Fall 2023: CSCI 4/5587 Programming Assignment #2

DUE: Monday, Nov 13th, 2023 (**Softcopy** @11 PM via Canvas)

Instructions

- **All work must be your own other than the instructor-provided data/code and hints to be used. You are NOT to work in teams on this assignment.**
- **Bonus marks: 5 points** for a well-presented report and well-commented code.

Problem and Task Description:

The given "face" dataset has 400 pictures of 40 subjects, 10 pictures of each subject.

(1) [**15 points**] Divide the dataset into a ratio of 85% for training and 15% for testing.

(2) [**15 points**] Write and run a Principal Component Analysis (PCA) algorithm to learn (i.e., train) from the training dataset. Utilize the (MATLAB) code available in Chapter 4 for reference, and refrain from incorporating any additional code or functions from external sources or libraries.

(3) [**30 points**] Employing all possible sequential combinations of eigenfaces (or principal component(s)) in a descending order based on their eigenvalues, calculate the face recognition accuracy by matching the test dataset with the correct subjects using the lowest distance. Create a graph depicting the relationship between the count of eigenfaces and the corresponding accuracy for all these cases.

(4) [**30 points**] For all combinations prepared in step #3, explore the upper similarity threshold for the best-case match. Illustrate this search by plotting a graph of similarity versus accuracy.

(5) [**10 points**] Conclusions: Based on the findings in steps #3 and #4, write your conclusions.

Submission: Submit the code for all four tasks outlined above. Include the two graphs mentioned in steps #3 and #4 and the conclusions in a report and submit the report.

--- x ---