ECE 361: Project Part 1

Group #2

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Summary

The first phase of this project begins by analyzing the datasets obtained from the receiver. The receiver measured 70 cases where there was no target present, and 30 cases where the target was present. The first phase of the analysis begins by obtaining the ROC curve, which can be found below in Figure 2. The optimal operating point and estimated positive predictive value can be seen in this same figure. P_F (false positive rate) and P_D (true positive rate) are respectively the x and y values that represent the optimal operating point. The standard deviation was determined and can be found below in Figure 3. The densities for no target present and target present with a threshold determined by intersection were plotted together, which can be found below in Figure 1. The corresponding density plot with an optimum threshold is displayed in Figure 4. From the data and the graph, $P_{\text{False Alarm}}$ and P_{Miss} were obtained. Finally, the confusion matrix obtained from the intersection of the two densities and the optimum threshold can be found below in Table 1 and Table 2 respectively.

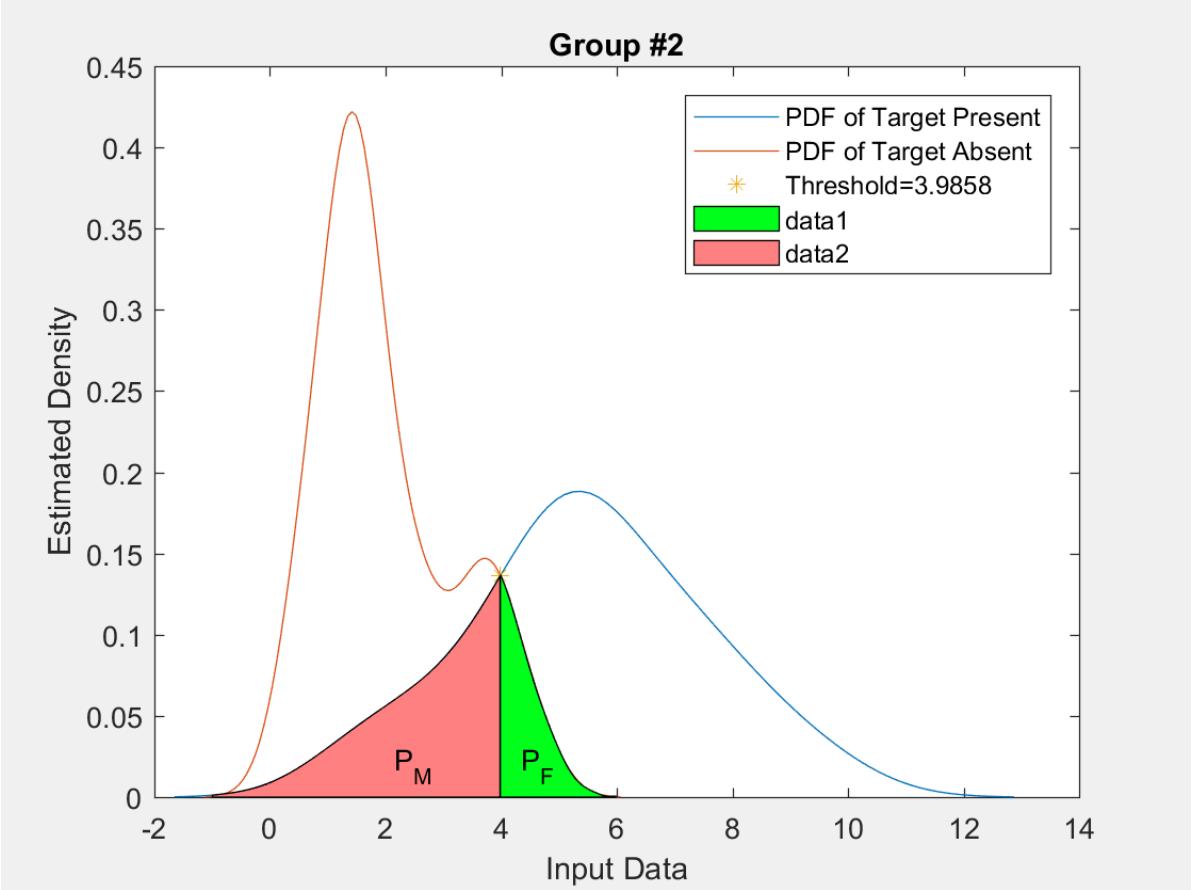

Figure 1: Estimated density for target present and target absent.

----------CONFUSION MATRIX INTERSECTION----------

Data Collected	Target Detected	Target Not Detected	Total Count
Target Absent	4	66	70
Target Present	23	7	30
Total Count	27	73	100

PPV=0.852

Table 1: Confusion Matrix using the intersection.

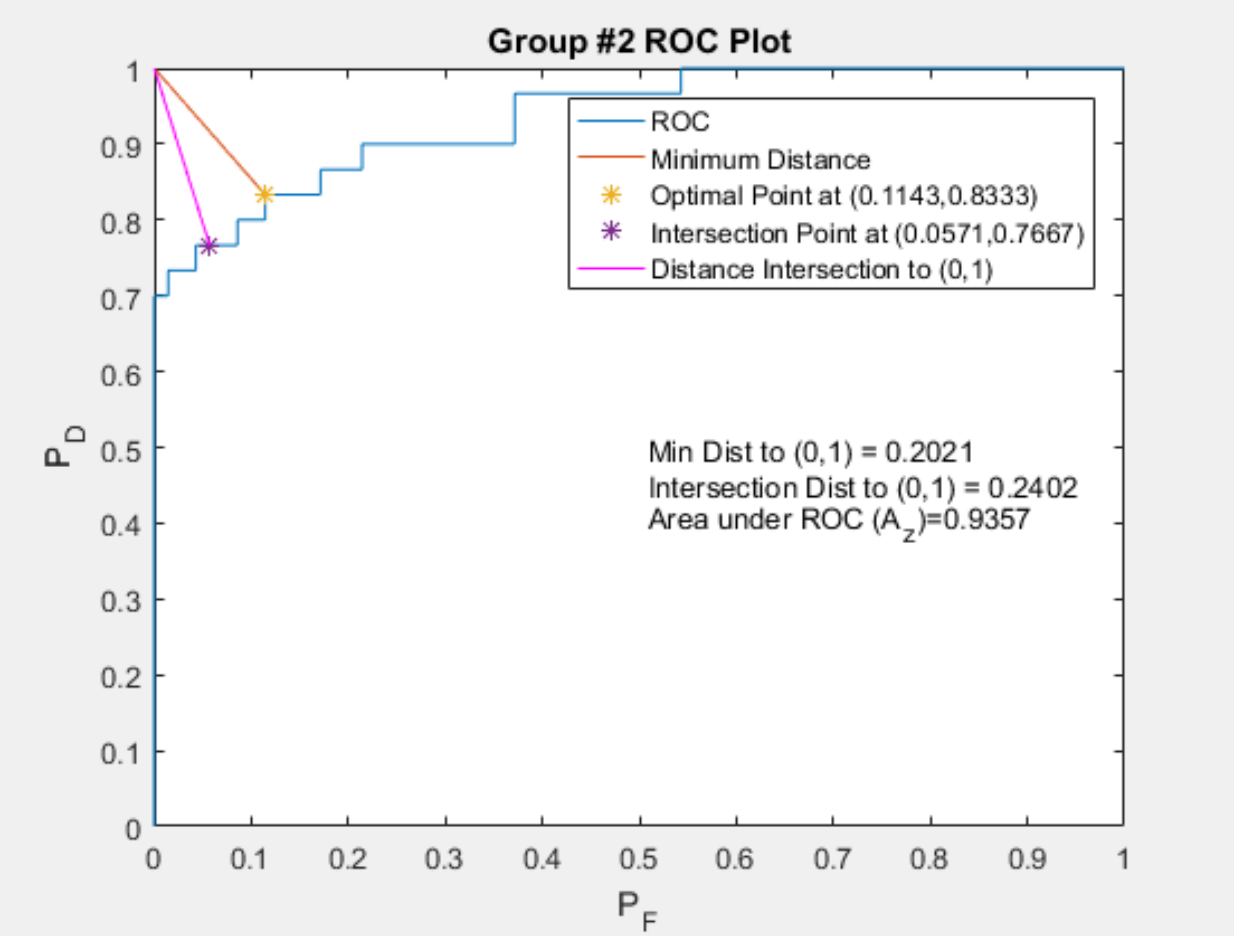

Figure 2: ROC plot with curve, optimal point with its minimum distance to corner, and intersection point with its minimum distance to corner.

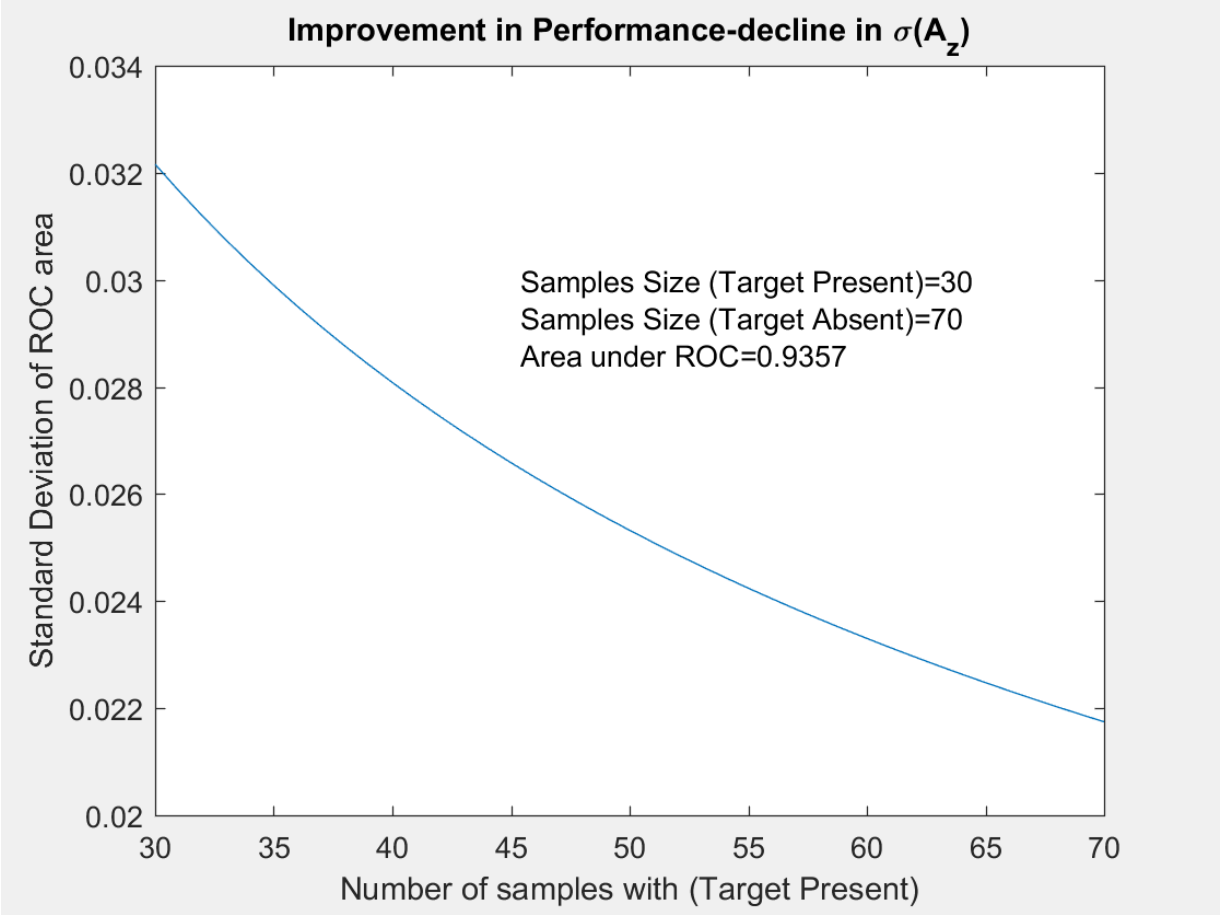

Figure 3: Plot of standard deviation.

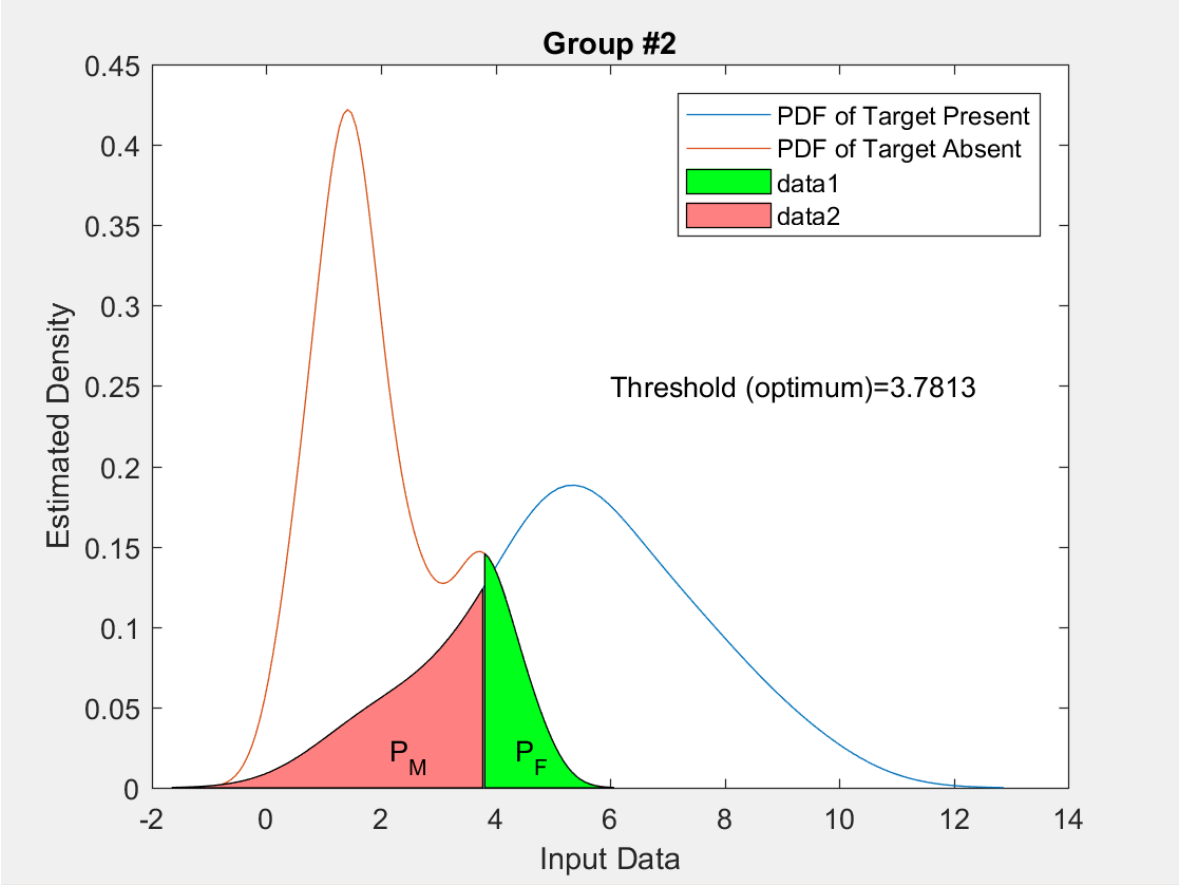

Figure 4: Estimates densities using the optimum threshold.

----------CONFUSION MATRIX OPTIMUM----------

Data Collected	Target Detected	Target Not Detected	Total Count
Target Absent	8	62	70
Target Present	25	5	30
Total Count	33	67	100

PPV=0.758

Table 2: Confusion Matrix created with optimum threshold.

performance index = 1.5040