Cairo University

Faculty of Engineering

Computer Engineering Department

First Year

IMAGE PROJECT

Face Recognition System

TEAM: 21

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Implemented by hand	Egin Faces Viola-Jones
What is used	Adaptive threshold Bilateral Filter

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Used Algorithms:

1. Viola-Jones
2. Eigen faces
3. Adaptive thresholding
4. Bilateral Filter

Experiment Results and Analysis:

For Face Detection

We used the Viola-Jones because it high performance accuracy and real time performance. For test cases we used a data set contains different faces from different nationality and different illumination and for performance measures we used the F1 score as it isn't sensitive to the bias in the data set

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When running the algorithm on real live stream the performance decreased and the number of false positive increased due to stream quality

For face recognition

We used Eigen Faces, firstly we resize all the images to 500*500 image then flatten it to 250000*1 vector then we calculate the mean face then we subtract it from the faces matrix then we get the Eigen vector of the A^T * A then multiply it by A then get the weights.

When we run the algorithm on the dataset the performance was proportional to the size of the dataset then we used PCA to reduce the number of Eigen faces and we select the k Eigen faces corresponding to the greatest Eigen values and for the accuracy we have 89% to 91%.

Different illuminations affect the recognitions model with Eigen faces so during signing the data we have to take that into consideration for

future improvements. Data augmentation to increase the Viola Jones algorithm accuracy from different datasets. us

Cartonization

for adding the functionality of cartonization first we needed to detect the edges for this we choose the Adaptive thresholding for it's high performance and clear edge result and to get clear homogenous regions of colors we used bilateral Filter.

The Hole System

After integrating all functionalities in the classification system the error of the both detection and recognition modules summed up which added some uncertainty to the system but the it was able to get a reasonable performance

Work Division:

Omar Abdelfatah and Abdalla Mahmoud	worked on the eigen faces algorithm cartonization
Osama magdy and Yahia Zakaria	worked on the voila-jones algorithm and on the application

Accuracy Performance:

For the main authentication application

Out of every 5 frames passed to the pipeline, we managed to successfully detect the face in 4 of them and identify the right face in 3 of them.

Conclusion and references:

In our Pipelined algorithm we used different techniques in each stage. Viola johns algorithm for detecting faces in the image that

achieved high accuracy in the test data test. Eigen faces for face recognition taking the face as input from the first stage. We investigated the downsides of each algorithm and their limitations in real life applications. Using a continuous stream of video (with PyQthread to reduce the bottleneck of the application) we have been able to efficiently detect the right face for the right person in the database. Otherwise, the user will not be authenticated.

Additional comments: