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CSC 872: Report on Fast Prototyping 1: Face Recognition using Eigen faces

Objective: Create a face recognition system using Eigen face algorithm.

Process:

Read the reference article on face recognition [], so as to understand the process and algorithm.

Implemented following steps in MATLAB for achieving the aim.

Steps implemented to achieve this:

- Image I/O + visualization
- PCA learning
- Recognition by nearest neighbor classification.

To obtain the above results, followed the step by step approach.

1.Read all images in MATLAB to perform the PCA analysis.

Which involves, computing the mean of the images vector, constructing co-variance matrix of it, finding out eigenvector for it and finally making a face model.

2. Then, learning method is applied to "known face" images' data.

3.After that, in testing mode, test face data is projected to the model and by using Nearest Neighbor classification, appropriate matching face is found out.

Challenges faced:

1. Being a beginner in MATLAB, it took some time for me, to get hands on, on the MATLAB coding.
2. Also, Implementing the above tasks, initially, was bit at difficult level for me, but I approached to every task with slow pace with detailed understanding. This helped me a lot to implement my code in an efficient way.

Working of my code:

Basically, it reads all the image data from my PC drive
`D:\Sudha_Project\Images\ALL\` - This has all images
`D:\Sudha_Project\Images\FA\` - This has all known faces database
`D:\Sudha_Project\Images\FB\` - This has test faces database and then in a loop read all the test images one by one and finds its matching face from the known database.

Following are some results of my face recognition algorithm code:
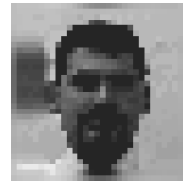
test face

matched face

test face

matched face

test face

matched face

test face

matched face

test face

matched face

test face

matched face

test face | matched face | test face | matched face

test face | matched face | test face | matched face

test face | matched face | test face | matched face

test face | matched face | test face | matched face

test face   matched face   test face   matched face

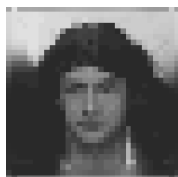test face   matched face   test face   matched face

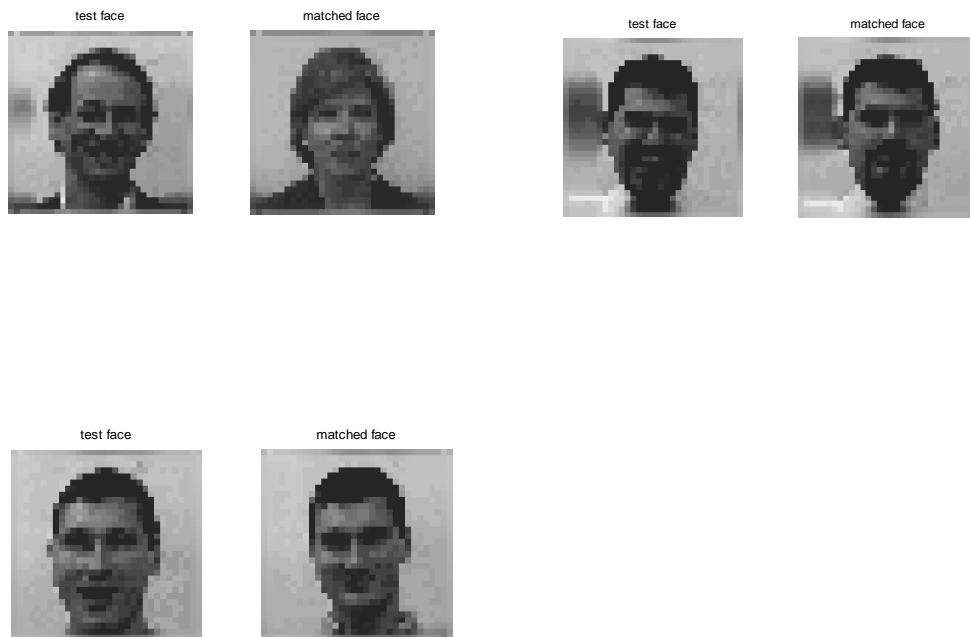test face   matched face   test face   matched face

test face   matched face   test face   matched face

test face   matched face

Command Window
>> fp1_sudha
Best Match: D:\Sudha_Project\Images\FA\small_00100FA0.TIF
Distance from test image:486
Best Match: D:\Sudha_Project\Images\FA\small_00101FA0.TIF
Distance from test image:519
Best Match: D:\Sudha_Project\Images\FA\small_00103FA0.TIF
Distance from test image:212
Best Match: D:\Sudha_Project\Images\FA\small_00106FA0.TIF
Distance from test image:267
Best Match: D:\Sudha_Project\Images\FA\small_00137FA0.TIF
Distance from test image:1123
Best Match: D:\Sudha_Project\Images\FA\small_00103FA0.TIF
Distance from test image:963
Best Match: D:\Sudha_Project\Images\FA\small_00107FA0.TIF
Distance from test image:746
Best Match: D:\Sudha_Project\Images\FA\small_00107FA0.TIF
Distance from test image:880
Best Match: D:\Sudha_Project\Images\FA\small_00107FA0.TIF
Distance from test image:688
Best Match: D:\Sudha_Project\Images\FA\small_00107FA0.TIF
Distance from test image:1211
Best Match: D:\Sudha_Project\Images\FA\small_00132FA0.TIF
Distance from test image:1125
Best Match: D:\Sudha_Project\Images\FA\small_00107FA0.TIF
Distance from test image:511
Best Match: D:\Sudha_Project\Images\FA\small_00106FA0.TIF
Distance from test image:1129
Best Match: D:\Sudha_Project\Images\FA\small_00107FA0.TIF

Conclusion:

Based on the results, we can see most of the test faces are closely matching with the paired faces.