

Title: Project 1
Subject: Computer Vision
Subject Code: ECE 763

Name: Deepayan Bardhan
Unity ID: 200266399 (dbardha)

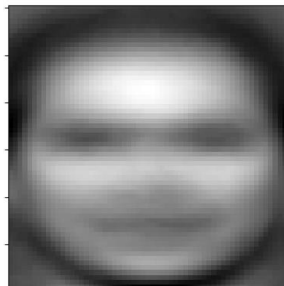
STEP 1: DATA PRE-PROCESSING

1. For the project, the LFWcrop dataset have been used, available at the following [link](#).
2. The first part for each of the model code describes the pre-processing of the images.
3. The non-face part has been cropped randomly from the images from one of the corners.
4. While reading the images, the images- both the faces and non-faces, have been resized to a dimension of 60x60.
5. After preprocessing the data are kept separately into 4 folder – Train_FaceData, Train_NonFaceData, Test_FaceData and Test_NonFaceData.

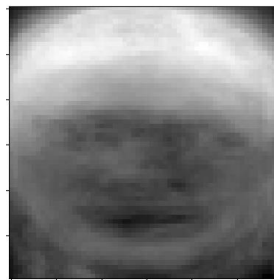
STEP 2: LEARNING A SINGLE GAUSSIAN MODEL

In this model python code for a single Gaussian model has been implemented and the following tasks are performed:

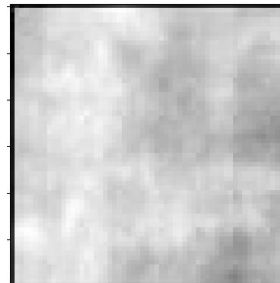
1. The estimated mean face has been visualized formed using the face-data



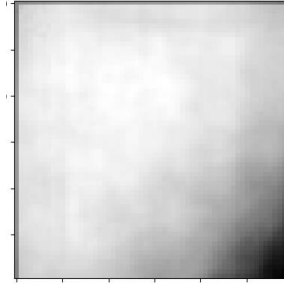
2. The estimated covariance face has been visualized formed using the face-data



3. The estimated mean image has been visualized formed using the non-face-data



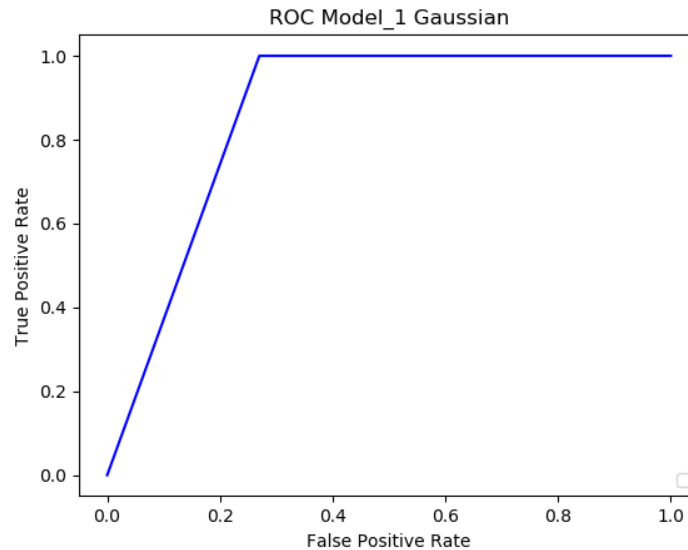
4. The estimated covariance image has been visualized formed using the non-face-data



5. Performance rate calculation by setting a threshold=0.5

False Positive Rate	0.235
False Negative Rate	0.197
Misclassification Rate	0.37

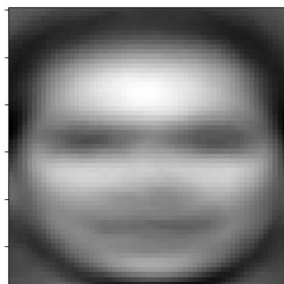
6. Plotting the ROC



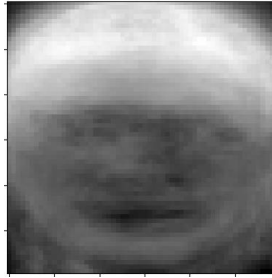
STEP 3: LEARNING A MIXTURE OF GAUSSIAN MODEL

In this model python code for a mixture of Gaussian model has been implemented and the following tasks are performed:

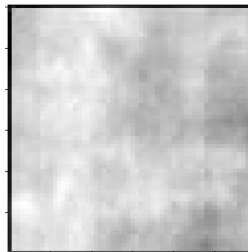
1. The estimated mean face has been visualized formed using the face-data



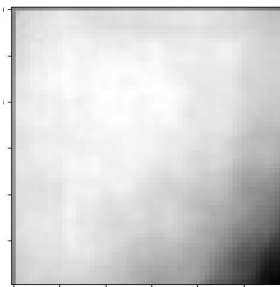
2. The estimated covariance face has been visualized formed using the face-data



3. The estimated mean image has been visualized formed using the non-face-data



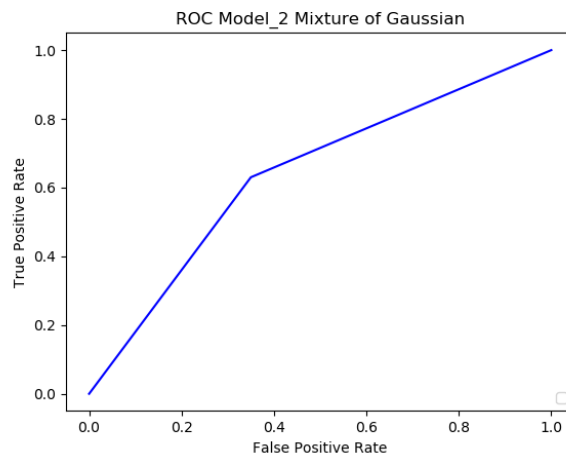
4. The estimated covariance image has been visualized formed using the non-face-data



5. Performance rate calculation by setting a threshold=0.5

False Positive Rate	0.343
False Negative Rate	0.377
Misclassification Rate	0.265

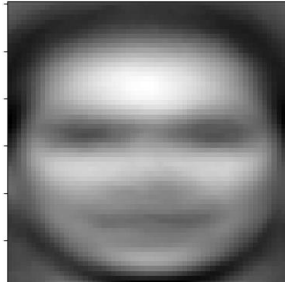
6. Plotting the ROC



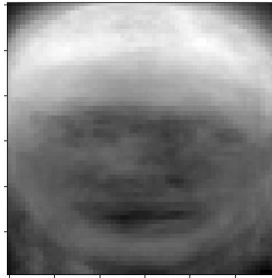
STEP 4: LEARNING A T-DISTRIBUTION MODEL

In this model python code for a T-Distribution model has been implemented and the following tasks are performed:

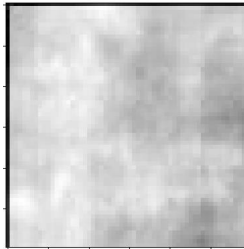
1. The estimated mean face has been visualized formed using the face-data



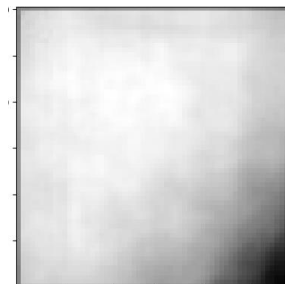
2. The estimated covariance face has been visualized formed using the face-data



3. The estimated mean image has been visualized formed using the non-face-data



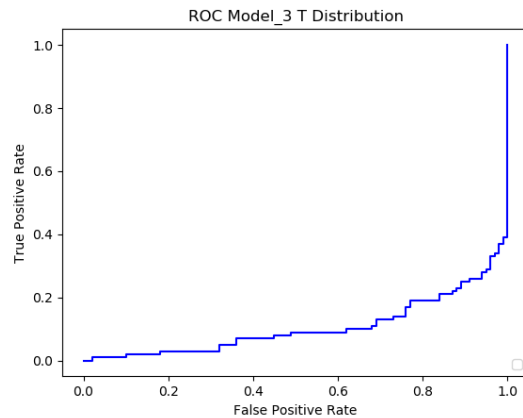
4. The estimated covariance image has been visualized formed using the non-face-data



5. Performance rate calculation by setting a threshold=0.5

False Positive Rate	0.318
False Negative Rate	0.152
Misclassification Rate	0.336

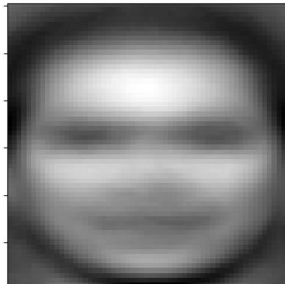
6. Plotting the ROC



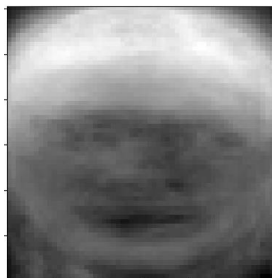
STEP 5: LEARNING A FACTOR ANALYZER MODEL

In this model python code for a Factor Analyzer model has been implemented and the following tasks are performed:

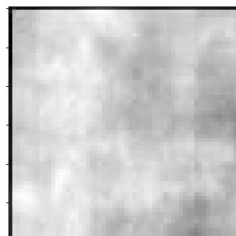
1. The estimated mean face has been visualized formed using the face-data



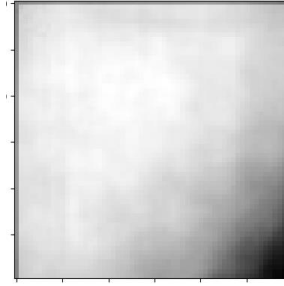
2. The estimated covariance face has been visualized formed using the face-data



3. The estimated mean image has been visualized formed using the non-face-data



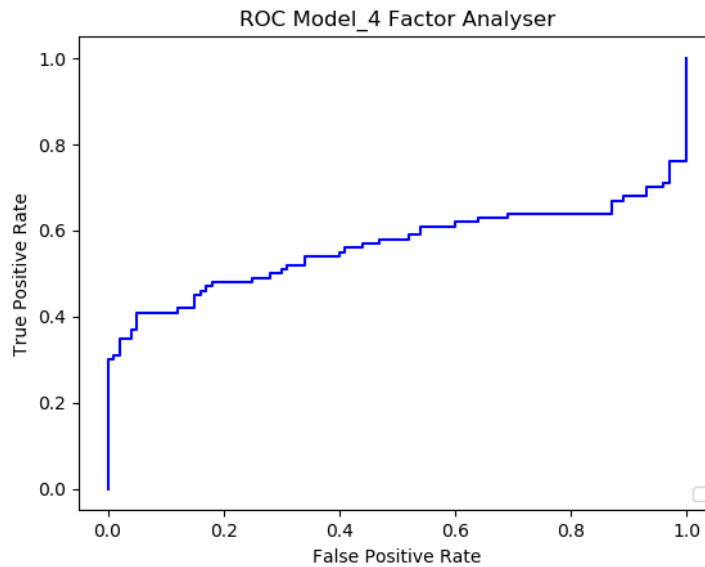
4. The estimated covariance image has been visualized formed using the non-face-data



5. Performance rate calculation by setting a threshold=0.5

False Positive Rate	0.288
False Negative Rate	0.197
Misclassification Rate	0.313

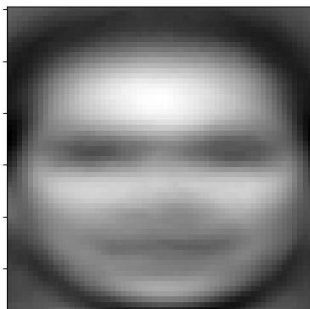
6. Plotting the ROC



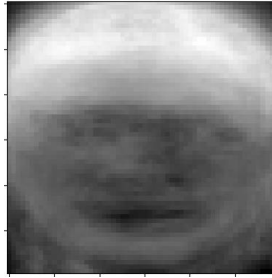
STEP 6: LEARNING A MIXTURE OF T-DISTRIBUTION MODEL

In this model python code for a mixture of T-Distribution model has been implemented and the following tasks are performed:

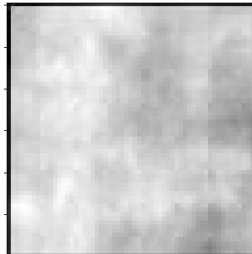
1. The estimated mean face has been visualized formed using the face-data



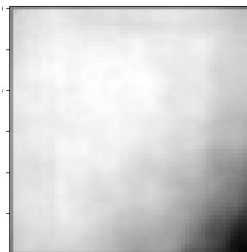
2. The estimated covariance face has been visualized formed using the face-data



3. The estimated mean image has been visualized formed using the non-face-data



4. The estimated covariance image has been visualized formed using the non-face-data



5. Performance rate calculation by setting a threshold=0.5

False Positive Rate	0.248
False Negative Rate	0.112
Misclassification Rate	0.236

6. Plotting the ROC

