

# Pattern Recognition & Machine Learning

## Assignment 1A

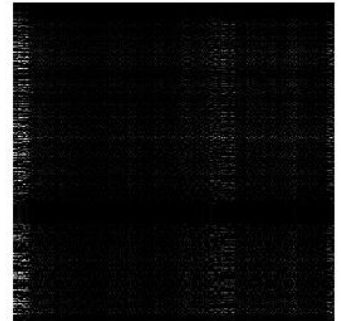
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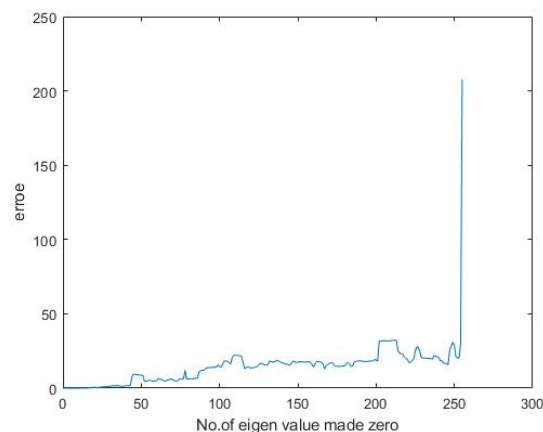
### Task 1

Perform the Eigen value Decomposition on the given grayscale square image of size  $M \times M$ . Reconstruct the image using NM eigenvectors with corresponding eigen values

### Reconstructed Image using 150 Eigen values & Error Image



### Plot between No. of Eigen Value used & Error



### Inference

Each eigen value is made zero starting from 256th which is also smallest. Now there is not significant change in error whwn smallest one were made zero but error shoots up as soon as largest is made zero. So, we can inferred that maximum information content about image is in largest eigen value.

## Task 2

Perform the Singular value Decomposition on the given gray scale square image of size  $M \times M$ . Reconstruct the image using NM singular vectors with corresponding singular values

### Reconstruct

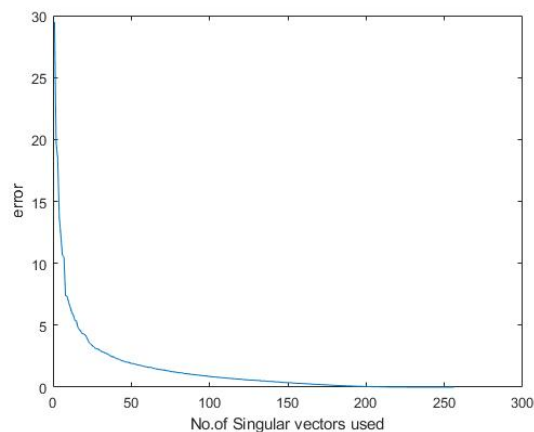
1. Using 240 singular vectors & singular values



2. Using 20 singular vectors & singular values



Plot between no. of singular values used and error



### Inference

From plot it can be inferred that for 0 singular vectors error was high but as we used starting singular vectors and valued error come down significantly and error does not change much after 130 singular vectors. So, maximum information about image is in the largest singular values and corresponding vectors