Dimensionality reduction using FDA for Bayes Classifier

Submitted by

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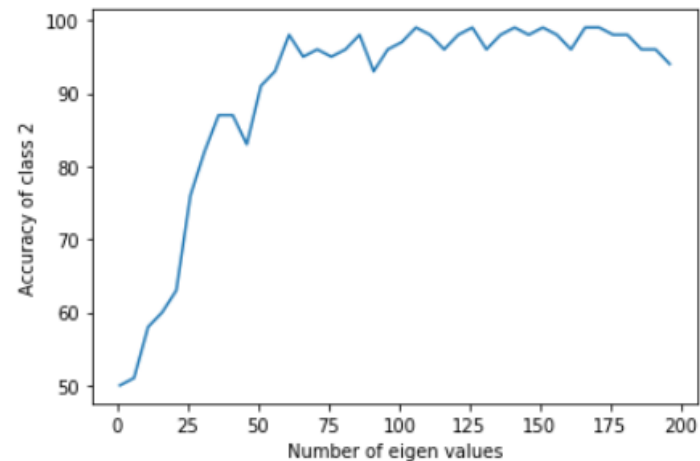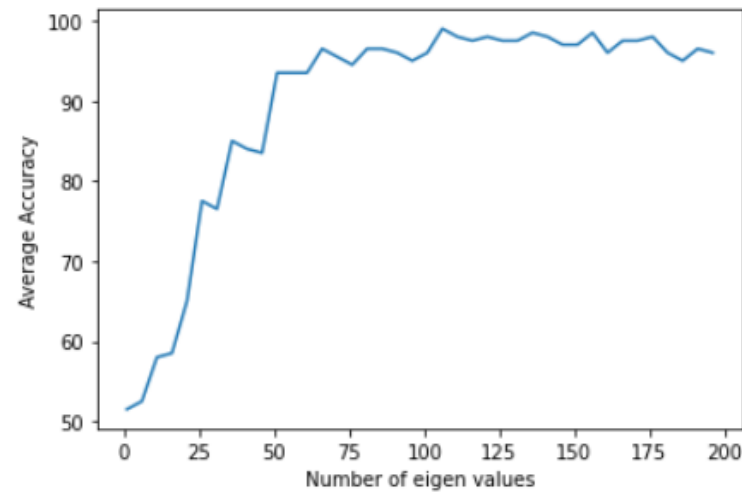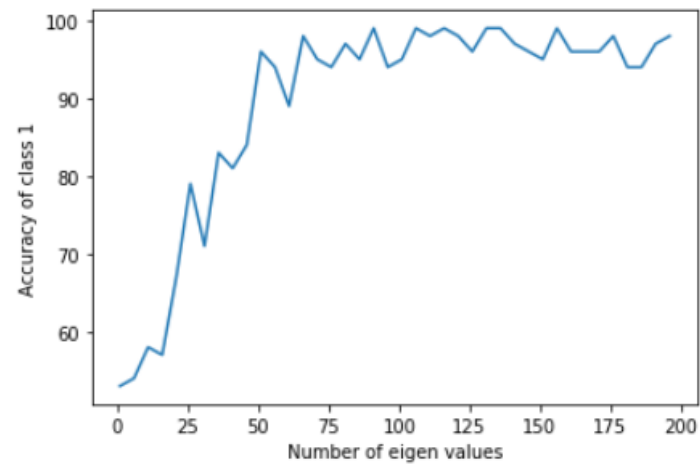# Objective of project and list of experiments

OBJECTIVE

To perform dimensionality reduction using Fisher Discriminant Analysis for Bayes Classifier

LIST OF EXPERIMENTS

- **Variation of acccuracy with number of eigen vectors for projection**

- **Variation of accuracy with type of covarience matrix(full,diagonal,spherical)**

- **Some examples of misclassified samples**

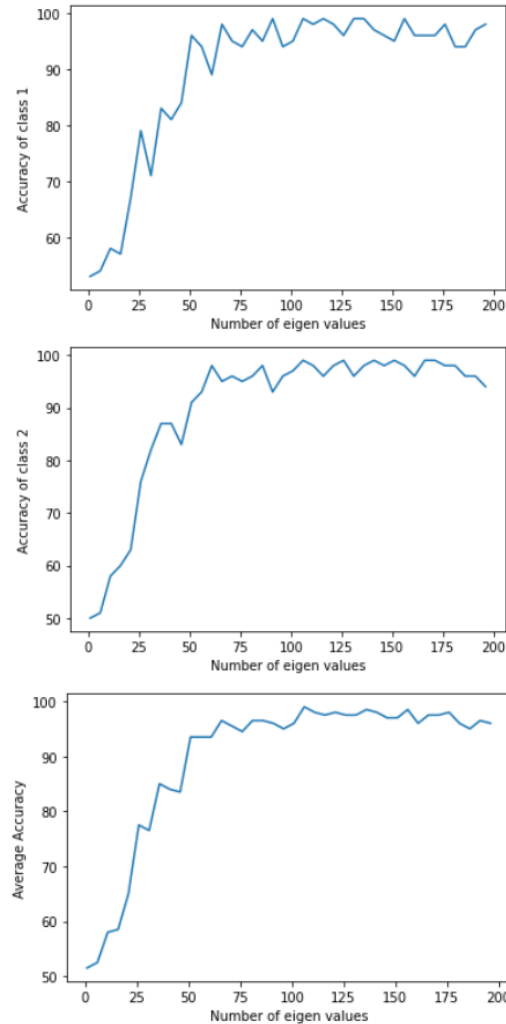- **Comparision with Bayes Classifier without dimensionality reduction**

Simulation results –Experiment 1

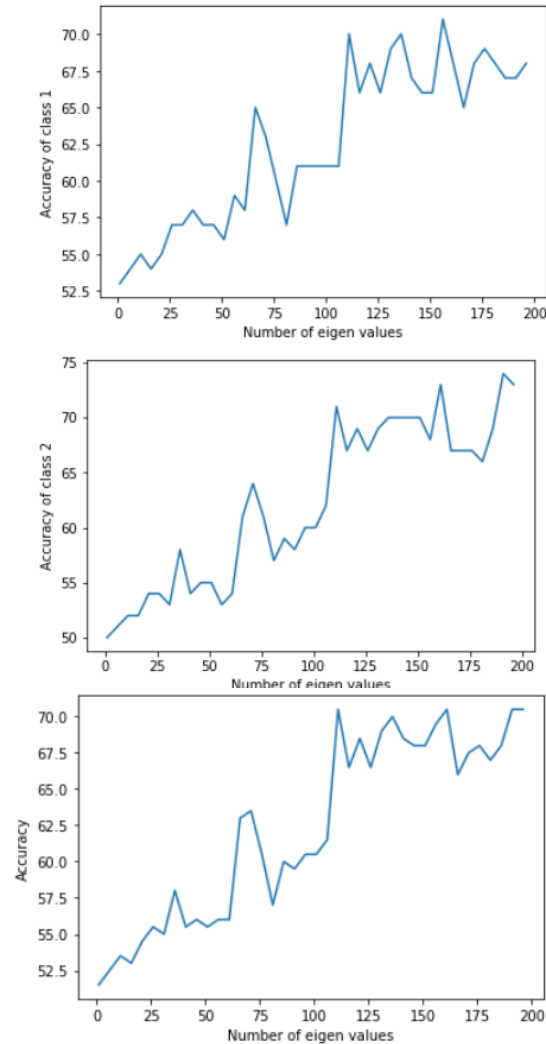Variation of Accuracy with the change in the number eigen vectors chosen for projection
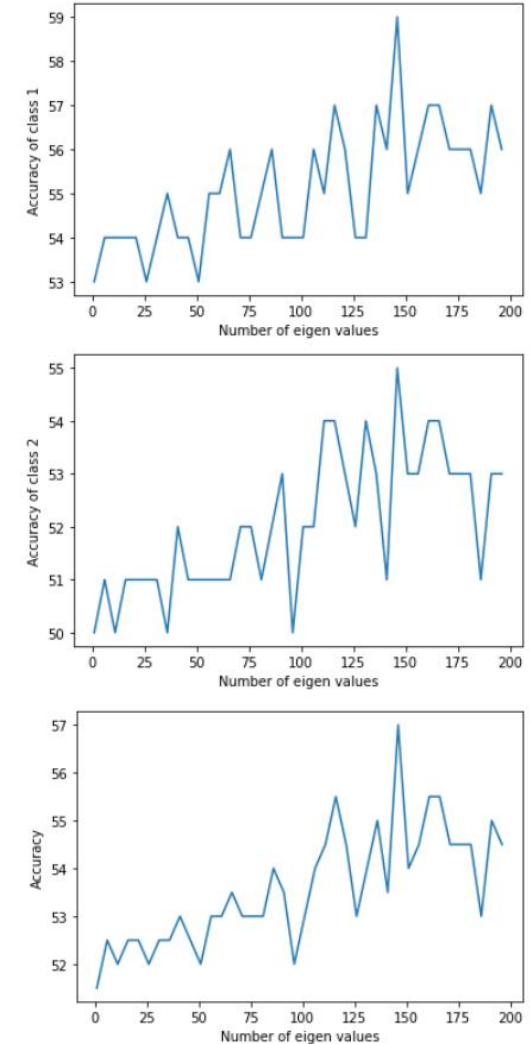
Simulation results –Experiment 2

Full Covariance

Diagonal Covariance

Spherical Covariance

Simulation results –Experiment 3

Misclassified Images

Actual Label: 1
Predicted Label: 2

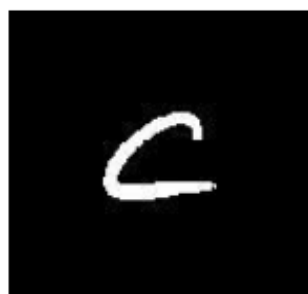Actual Label: 2
Predicted Label: 1
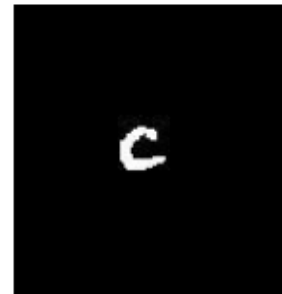
Actual Label: 1
Predicted Label: 2

Actual Label: 1
Predicted Label: 2

Actual Label: 1
Predicted Label: 2

Actual Label: 2
Predicted Label: 1

Actual Label: 2
Predicted Label: 1

Actual Label: 1
Predicted Label: 2

Simulation results –Experiment 4

For Bayes Classifier without Dimensionality Reduction

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Accuracy1 = 89
Accuracy1 = 94
Average Accuracy = 81.5
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For Bayes Classifier with Dimensionality Reduction

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Accuracy of Class 1 :  [53, 54, 58, 57, 67, 79, 71, 83, 81, 84, 96, 94, 89, 98, 95, 94, 97, 95, 99, 94, 95, 99, 98, 99, 98, 96, 99, 99, 97, 96, 95, 99, 96, 96, 96, 98, 94, 94, 97, 98]
Accuracy of Class 2 :  [50, 51, 58, 60, 63, 76, 82, 87, 87, 83, 91, 93, 98, 95, 96, 95, 96, 98, 93, 96, 97, 99, 98, 96, 98, 99, 96, 98, 99, 98, 99, 98, 96, 99, 99, 98, 98, 96, 96, 94]
Average Accuracy : [51.5, 52.5, 58.0, 58.5, 65.0, 77.5, 76.5, 85.0, 84.0, 83.5, 93.5, 93.5, 93.5, 96.5, 95.5, 94.5, 96.5, 96.5, 96.0, 95.0, 96.0, 99.0, 98.0, 97.5, 98.0, 97.5, 97.5, 98.5, 98.0, 97.0, 97.0
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(eigen vectors changing at the rate 1:200:5)

The accuracy of Bayes Classifier is obtained when we use around 50 eigen vectors for projection

Inferences

- The accuracy values are increasing with the increase in the number of eigen vectors used for projection. This is because as the eigen vectors increase, the more will be the number of feature vectors so is the information provided.

- The highest accuracy obtained when eigenvectors chosen for projection is 110.

- The accuracy for full covariance matrix is higher followed by diagonal and spherical respectively. This is because when the

- The character 'e' which belongs to class 1 is being misclassified to class 2 and character 'c' which belongs to class 2 is misclassified to class 1 because of the structural ambiguity of the patterns provided.

- The accuracy of Bayes Classifier (without dimensionality reduction) is obtained when we use 50 eigen vectors for projection.