

PR ASSIGNMENT - 3 (Deadline: 03/04/2023)

Design of PCA, LDA

Deliverables for this assignment:

1. Programming Assignment (MATLAB or Python)

2. Code file and output screenshots for all.

Do not use the in-built function for implementing; however you can cross verify your result with it. (negative marks if you use)

1. Consider the 128- dimensional feature vectors ($d=128$) given in the “**gender.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 (use 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)

2. For the same dataset “**gender.csv**” (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 (use 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.

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

- a) Use the following “**face.csv**” file to classify the faces of 40 different people using PCA.
- b) Do not use the in-built function for implementing PCA.
- c) Use appropriate classifier taught in class (use 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-7b8d2af3d3ea>

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

- a) Use the following “**face.csv**” file to classify the faces of 40 different people using LDA.
- b) Do not use the in-built function for implementing LDA.
- 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>
