Generate the datasets A and B in R^2, each consisting of 2000 data points from a normal distribution. The dataset A and B have been drawn from the N (μ_1, Σ_1) and N(μ_2, Σ_2). Let us fix the $\mu_1 = [-1,1]$ and $\mu_2 = [2,1]$ and $\Sigma_1 = \Sigma_2 = \begin{matrix} 0.7 & 0 \\ 0 & 0.3 \end{matrix}$.

Separate the 250 data points from each class as a testing set. Plot the optimal Bayesian decision boundary.

1. Write a function implementing the standard SVM with a linear kernel using the gradient descent method. Obtain the best accuracy on the test set by tuning the value of the parameter c. Plot the decision boundary obtained by the standard SVM mode with linear kernel. Compare it with the Bayesian decision boundary.

2. Consider the two-moon dataset. Divide the training and testing point in the ratio of 4:1. Train the standard SVM model with RBF kernel and plot the optimal separating surface obtained by the SVM model by tuning the parameter c and kernel parameter σ. Report Precision, Recall, F-measure, and accuracy on the testing set.

3. Consider the Iris dataset. The dataset contains three types of flowers described by the four features. Consider only the data points with labels 1 and 2. Divide the dataset into training, testing, and validation in the ratio 8:1:1. Use the training set to train the SVM model with a linear kernel. Use the validation set to tune the

parameter value . Finally, obtain the accuracy of the test set.