

Lab 3

Implement Linear Discriminant Analysis (LDA) and Quadratic Discriminant Analysis (QDA). You should NOT use any machine learning library for this lab. Please only use NumPy in Python to implement the algorithms. Perform classifications on the same Iris dataset as Lab 2.

Exercises:

1. Break the sample into 80% for training, and 20% for test datasets. You should choose the first 80% instances from each class for training and the rest for testing.
2. Build an LDA classifier based on the training data. Report the training and test errors for your classifier.
 - o Provide a function called *problem2(samples)* that returns an Nx1 array of predicted labels. Samples is an NxP array.
3. Build a QDA classifier based on the training data. Report the training and test errors for your classifier.
 - o Provide a function called *problem3(samples)* that returns an Nx1 array of predicted labels. Samples is an NxP array.
4. Is there any class linearly separable from other classes? Explain your answer based on your experiments.
5. Assume the features are independent, i.e., Σ is a diagonal matrix. Repeat Question 3, and report your results. Also, please report the training time of this method and the original QDA that you implemented in Question 3.
 - o Provide a function called *problem5(samples)* that returns an Nx1 array of predicted labels. Samples is an NxP array.

Submit your work in the form of a Jupyter Notebook.