ELE 888 Lab 1 Report

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**Plots**

**For Question 1**

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**Figure 1:** Iris setosa and Iris versicolour graphs due to sepal width.



**Figure 2:** Graph of x1 vs. x2.

**For question 2**



**Figure 3:** Subtraction of posterior probabilities for min rate error classifier.



**Figure 4:** Posterior probabilities for Iris Setosa and Iris Versicolour respectively.

**For Question 3**

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**Figure 5:** Subtraction of posterior probabilities for min rate error classifier of test data using sepal width as discriminating feature.



**Figure 6:** Posterior probabilities with respect to the test data.

**For Question 6**

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**Figure 7:** Iris setosa and Iris versicolour graphs due to sepal length.



**Figure 8:** Subtraction of posterior probabilities for min rate error classifier of test data using sepal length as discriminating feature.



**Figure 9:** Graphs of posterior probabilities for test data

**Answers and observations for Each part of Lab Report**

1.As shown in Figure 1, Iris Setosa and Iris Versicolour both have the same number of samples which mean they have the same prior probability of 0.5. They were identified as either Iris Setosa Iris Verisicolour according to their sepal width and were placed in their corresponding bar graph as shown in the results.

2. The posterior probabilities and values of g(x2) are shown in Figure 4. The values of their means and standard deviations are slightly different. The mean and standard deviation for Iris Setosa according to Sepal width is 3.4180 and 0.3810 respectively while the mean and standard deviation for the Iris Versicolour is 2.77 and 0.3138 respectively.

3. By using X= [ 3.3 4.4 5.0 5.7 6.3] as the sample set, we can get the respective posterior probabilities and discriminant function values as shown in the results.

4. As shown in the results, the optimal threshold that was achieved was 3.0980. This is the point at which differentiate the classes w1 and w2 since when looking at the original graph, at 3.0980 the y value of 0. This is a key indicator that would suggest that the value is the optimal threshold.

5. As shown in our results, when taking out half of w1, the optimal threshold becomes 3.0750, which suggests that the point at which the y value reaches 0 has been shifted slightly left.

6. After looking at the results of both sepal width and sepal length, sepal width would be the better feature to use since the standard deviations and means for both the classes are closer to each other with sepal width compared to sepal length. The optimal threshold also happens too quickly with sepal length, using sepal width would lead to more accurate readings.

**Conclusions**

The main conclusion drawn from this lab experiment is that with the data given, sepal width was the better discriminating feature to use due to the means and standard deviations being closer to each other with respect to the classes. Another key feature is that the optimal threshold is at a much better position when using sepal width compared to using sepal length. Another key finding is that the optimal threshold will shift towards the left or right depending on which classes you decide to take some samples away from. To conclude, the results obtained from this experiment fall in line with what is expected due to theory learned in class.