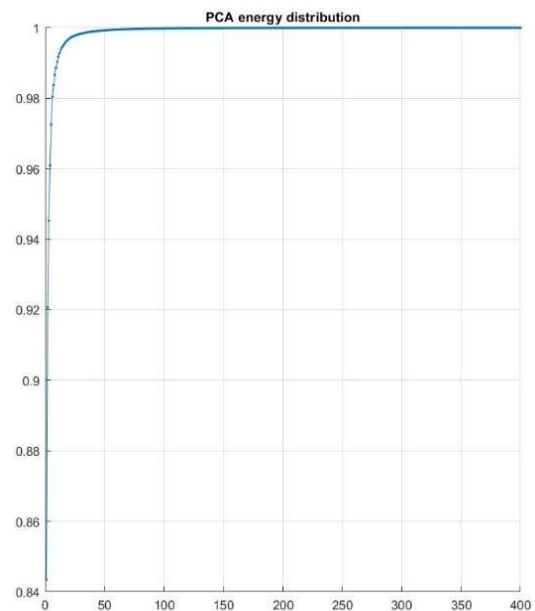
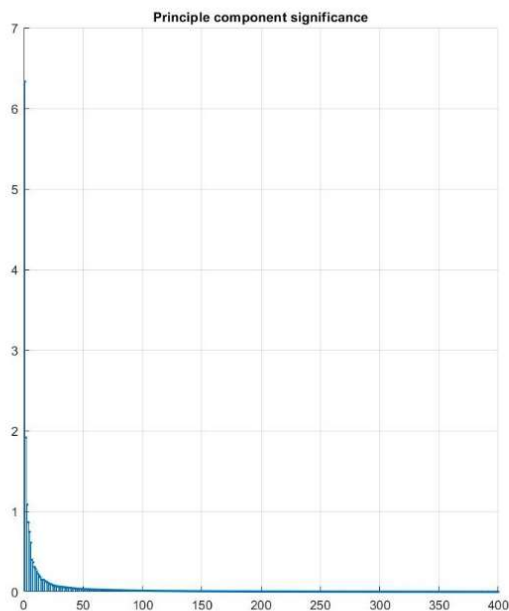


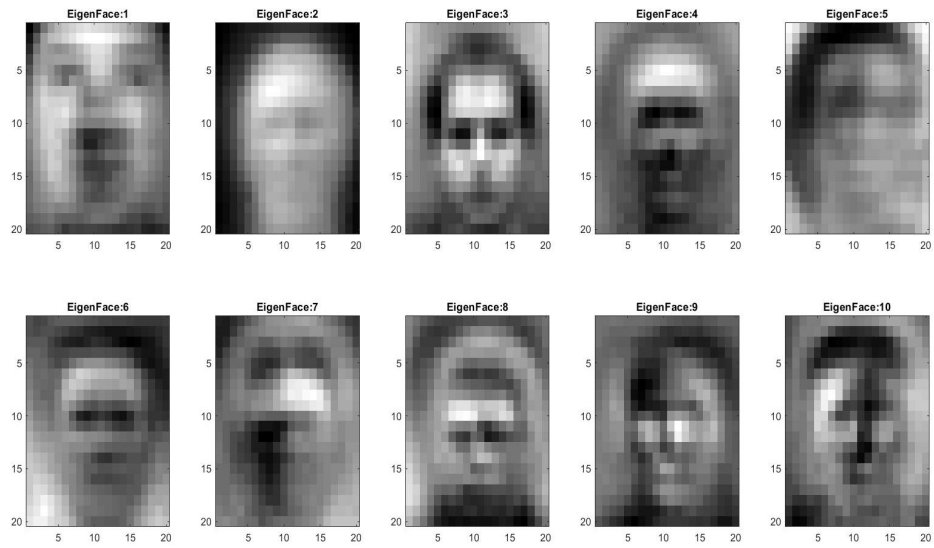
A Matlab implementation of Eigenface and Fisherface Face detection is attached as "Eigenface_Fisherface_homework_16201097.m". Below explained the sub sections and small description of the code with generated images:

EigenFace implementation

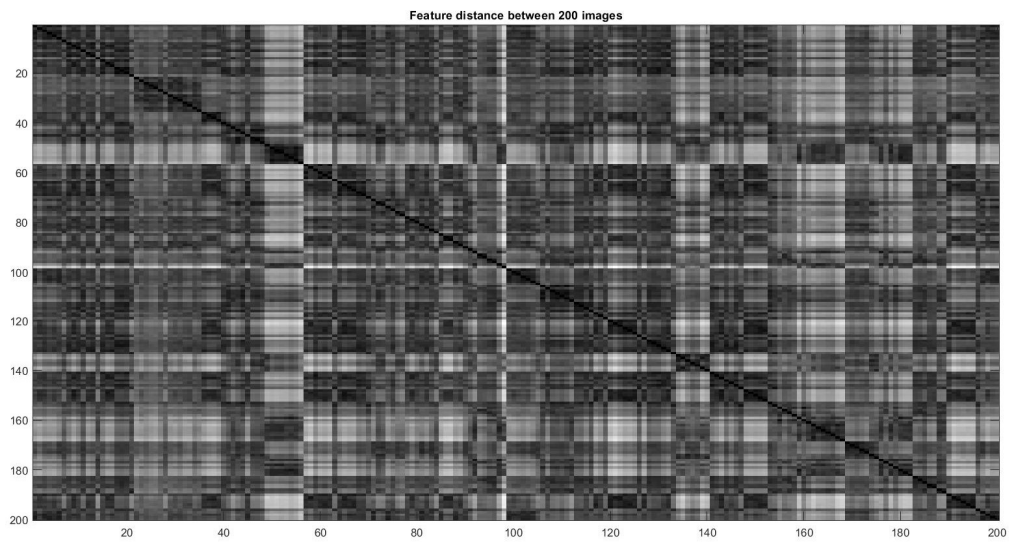
- 1) We first load the training data as load facedata.
- 2) Then pulled 10 images from 1 person from internet, normalize the images as 20x20 thumbnails, dynamic range scaling to [0, 1], and append it into the face/ids data set, also given it id 999.
- 3) Next step we compute the PCA.
- 4) Then we plotted PCA component as per the significance and also plotted their energy:



- 5) Next we plotted 10 Eigenfaces in grayscale:

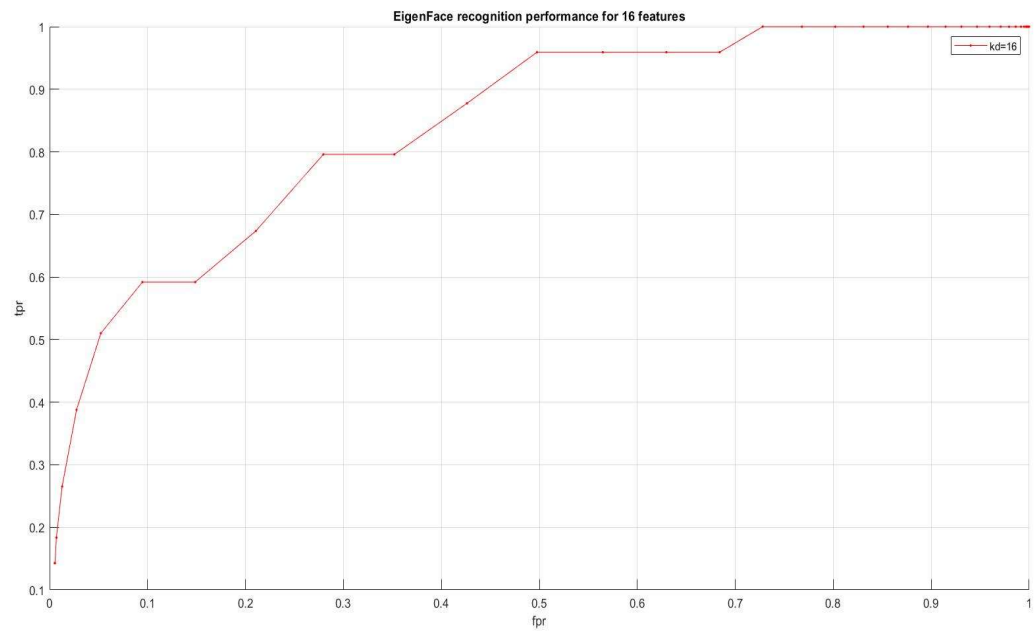


6) Then we selected top 16 features and plotted the feature distances between 200 images:

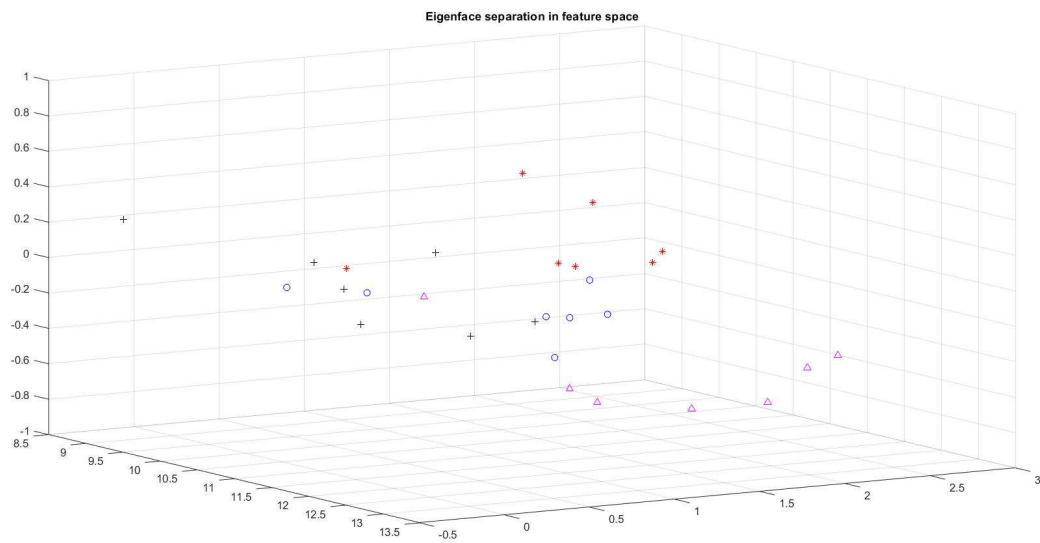


7) Then we calculated the true positive, false positive, true negative, false negative rate for the EigenFace algorithm performance.

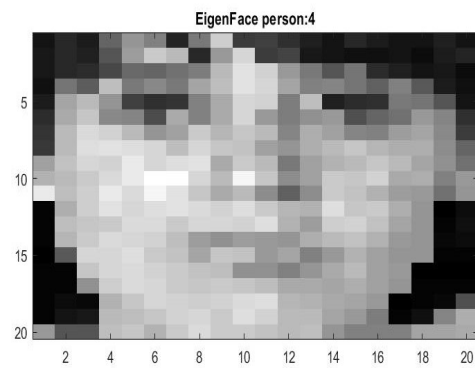
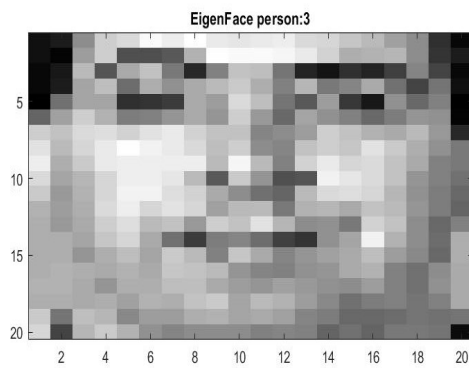
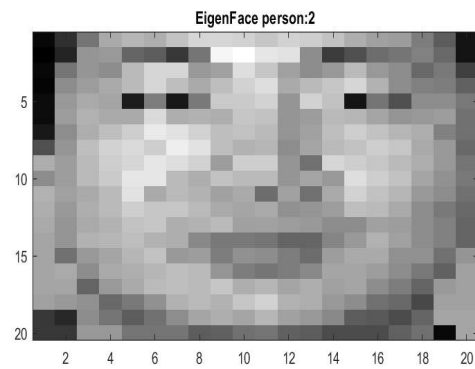
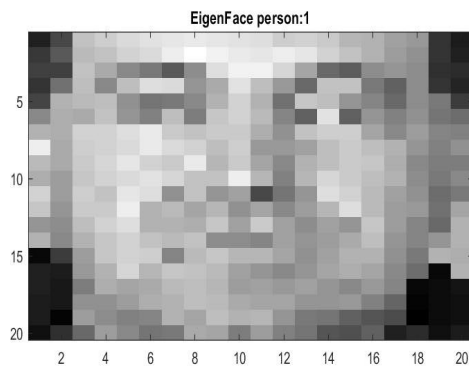
8) Then we plotted the ROC curve for EigenFace detection performance for 16 features:



9) Now we did plotting of image point in 3D feature space Eigenface separation in feature space:



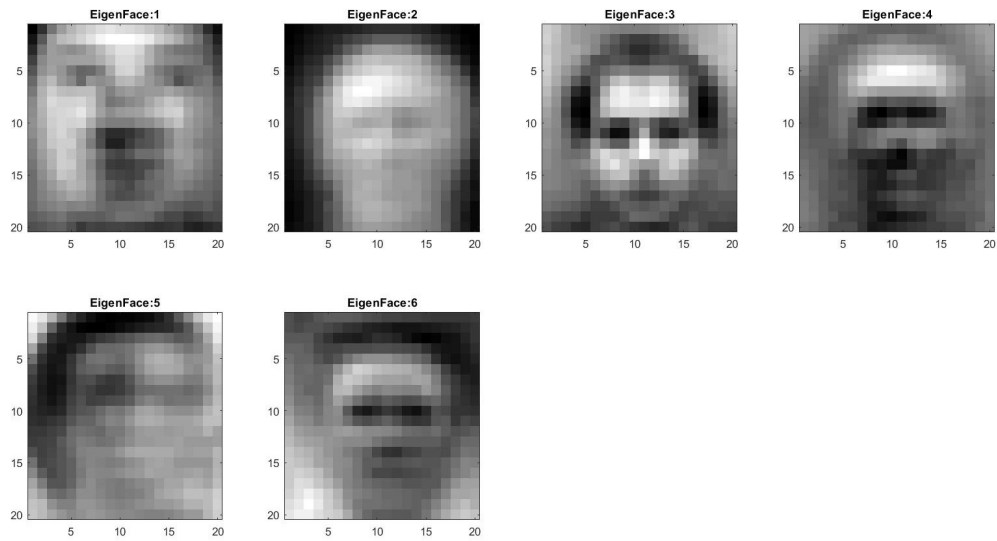
10) Then shown the EigenFace for that 4 types:



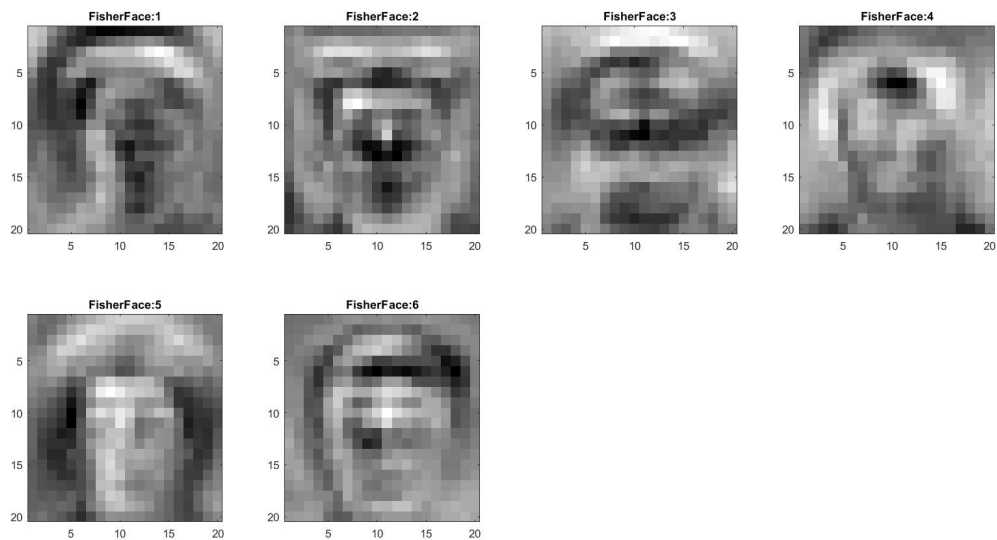
FisherFace Implementation and comparison with EigenFace

- 1) We declared the label , feature size and number of images to work with.
- 2) Then we computed the LDA using the getLDA function.
- 3) Next we calculated feature distance calculation eigenface and FisherFace
- 4) Then we scaled the image to feature size K_d , where $K_d = 32$ here.
- 5) We showed total 6 EigenFaces and 6 FisherFaces in greyscale:

EigenFaces:



FisherFaces:



- 6) FisherFace implementation completed finally, now we will compare both approaches.
- 7) We plotted ROC curve for both EigenFace and FisherFace implementation performance , for 1200 faces, we can see clearly that FisherFace perform much better that EigenFace as it is using the label information compated to PCA in EigenFace , which is an unsupervised approach and does not use label information.

