133B Project Proposal

Objective: Compare matrix factorization methods impact on facial recognition, i.e. implementation of 'Eigenfaces and Fisher Faces'.

Dataset: Labeled Faces in the Wild, (http://vis-www.cs.umass.edu/lfw/)

Outline:

This Project attempts to measure performance (accuracy and speed) of facial recognition techniques based on low rank factorization, with labeled classes. The procedure is as follows:

1) Separate Training and Test Dataset
2) Compute low rank factorization
3) From the training dataset, find covariance within each class
4) From the test dataset, compute maximum likelihood given training set covariance matrices.
5) Set classification as $\text{argmax}\, N(\mu, \Sigma)$
6) Compare accuracy

Given a grayscale dataset where each face (picture) is represented as $A \in \mathbb{R}^{m \times n}$, we will compute low rank approximations of form $A \approx A_r = \tilde{A}Q^T$ using 4 different techniques

1) Truncated Singular Value Decomposition
2) Truncated QR Factorization
3) K-means Clustering
4) LDA
5) No Factorization

From lectures, we would expect LDA to have the highest accuracy, and truncated QR factorization to have the best speed.