

AMATH 582 Winter Quarter 2018

Homework 1: Extended Yale Faces B Database – Eigenfaces

DUE: Friday, Jan. 19, 2018

Please go to CANVAS and download two data sets (ORIGINAL IMAGE and CROPPED IMAGES)

Your job is to perform an SVD analysis of these data sets. Please start with the cropped images and perform the following analysis.

1. Do an SVD analysis of the images (where each image is reshaped into a column vector and each column is a new image).
2. What is the interpretation of the \mathbf{U} , $\mathbf{\Sigma}$ and \mathbf{V} matrices?
3. What does the singular value spectrum look like and how many modes are necessary for good image reconstructions? (i.e. what is the rank r of the face space?)
4. compare the difference between the cropped (and aligned) versus uncropped images.

This is an exploratory homework. So play around with the data and make sure to plot the different things like the modes and singular value spectrum. Good luck, and have fun.