Template for Reports – Example for Report 1

Cover page

- a. Course name
- b. Assignment number and title
- c. Your name
- d. Date the assignment was turned in
- e. The following statement with your name written beneath it.

Statement: "I declare that all material in this assignment is my own work except where there is clear acknowledgment or reference to the work of others. I understand that both my report and code may be subjected to plagiarism detection software, and fully accept all consequences if found responsible for plagiarism, as explained in the syllabus, and described in UNR's Academic Standards Policy: UAM 6,502."

Theory

Experiment 1 (section) Experiment 2 (section) Experiment 3 (section) Experiment 4 (section)

Results and Discussion

Experiment 1 (section)

<u>Part 1.a</u> (subsection) Design a Bayes classifier for minimum error to classify the samples from set **A**. Which discriminant (i.e., case I, II, or III) would be optimum in this case and why? How would you set the prior probabilities $P(\omega 1)$ and $P(\omega 2)$?

<u>Part 1.b</u> (subsection) Plot both the Bayes decision boundary and the samples from data set **A** on the same plot to better visualize how the Bayes rule would classify the data in this case.

<u>Part 1.c</u> (subsection) Next, classify all 200,000 samples and report (i) the misclassification rate for each class separately (i.e., the percentage of misclassified samples for each class) and (ii) the total misclassification rate (i.e., the percentage of misclassified samples overall).

<u>Part 1.d</u> (subsection) Calculate the theoretical probability error (e.g., Bhattacharyya bound) and compare it with the misclassification rate from part (c). What do you observe?

Experiment 2 (section)

<u>Part 2.a</u> (subsection) Design a Bayes classifier for minimum error to classify the samples from set **B**. Which discriminant (i.e., case I, II, or III) would be optimum in this case and why? How would you set the prior probabilities $P(\omega 1)$ and $P(\omega 2)$?

<u>Part 2.b</u> (subsection) Plot both the Bayes decision boundary and the samples from data set **B** on the same plot to better visualize how the Bayes rule would classify the data in this case.

<u>Part 2.c</u> (subsection) Next, classify all 200,000 samples and report (i) the misclassification rate for each class separately (i.e., the percentage of misclassified samples for each class) and (ii) the total misclassification rate (i.e., the percentage of misclassified samples overall).

<u>*Part 2.d (subsection)*</u> Calculate the theoretical probability error (e.g., Bhattacharyya bound) and compare it with the misclassification rate from part (c). What do you observe?

<u>*Part 2.e.*</u> (subsection) How do your results from this experiment compare with your results from experiment 1 and why?

Experiment 3 (section)

<u>Part 3.a</u> (subsection) Classify the samples from data set **A** using the Euclidean distance classifier and compare your results (i.e., misclassification rates) with those obtained from experiment 1. Explain your findings.

Experiment 4 (section)

<u>Part 4.a</u> (subsection) Repeat experiment 3 using the samples from data set **B**. Compare and discuss your results with those obtained from experiments 2 and 3. Explain your findings.