EECS 4404

Assignment 3

Anton Sitkovets

Step 1

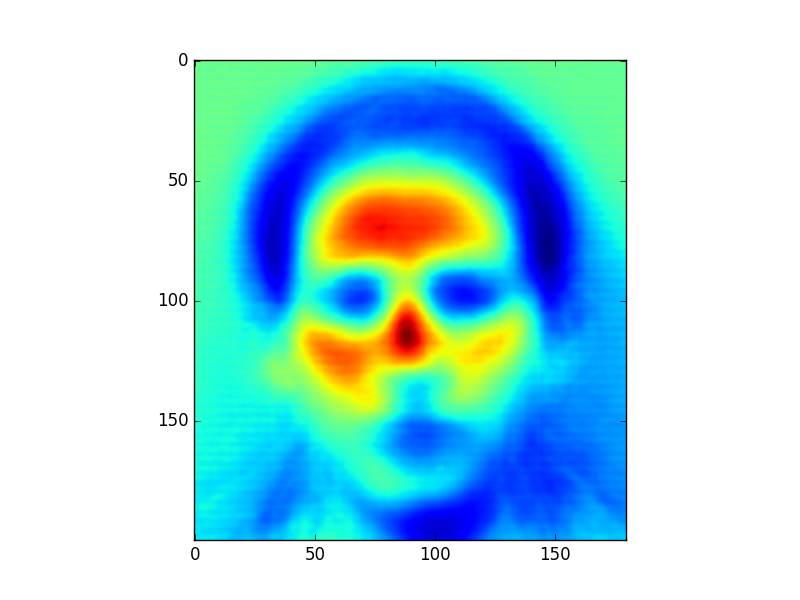


Figure 1. Mean Face of Dataset

Step 2

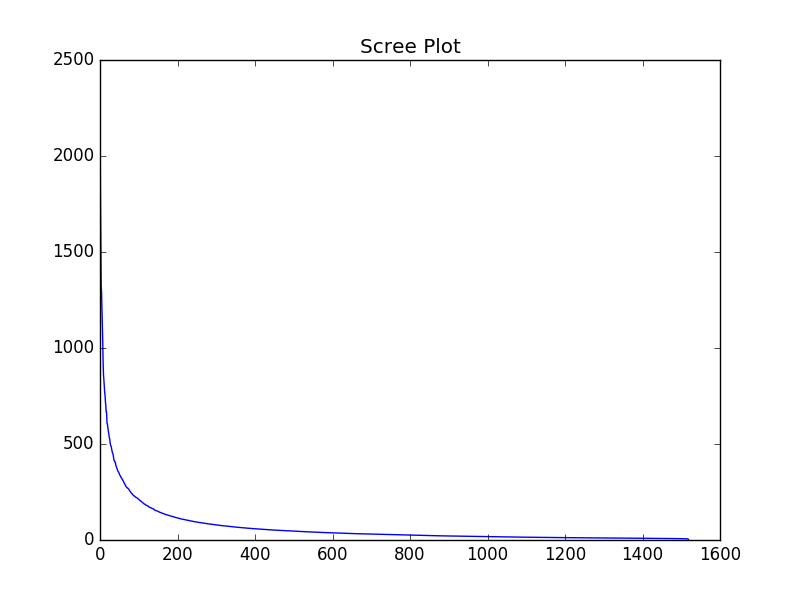


Figure 2. Scree Plot

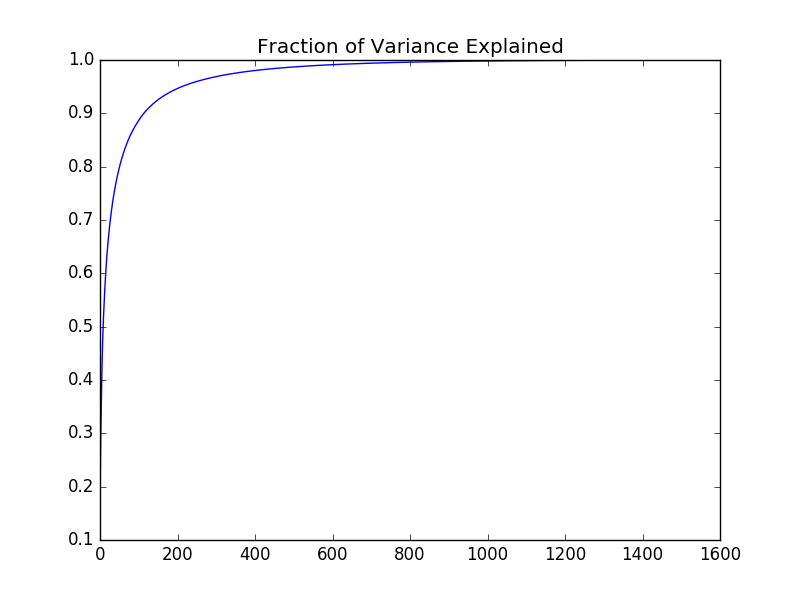
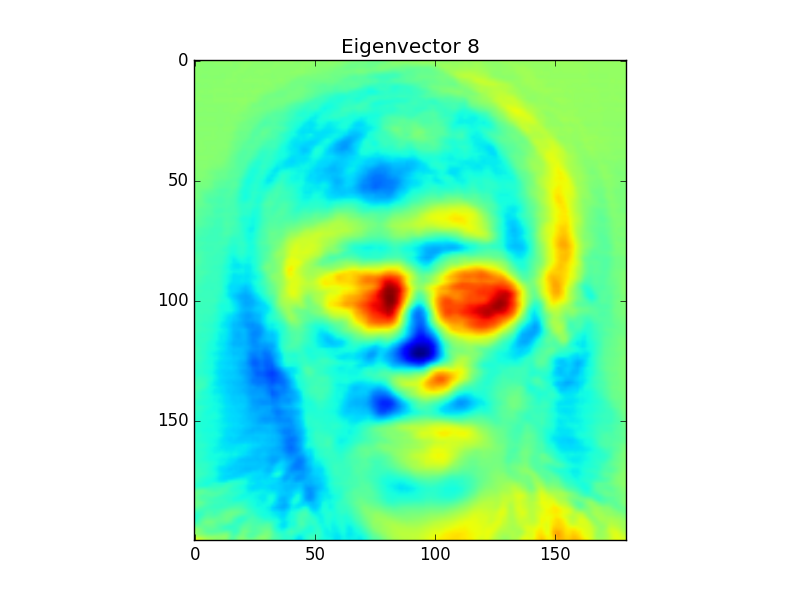
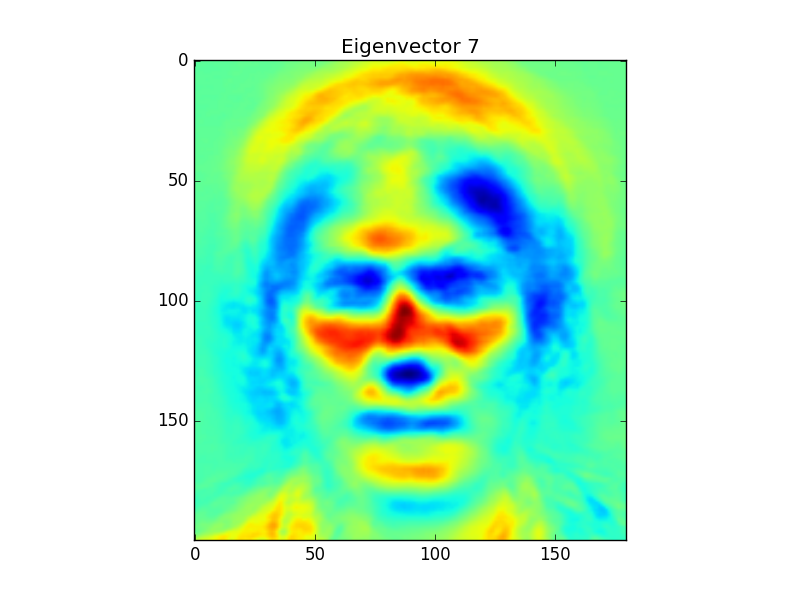
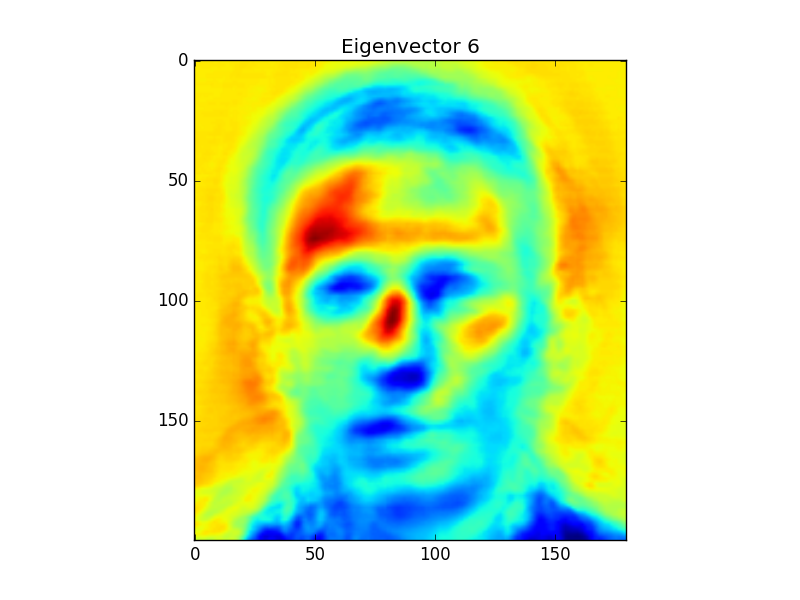
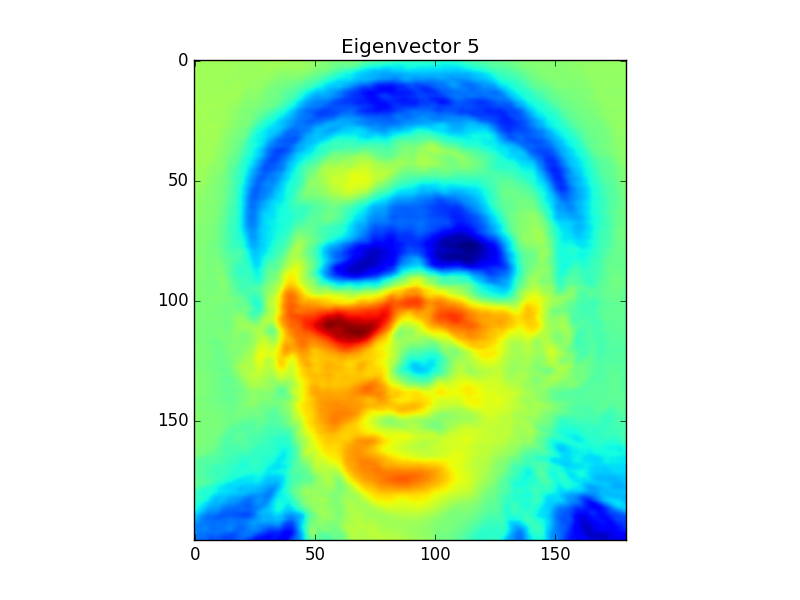
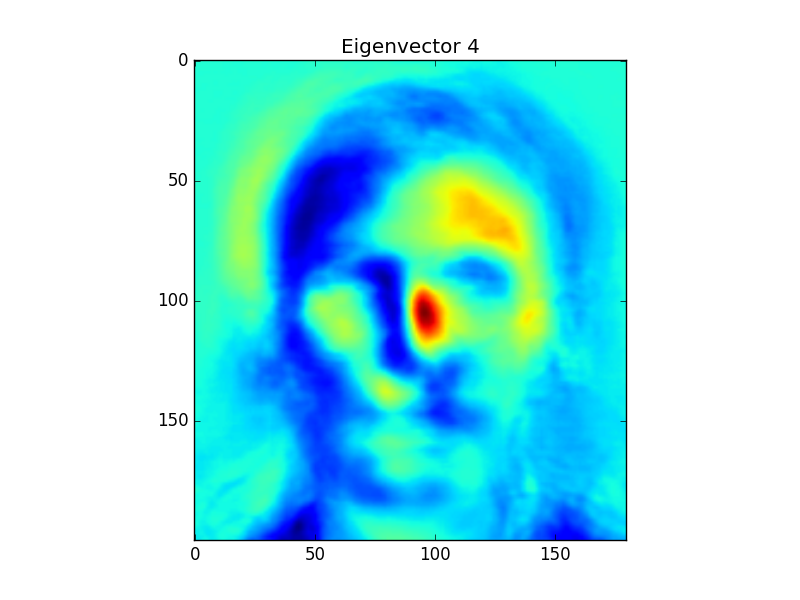
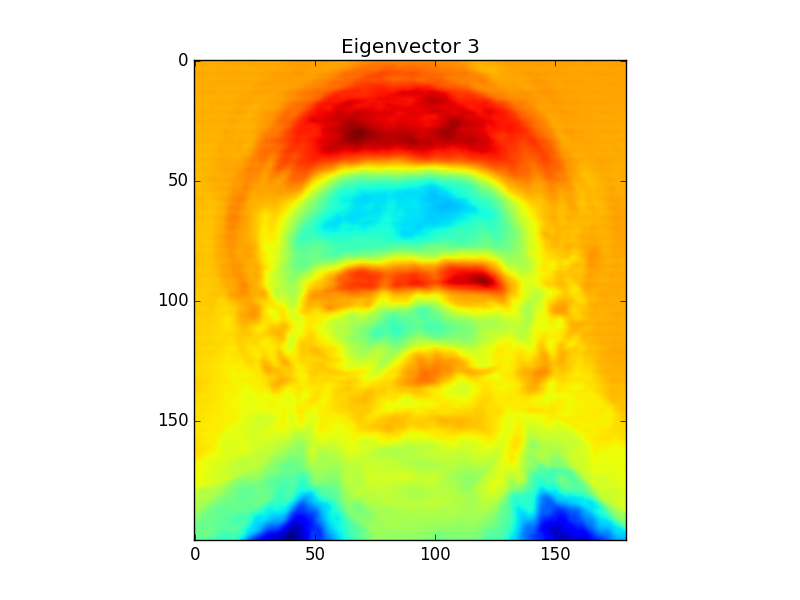
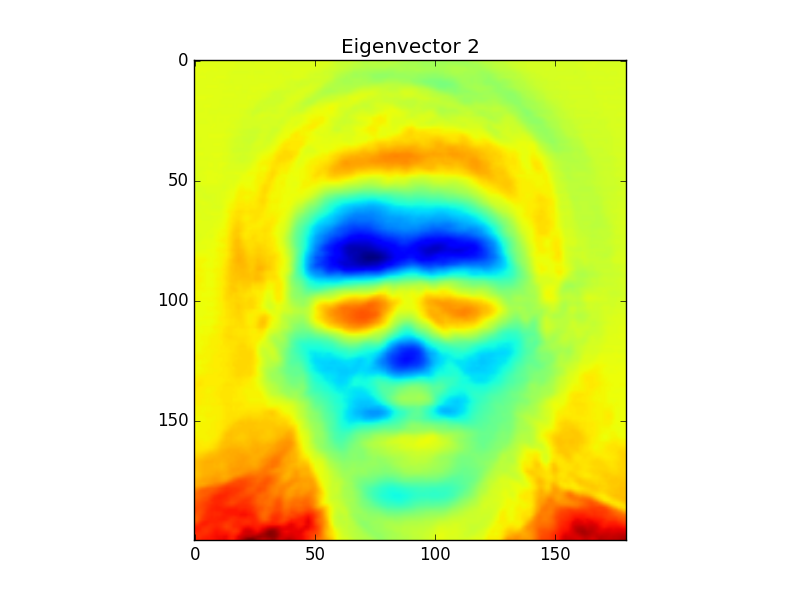
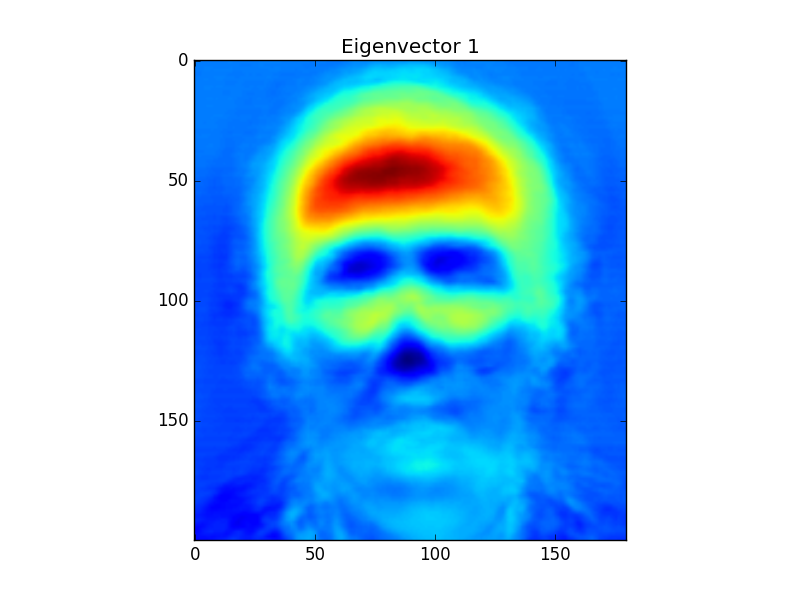
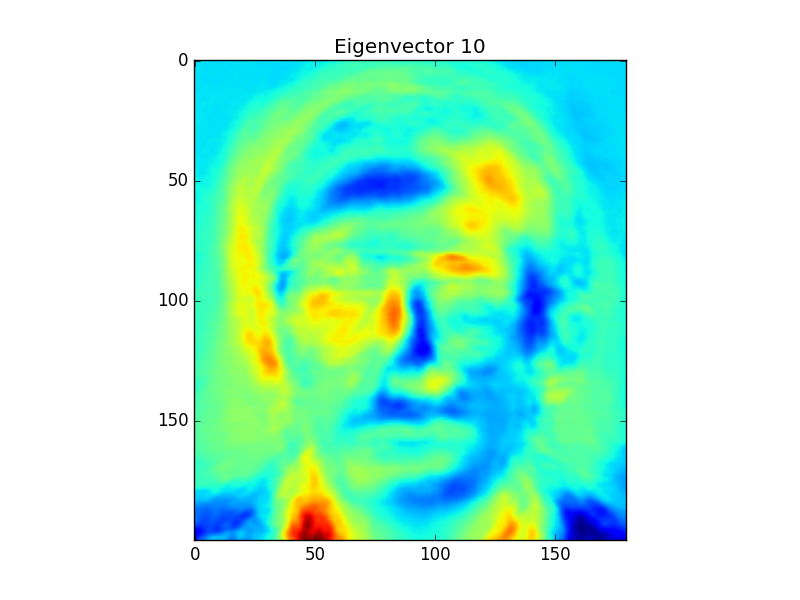
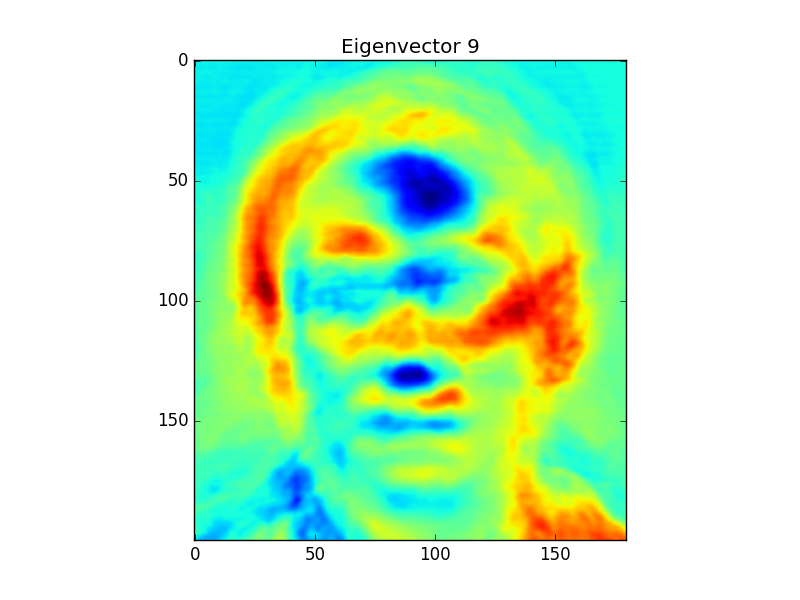


Figure 3. Fraction of Variance for Eigenvalues



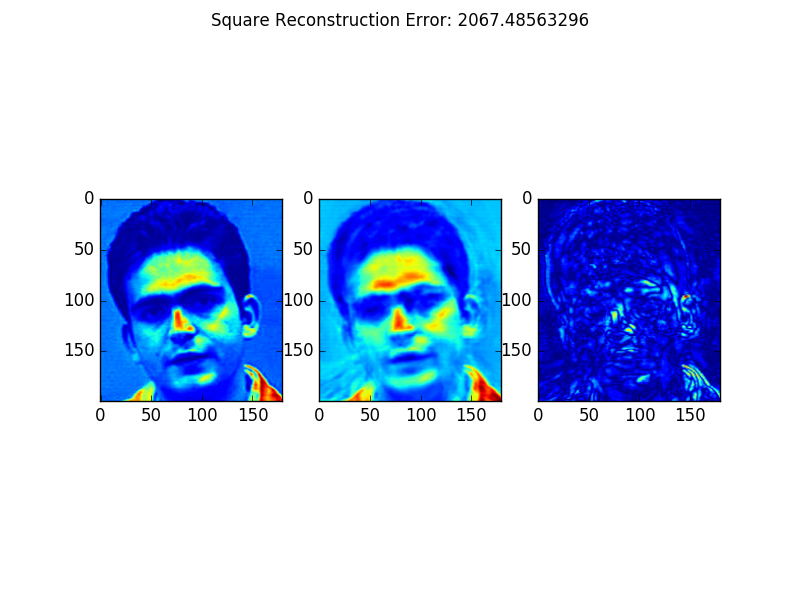
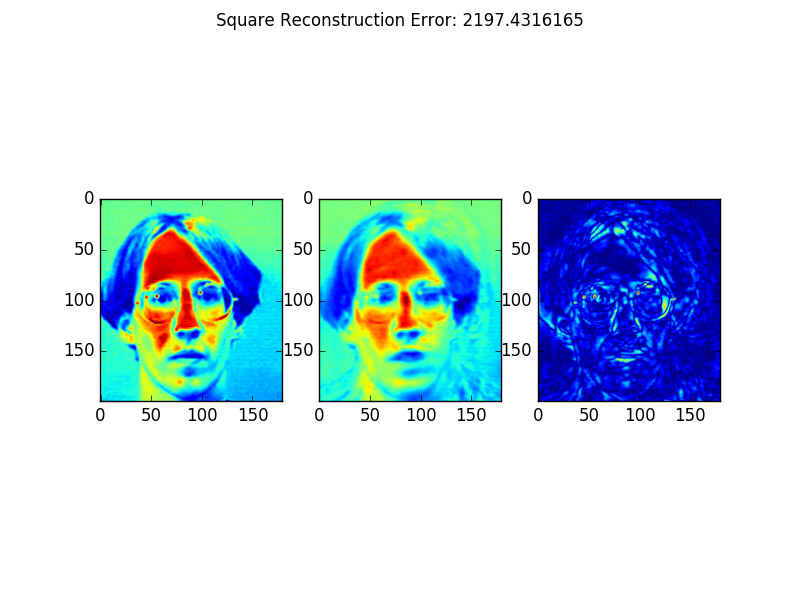


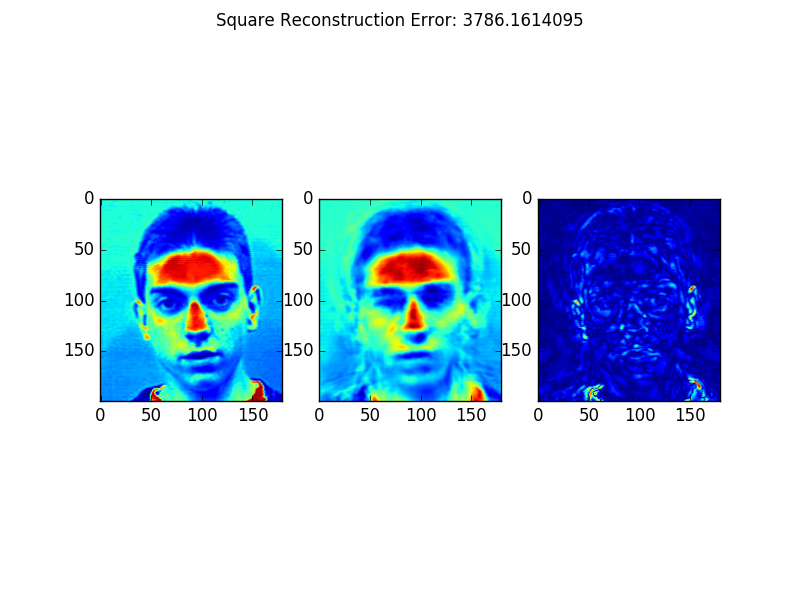
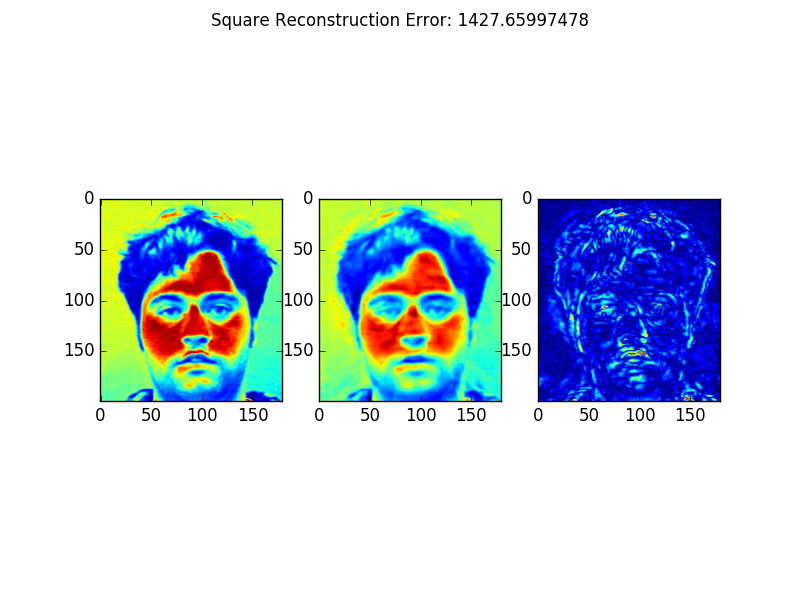
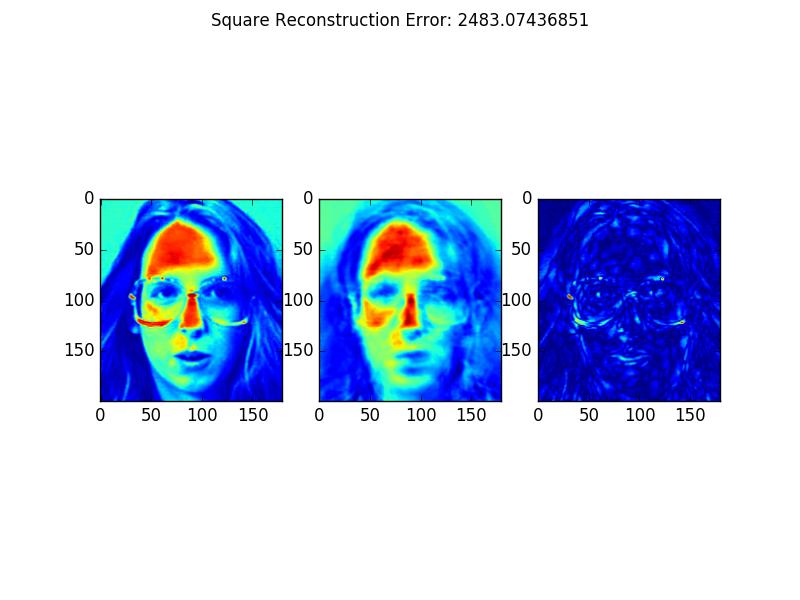
The subspace dimensionality used was 114.

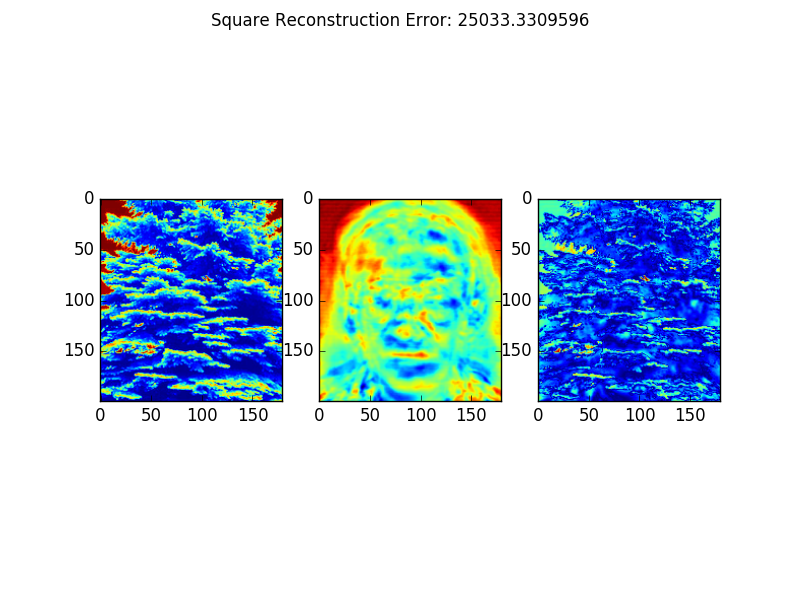
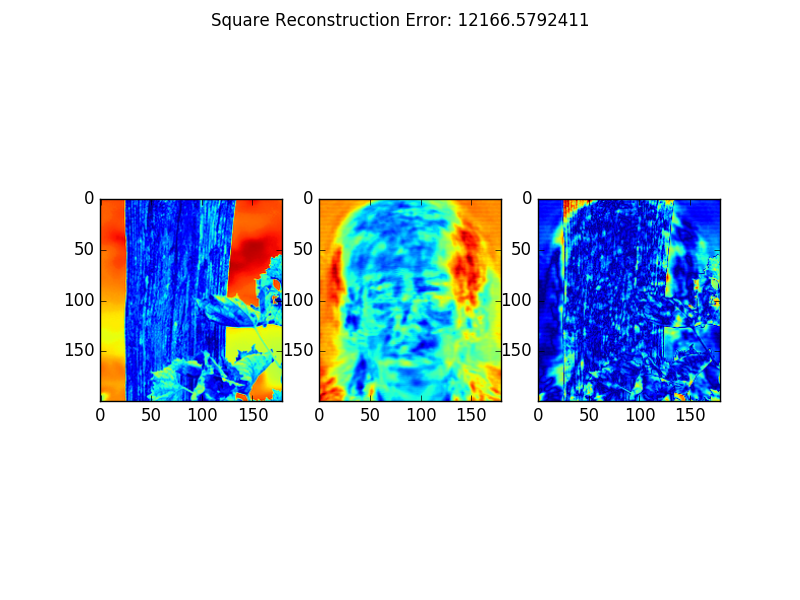
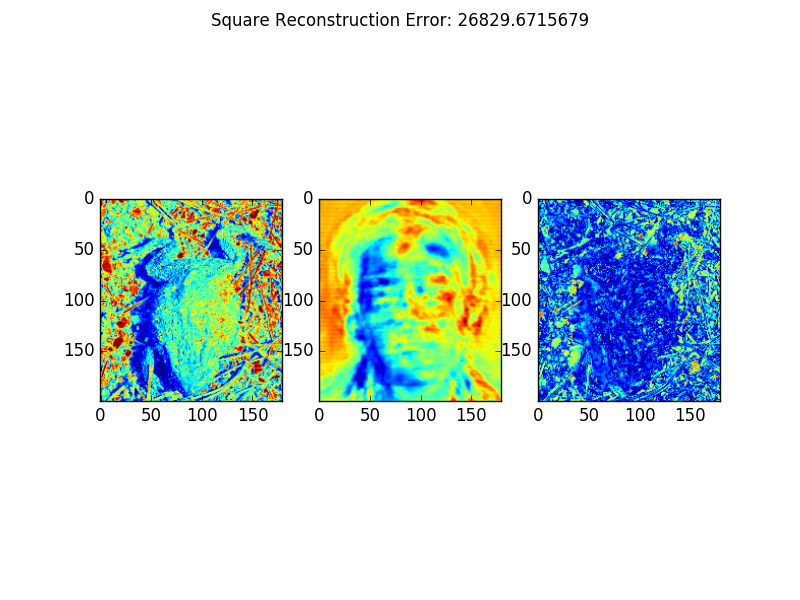
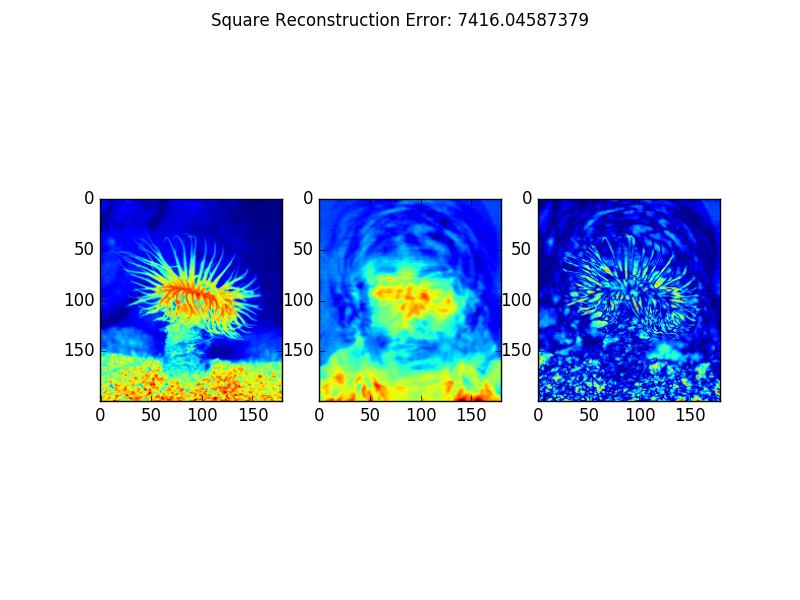
Looking at the principle components above, you can see that each component describes a facial feature that is descriptive of a person. The first component shows that the forehead is very red meaning that the forehead has a lot of variance among individuals. This means that the variations in foreheads of individuals can be used as a discriminative factor in identifying an individual. Each principle component isolates a discriminative feature of an individual, where the next ones are the eyes, hair, nose jaw, cheeks, etc. These components also outline the most likely location of each of these features in an image. This means that the model has been trained to assume that people are looking forward and not tilting their heads.

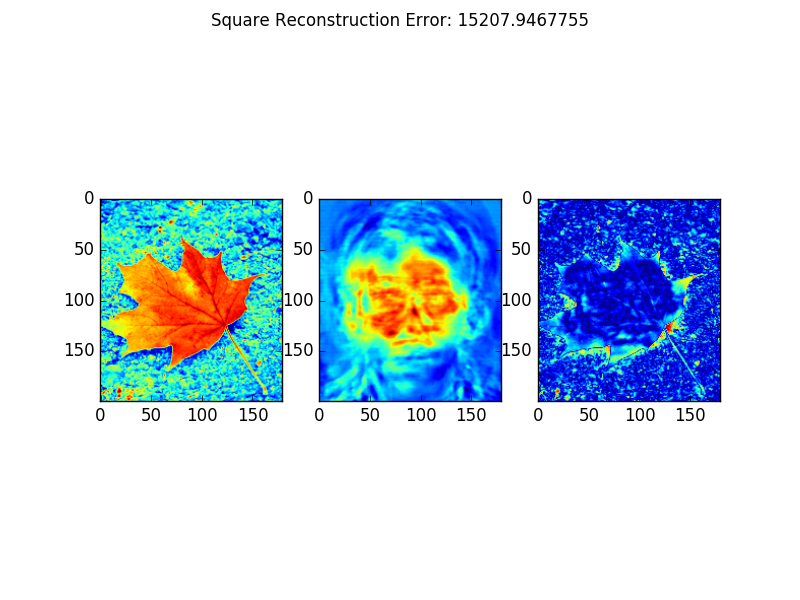
Step 3

Face Reconstruction Results





Non face Image Reconstruction



Histograms of Reconstruction Error for Face and Non Face Images

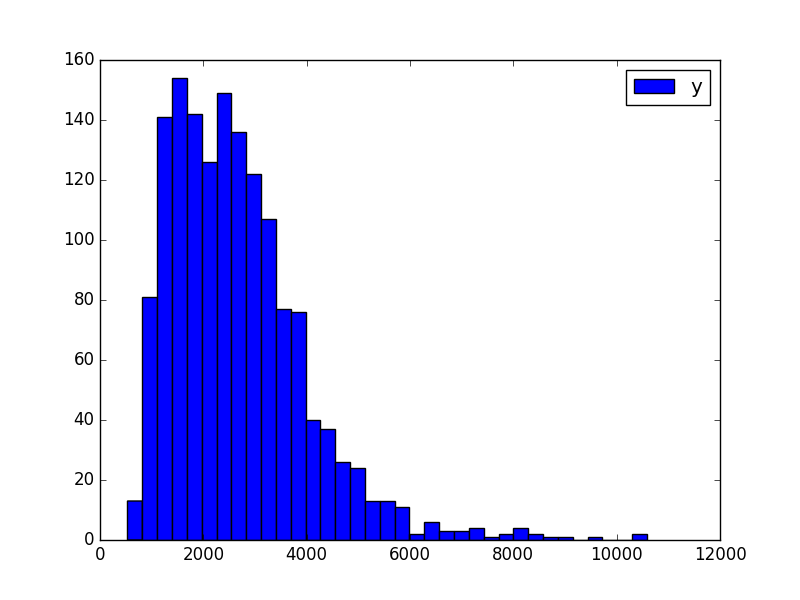


Figure . Histogram of Reconstruction Error for Face Images

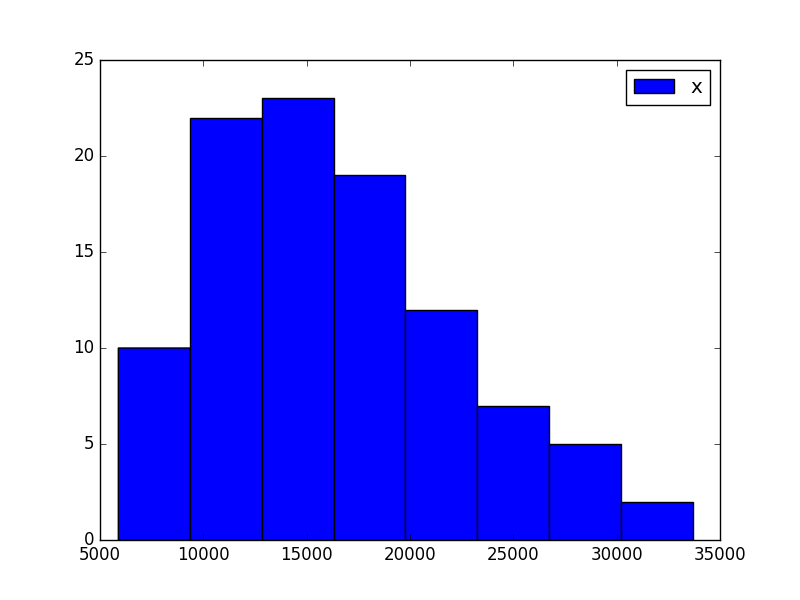


Figure . Histogram of Reconstruction Error for Non Face Images

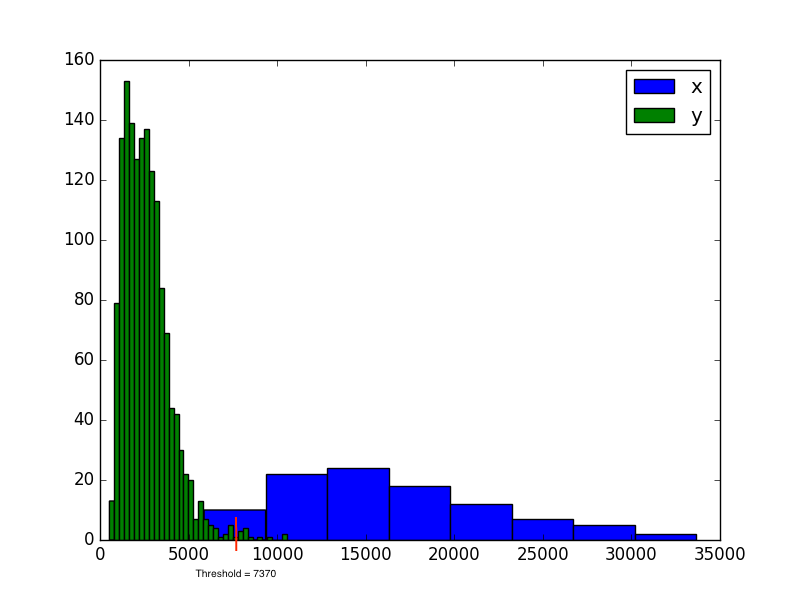
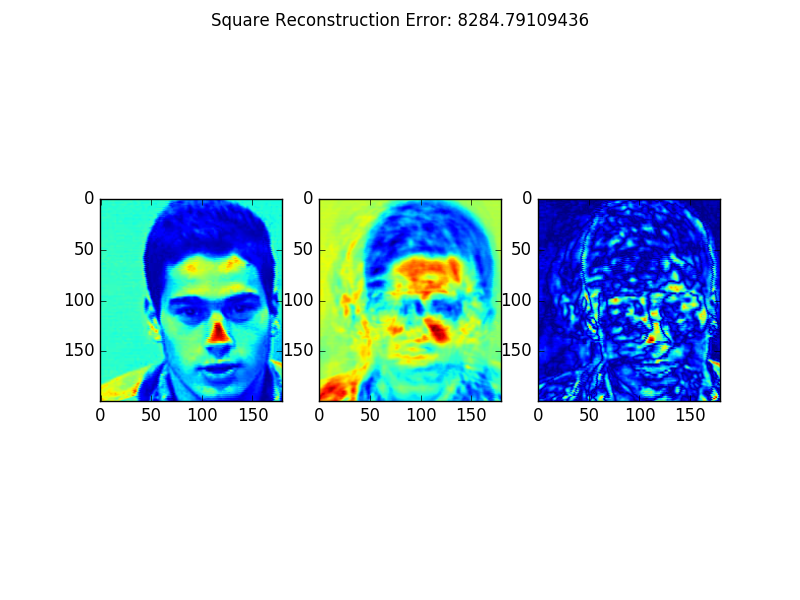
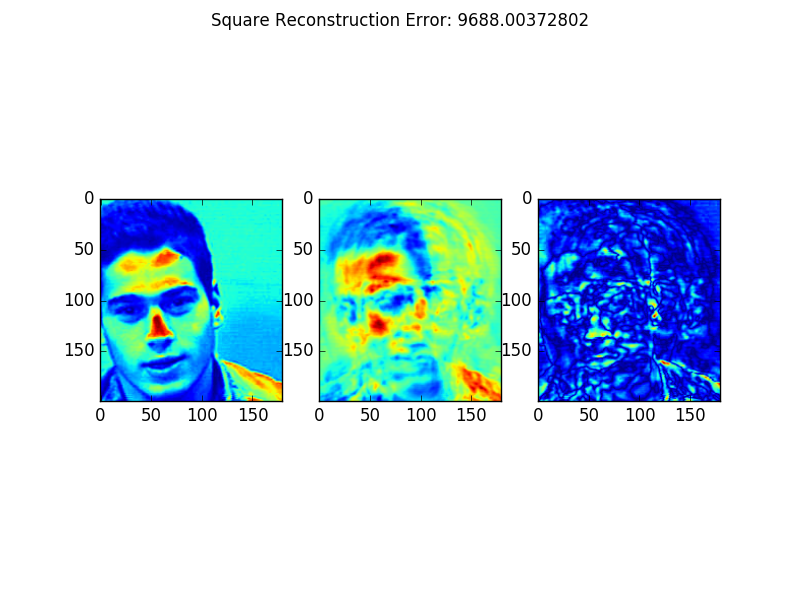
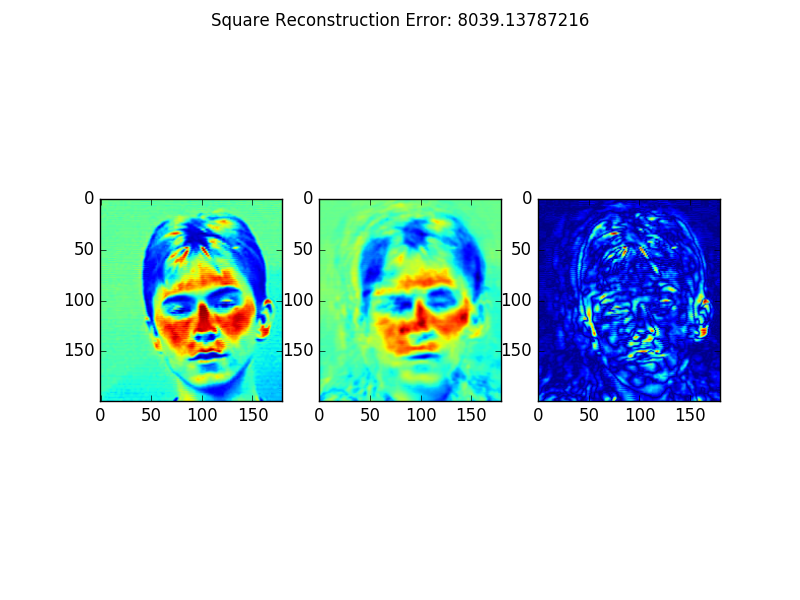


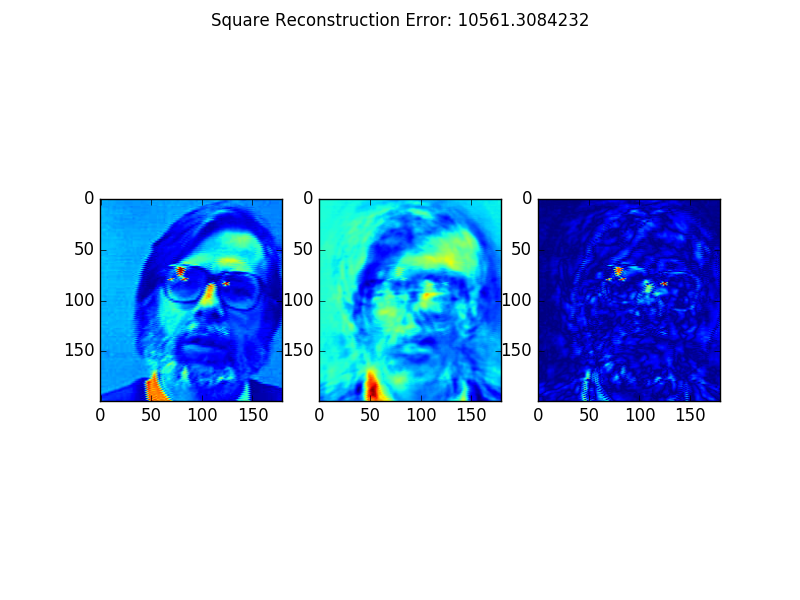
Figure . Histogram with both Face and Non Face Reconstruction Errors. Threshold value is chosen to be 7370

The chosen threshold value was 7370 after inspecting the above histogram.

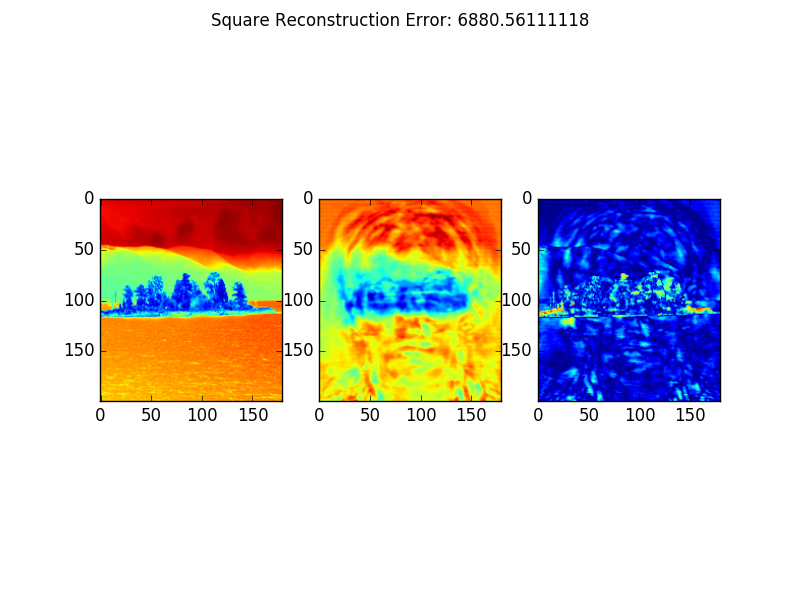
Classification of Faces as Non Face Examples

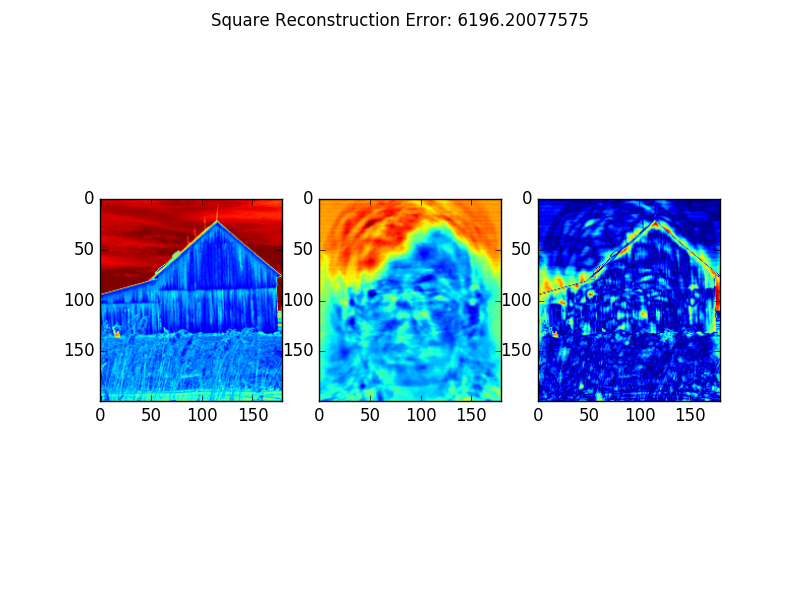


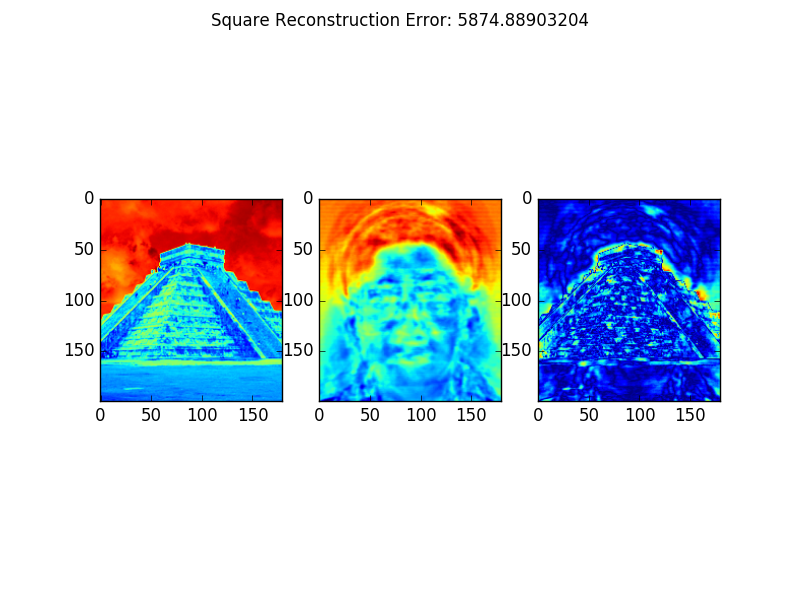


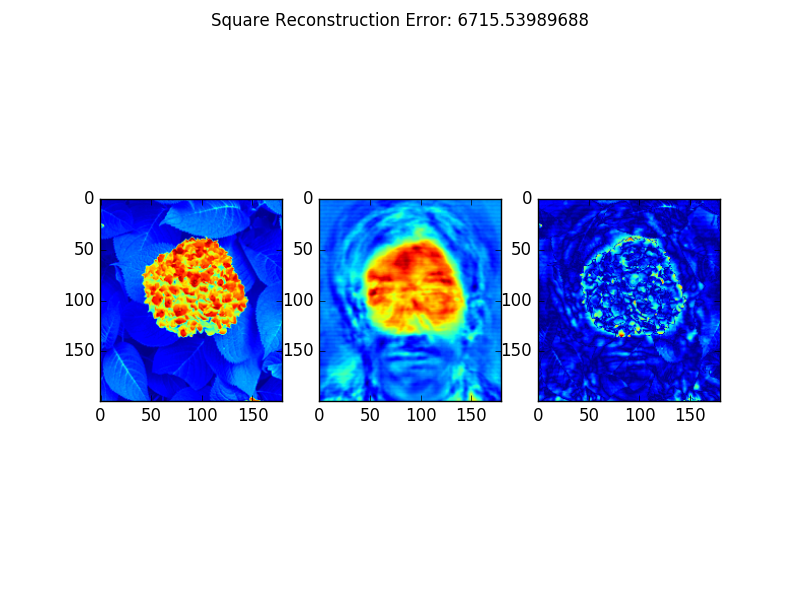


Classification of Non Face Images as Faces Examples

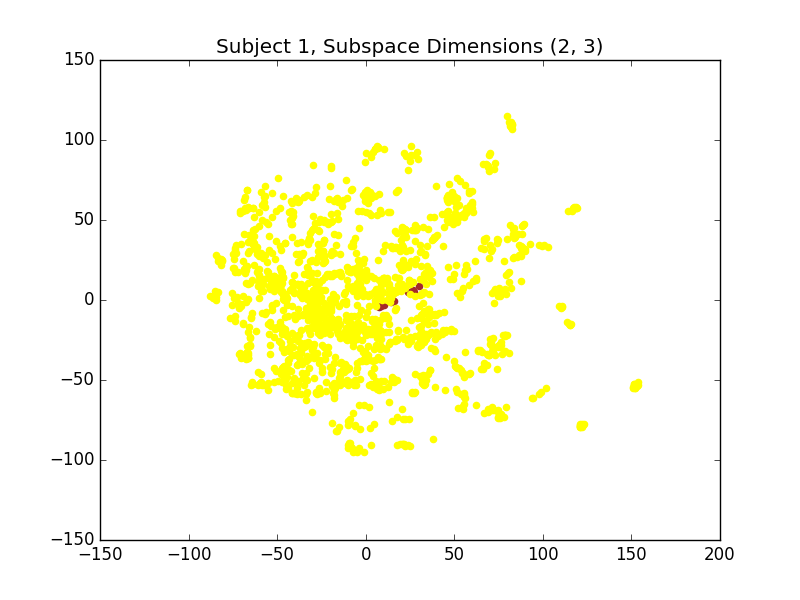
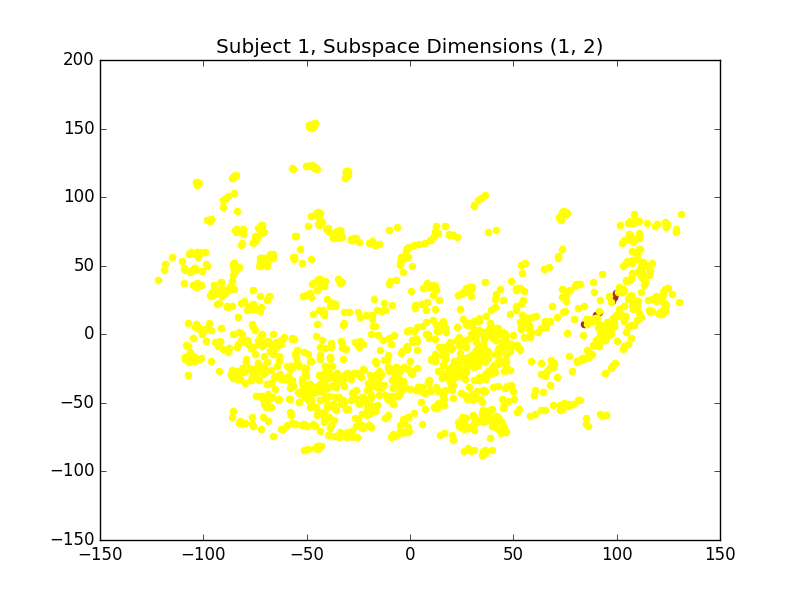








Step 4



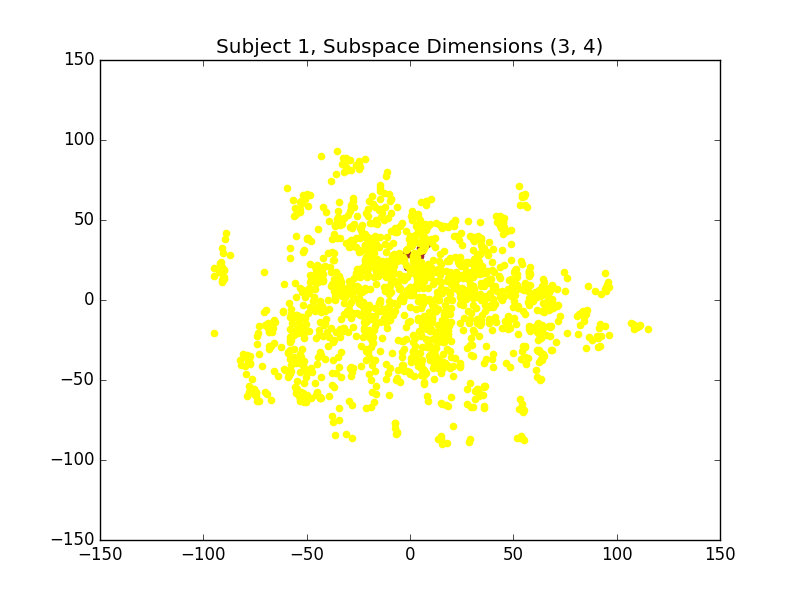
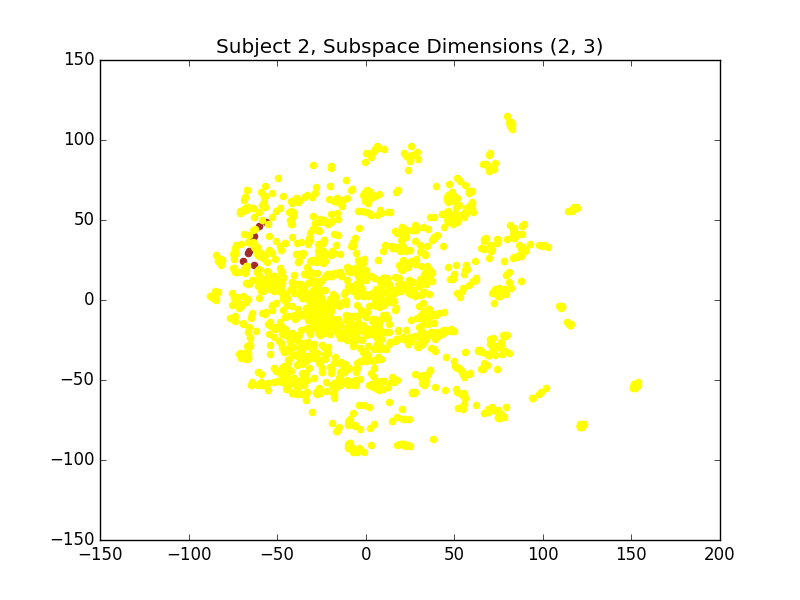
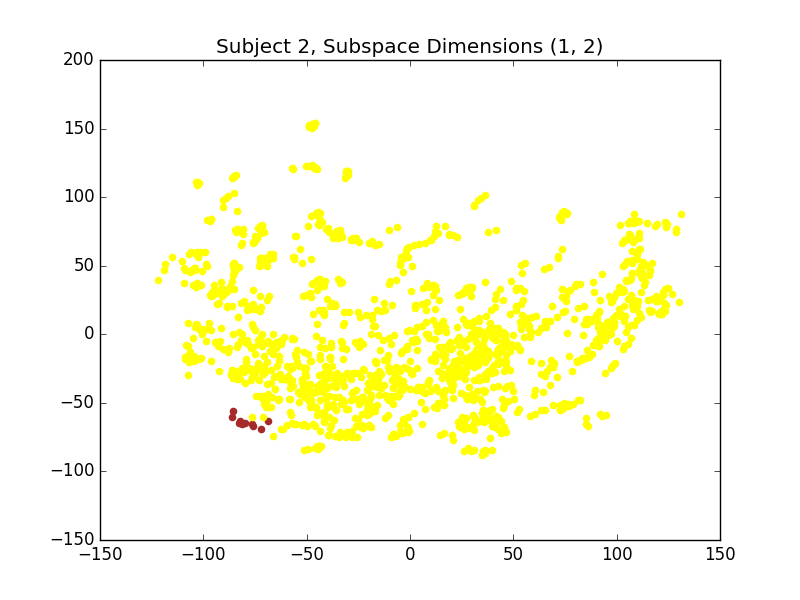


Figure . Scatter plots for Subject 1



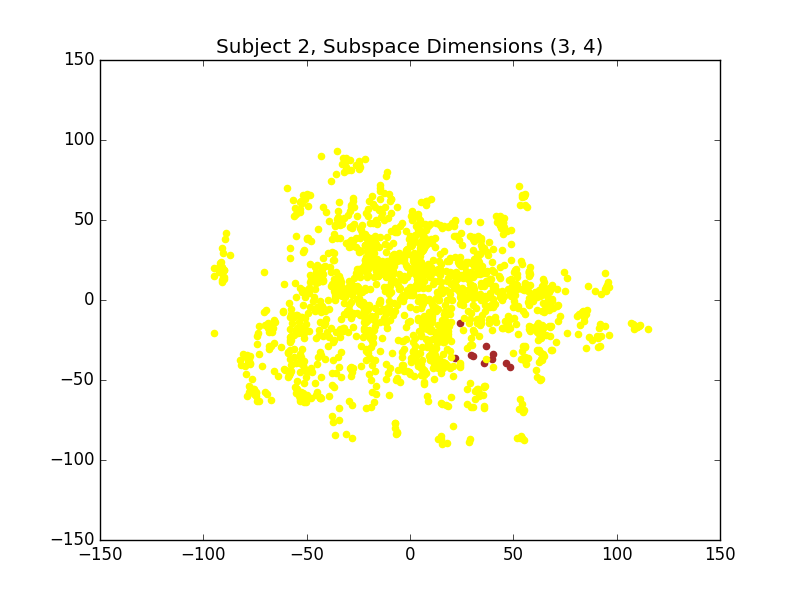


Figure . Scatter plots for Subject 2

