PR ASSIGNMENT - 3 (Deadline: 01/04/2021)

Design of PCA, LDA
Deliverables for this assignment:
1. Programming Assignment (MATLAB or Python)
2. Code file and output screenshots for all.

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1. Consider the 128- dimensional feature vectors (d=128) given in the "**gender_feature _vectors.csv**" file. (2 classes, male and female)

a) Use PCA to reduce the dimension from d to d'. (Here d=128)
b) Display the eigenvalue based on increasing order, select the d' of the corresponding eigenvector which is the appropriate dimension d' (select d' S.T first 95% of λ values of the covariance matrix are considered).
c) Use d' features to classify the test cases (any classification algorithm taught in class like Bayes classifier, minimum distance classifier, and so on)

Dataset Specifications:

Total number of samples = 800
Number of classes = 2 (labeled as "male" and "female")
Samples from "1 to 400" belongs to class "male"
Samples from "401 to 800" belongs to class "female"
Number of samples per class = 400
Number of dimensions = 128

Use the following information to design classifier:

Number of test cases (first 10 in each class) = 20
Number of training feature vectors (remaining 390 in each class) = 390
Number of reduced dimensions = d' (map 128 to d' features vector)

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2. For the same dataset (2 classes, male and female)

a) Use LDA to reduce the dimension from d to d'. (Here d=128)
b) Choose the direction W to reduce the dimension d' (select appropriate d').
c) Use d' features to classify the test cases (any classification algorithm will do, Bayes classifier, minimum distance classifier, and so on).

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3. Give the comparative study for the above results w.r.t to classification accuracy in terms of the confusion matrix.

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4. **Eigenfaces**- Face classification using PCA (40 classes)

a) Use the following "**face.csv"** file to classify the faces of 40 different people.
b) Do not use the in-built function for implementing PCA.
c) Use appropriate classifier taught in class (any classification algorithm taught in class like Bayes classifier, minimum distance classifier, and so on)
d) Refer to the following link for a description of the dataset:

https://towardsdatascience.com/eigenfaces-face-classification-in-python-7b8d2af3d3e

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5. **Fisherfaces**- Face classification using LDA (40 classes)

e) Use the following "**face.csv"** file to classify the faces of 40 different people.
f) Do not use the in-built function for implementing LDA.
g) Use appropriate classifier taught in class (any classification algorithm taught in class like Bayes classifier, minimum distance classifier, and so on)
h) Refer to the following link for a description of the dataset:

https://towardsdatascience.com/eigenfaces-face-classification-in-python-7b8d2af3d3e

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