Shaan Ul Haque(180070053)
Samarth Singh (180050090)
Niraj Mahajan (180050069)

Question 5

5.1: Reconstruction of Images Compressed by PCA

Using the PCA performed in the previous question, we compressed several images from the ORL dataset (d = 92x112 $\equiv$ 10304) to a mere k dimensional space for $k << d$. In this section, we reconstruct images back from their compressed state, and compare the information retention for different values of k

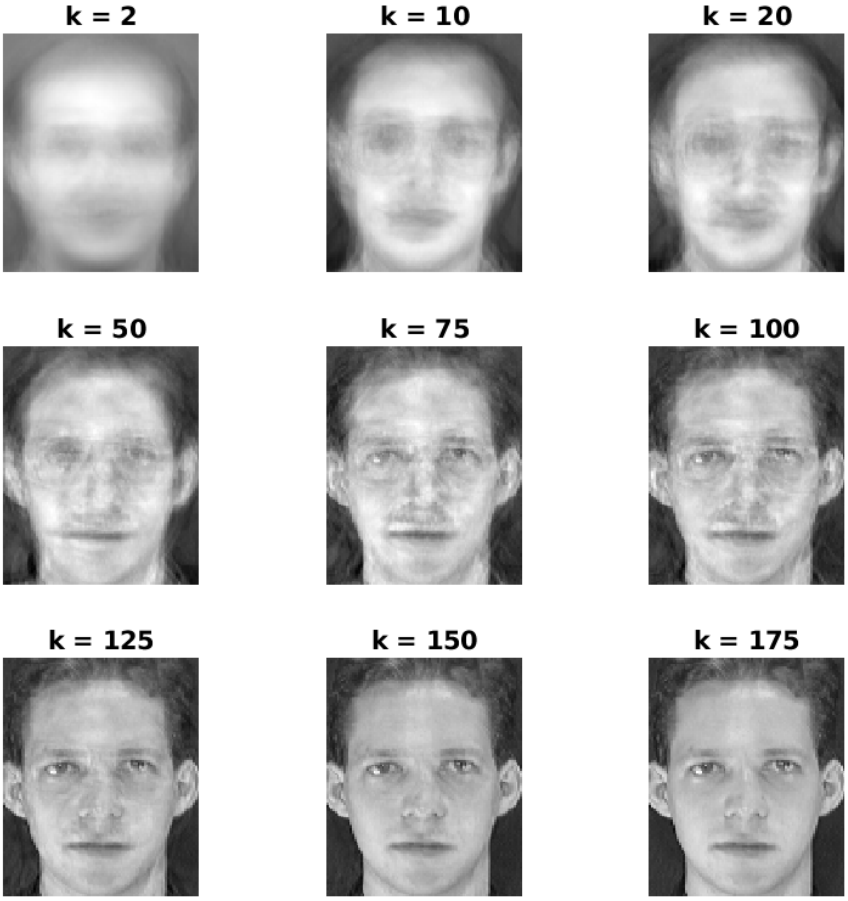

Figure 5.1: Reconstruction of images of person 1 compressed using various values of k

Shaan Ul Haque(180070053)
Samarth Singh (180050090)
Niraj Mahajan (180050069)

5.2: Visualising Eigenfaces

In this section, we visualise the eigenvectors corresponding to the highest 25 eigenvalues, by reshaping them into a 112x92 dimensional image.

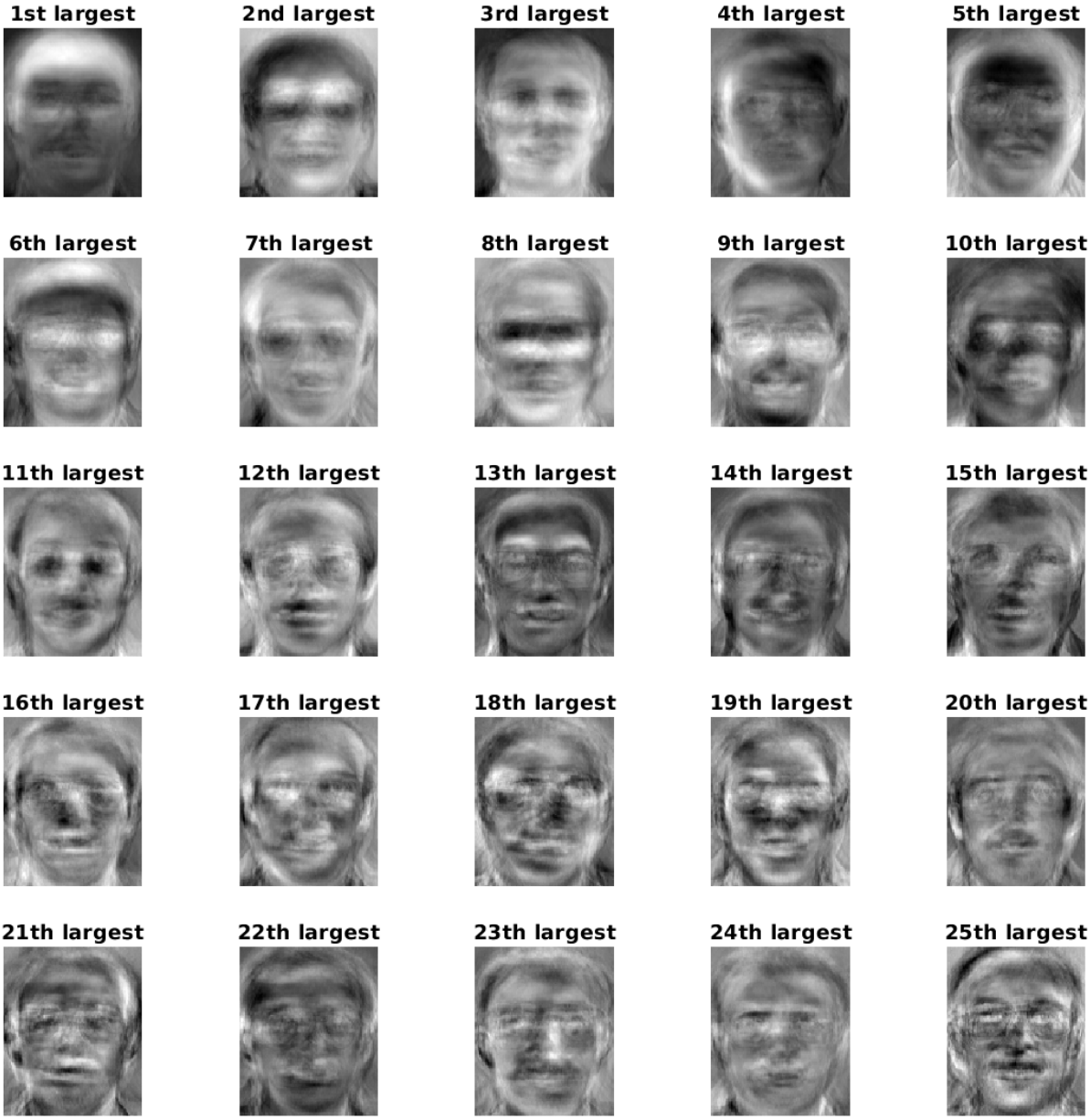

Figure 5.2: Top 25 eigenfaces

5.3: Usage of code

- Execute the **myMainScript.m** function to display the results and the plots. This takes around 13.5 seconds.
- Since the dataset is being used for Q4, Q5, Q6 in the assignment, we have kept the datasets in a common directory just inside our submission directory. The ORL dataset is expected to be in a relative directory **'../../datasets/'**, and the Yale dataset is expected to be in a relative directory **'../../datasets/CroppedYale/'** That is the per person directories should be as follows:
  '../../datasets/ORL/s*/' and
  '../../datasets/CroppedYale/yaleB/'**
- The **loadOrl.m** function loads the data.
- The **fitPCA.m** function generates the eigenvectors of the data matrix using the *svd* library function.
- The **getPredictor.m** functions returns a struct which stores the relevant eigenvectors, and the subspace transformation operator using the said eigenvectors.