

CS5691: PRML

Programming Assignment 1

Deadline: January 28, 2022

Tasks to be performed:

A square gray-scale image is given to you. Represent the image as a matrix. Perform Eigenvalue Decomposition (EVD) and Singular Value Decomposition (SVD). Sort the eigenvalues/singular values in descending order. If the values are complex, use magnitude to sort. Next, reconstruct the image from the top K eigenvalues/singular values.

- a) Compute the Frobenius norm between the reconstructed image and the original image. Compare and contrast eigenvalue decomposition and singular value decomposition of the image. Plot this norm as a function of K.
- b) Write a report on the experiments performed. The report must have the following contents:
 - i) Motivation
 - ii) EVD/SVD
 - iii) Experimental results
 - iv) Inferences

Dataset: [Link](#)

Mapping: [Link](#)

Language: C, Python, MATLAB

Libraries allowed: Reading jpg/png image, plot functions, EVD, matrix operations.

Libraries not allowed: SVD

Guidelines:

- (a) Plot the reconstructed images along with their corresponding error image (actual - reconstructed).
- (b) A comparative graph of the reconstruction error vs. K is required in each experiment.
- (c) This is an exploratory assignment. You are advised to do as many experiments as possible to learn EVD, SVD, similarities, and differences between them. You may also experiment with color images.

Note: We recommend you use LaTeX for creating the report. The report should not exceed 3-pages, and the code should be well commented. You need to upload the report **RollNo.pdf** on Turnitin and the code in a zip file **RollNo.zip** on Moodle. The details regarding the submissions will be communicated later.