Report for CS215 Assignment 2

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Question No - 5

Part-a

The code ques5a.m contains a 3D matrix **final_Data** of size $10 \times 784 \times 84$. If we need the 84 coordinates for digit 0, then we can print the matrix **final_Data(1,:,:)** of size 784×84 where each column represents each of the 84 coordinates for the digit 0. Similarly we can find the 84 coordinates for each of the digits 0-9.

Algorithm for generating image from 84 coordinates

Step 1: We first create a matrix **image** which in each loop contains all the images of a particular digit depending on the loop.

Step 2: We then create a matrix **image_comp** which contains a single image of a particular digit.

Step 3: We calculate the mean of the matrix **image** and store it in a row matrix μ

Step 4: We then calculate the covariance of the matrix **image** and store it in a matrix **C** .

Step 5: Then we store the matrix of eigen vectors in V and the matrix D consisting the eigen values as the diagonal elements of the matrix D.

Step 6: Now using a for loop, we only consider the top 84 eigen vectors for image generation using the formula $final\_Data = \mu + \Sigma_{i=1}^{84} \lambda v_i$ where v_i represent the eigen vectors of the image.

Step 7: Then we plot the final_Data matrix using **imshow()** and show both the original image and reconstructed image side by side using **subplot()** .

Image Comparison side by side

(a) represents original image and (b) represents reconstructed image