Face Detection & Recognition
Team 17
Project 1

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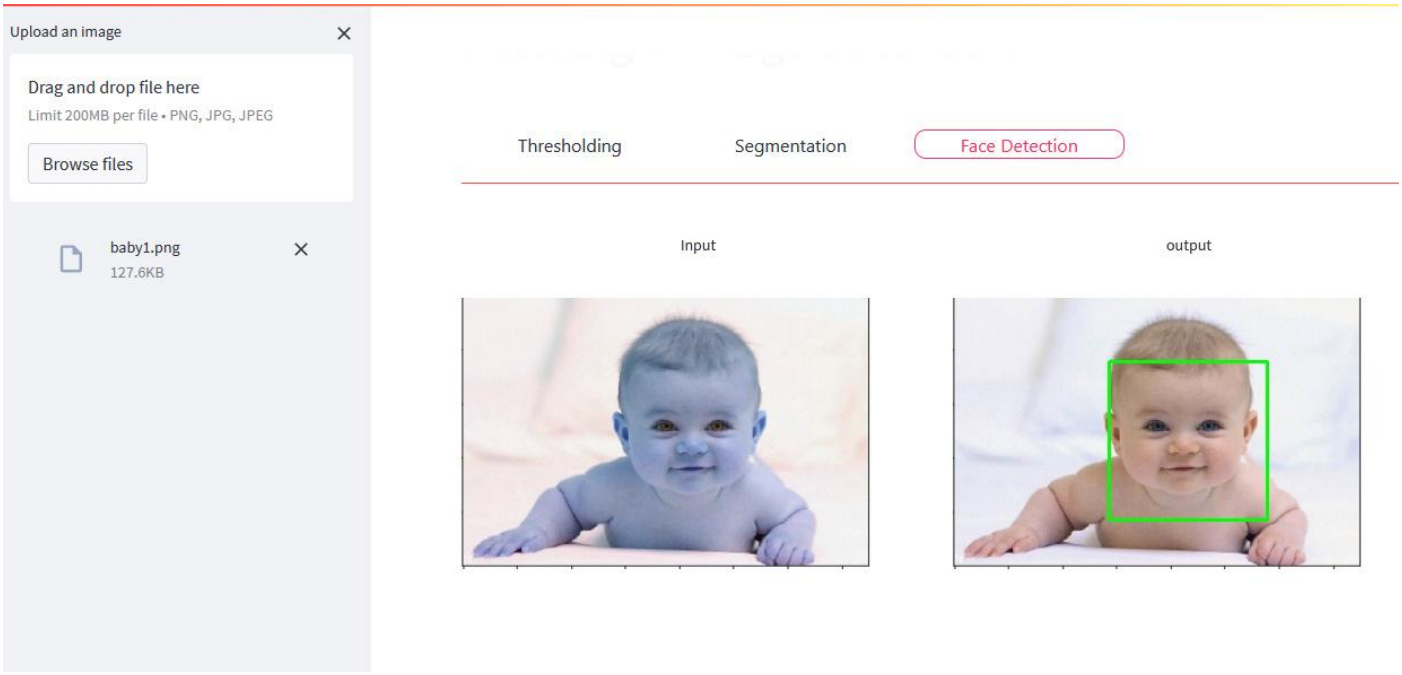
Description:

We will make face detection and recognition using PCA/Eigenfaces analysis.

1. Face Detection:

We implement it using openCV library by cascadeclassifier which contain data used to detect objects.

Results:



2. Face Recognition:

The objective of this project is to highlight the importance of linear algebra in the field of computer vision and face recognition. Eigenface is the name of a set of eigenvectors computed from an image dataset. Eigenvectors is a set of features which characterize the global variation among face images.The basis of the eigenfaces method is the Principal Component Analysis (PCA).PCA is a dimensionality-reduction method that is often used to reduce the dimensionality of large data sets, by transforming a large set of variables into a smaller one that still contains most of the information in the large set.We implement it from scratch.

Algorithm Steps:

1) We load training our dataset which consist of 5 folders (number of our team), each folder represent one member of the team, each folder has 30 images which is taken in different position.

2) We get mean value then subtract images from mean.

3) We get covariance matrix, eigenvalues and eigenvectors.

4) Then get similarity between image and eigenvector of data.

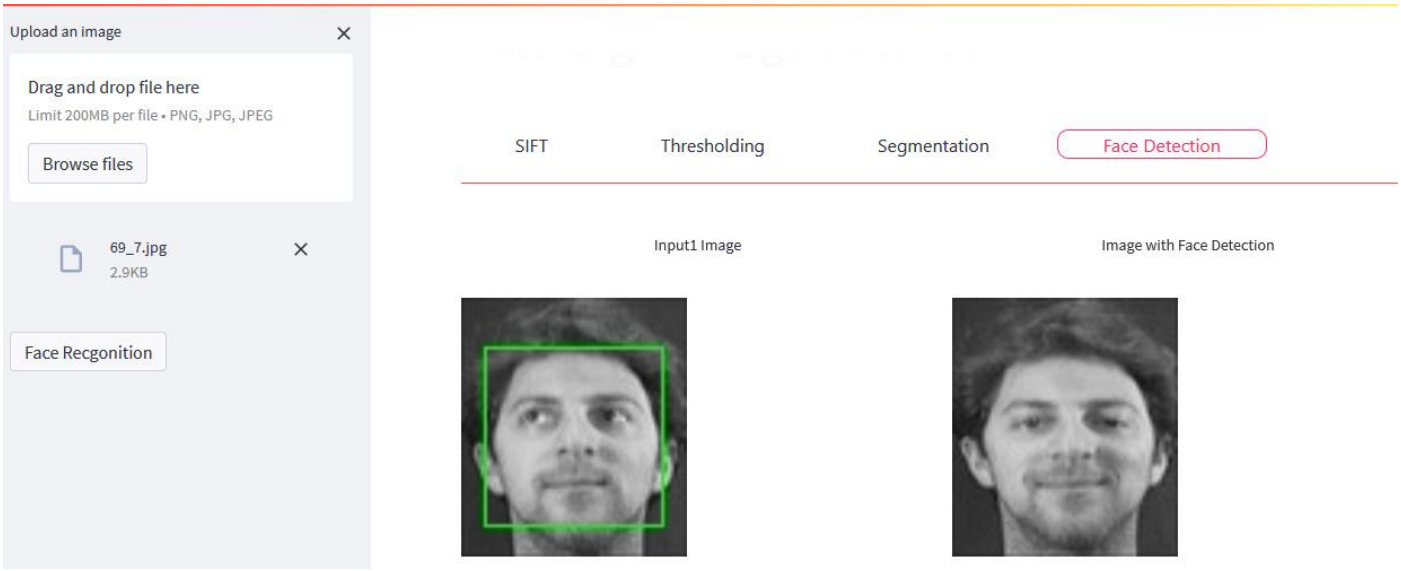
5) Sort eigenvalues and corresponding eigenvectors in descending order.

6) Select subset of eigenvectors.

7) Reduce dimensionality of the data

8) Then make Random Forest Classifier model.

Results:



3. Plot ROC Curve:

Plots the ROC Curve by using the list of coordinates (tpr and fpr) at different classification thresholds. In the model we made we will use it to make predictions on a validation dataset, and the TPR (true positive rate) and FPR (false positive rate) are calculated for each threshold. The area under the curve (AUC) is calculated to evaluate the overall performance of the classifier.The optimal classification threshold can be chosen based on the trade-off between TPR and FPR. The ROC curve is a useful tool for evaluating the performance of binary classification models and choosing an optimal classification threshold.

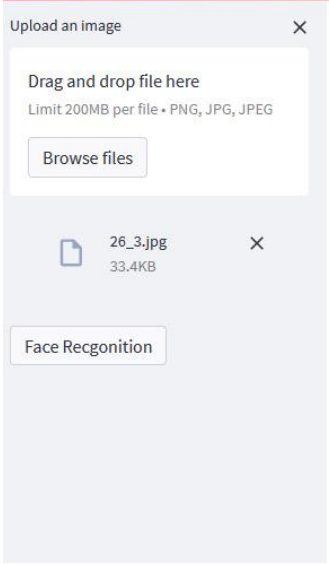
Args:

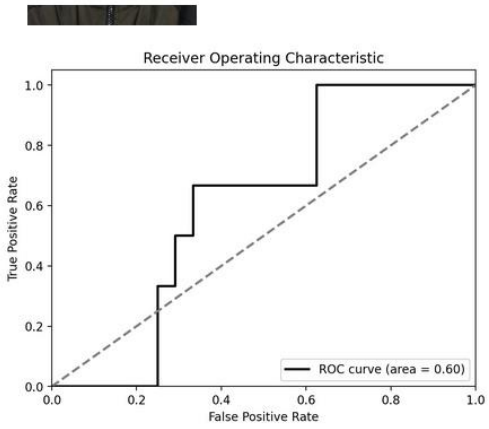
tpr: The list of TPRs representing each coordinate.

fpr: The list of FPRs representing each coordinate.

scatter: When True, the points used on the calculation will be plotted with the line (default = True).

Results:





4. Confusion matrix:

It used to evaluate the performance of a machine learning model, shows the number of true positives, true negatives, false positives, and false negatives. the number of true positives is the number of instances where the model predicted the label correctly and the actual label was positive.

Results: