

CLASSIFICATION OF OBJECTS USING LINEAR DISCRIMINANT ANALYSIS

1. PROBLEM 1

- Generate a set of 200 random points in the plane such that half the points lie in quadrants II, III (class 1) and the other half in I and IV (class 2).
- Build a classifier using 80 points from each class using linear discriminant analysis.
- Use your classifier to determine which class the 40 points of testing data belong to.

To implement your classifier write a subroutine called "myclassifier" that returns the class labels (variable name testlabels) of the test data (TEST) and the classification error (variable name trainerrors) on the training data (TRAIN). In matlab your call should look like

```
[testlabels, trainerrors] = myclassify(TEST, TRAIN, trainlabels);
```

The variable trainlabels is a vector of 1s and 0s consisting of the class labels of the training data.

2. PROBLEM 2

Repeat the above experiment for the classification data set on the class website. This data sets has 200 columns vectors. The first 100 belong to class 1, the second 100 belong to class 2.

3. PROBLEM 3

This problem deals with modifying the derivation of linear discriminant analysis done in class.

- If you ignore the within class scatter what is the new optimization problem for linear discriminant analysis, i.e., only include the between class scatter.
- Solve this optimization problem and compare to the eigenvector problem that we derived to generate a best basis.
- Repeat either problem 1 with this new classifier. Note that you can simply write a new subroutine myclassifier2. Comment on your results.