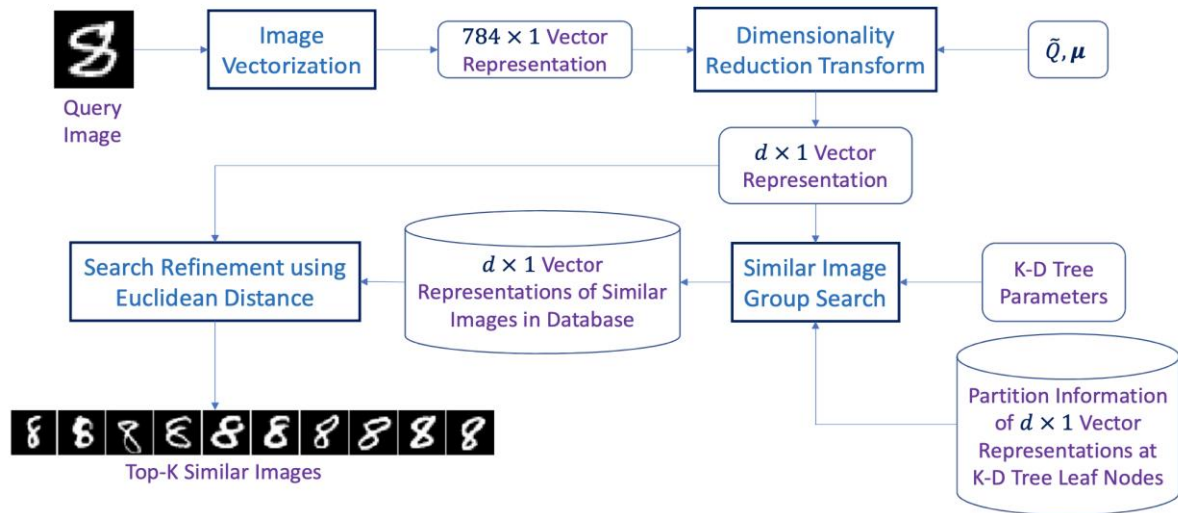
## Assignment 7

Due date: 21 March 2023

### 1. PCA & KD-Tree

The MNIST Dataset:





## Performance Evaluation:

$$\text{Search Precision} = \frac{\text{Number of Responses Matching Query Image}}{\text{Query Response Size (K for Top-K Responses)}}$$

Experiment with varying values of target feature subspace dimension  $d$ , K-D Tree maximum dept  $D_{max}$ , and leaf node data number threshold  $m$ .

Report **Search Precision** for different cases.

The MNIST data set can be accessed through the Keras library.

## 2. Spherical Clustering

Consider the YALE face dataset of the previous assignment, consisting of 15 subjects of 11 faces each. Downscale the images by a factor of 2 along both the height and width axes. Flatten the images into vectors  $x_1, x_2, \dots, x_n$ .

Perform spherical clustering on these vectors by choosing an appropriate cluster number  $K$  and visualize the mean face of the each of the clusters at convergence.