Project 2 – Perceptron Classifier

Team Members: Isabella, Hudson, Jacob, Hayat

Student Certification

Team Member 1

- Print Name: Isabella Darko
- Date: 9/30/2025
- I have contributed by doing the following: I did part 1 data set B and set up the pdf where we put everything
- Signed: *Isabella Darko*

Team Member 2

- Print Name:
- Date:
- I have contributed by doing the following:
- Signed:

Team Member 3

- Print Name:
- Date:
- I have contributed by doing the following:
- Signed:

Team Member 4

- Print Name:
- Date:
- I have contributed by doing the following:
- Signed:

Part 1 – Dataset Experiments

Dataset A

place holder

Dataset B

Hard Unipolar Activation

Training Split 75/25

- *Training Plot:* `B_train_hard_75.png`
- *Testing Plot:* `B_test_hard_25.png`
- Training Total Error: [value]

Confusion Matrix (Testing Data)

	Predicted Positive	Predicted Negative
Actual Positive	TP = [ ]	FN = [ ]
Actual Negative	FP = [ ]	TN = [ ]

Rates

- Accuracy: [ ]
- True Positive Rate (Recall): [ ]
- False Positive Rate: [ ]
- Precision: [ ]
- F1 Score: [ ]

Training Split 25/75

- *Training Plot:* `B_train_hard_25.png`
- *Testing Plot:* `B_test_hard_75.png`
- Training Total Error: [value]

Confusion Matrix (Testing Data)

	Predicted Positive	Predicted Negative
Actual Positive	TP = [ ]	FN = [ ]
Actual Negative	FP = [ ]	TN = [ ]

Rates

- Accuracy: [ ]
- True Positive Rate (Recall): [ ]
- False Positive Rate: [ ]
- Precision: [ ]
- F1 Score: [ ]

Comparison of 75/25 vs 25/75

- **a. Are error rates different, and if so, why?**
- **b. What is the effect of different datasets and the effect of different training/testing distributions of TEs on the accuracy, confusion matrices, and rates?**
- **c. When would you go with step 1 (75/25) and when with step 2 (25/75)?**
- **d. Comment and discuss.**

Soft Unipolar Activation

Training Split 75/25

- *Training Plot:* `B_train_hard_75.png`
- *Testing Plot:* `B_test_hard_25.png`
- Training Total Error: [value]

Confusion Matrix (Testing Data)

	Predicted Positive	Predicted Negative
Actual Positive	TP = [ ]	FN = [ ]
Actual Negative	FP = [ ]	TN = [ ]

Rates

- Accuracy: [ ]
- True Positive Rate (Recall): [ ]
- False Positive Rate: [ ]
- Precision: [ ]
- F1 Score: [ ]

Training Split 25/75

- *Training Plot:* `B_train_hard_25.png`
- *Testing Plot:* `B_test_hard_75.png`
- Training Total Error: [value]

Confusion Matrix (Testing Data)

	Predicted Positive	Predicted Negative
Actual Positive	TP = [ ]	FN = [ ]
Actual Negative	FP = [ ]	TN = [ ]

Rates

- Accuracy: [ ]
- True Positive Rate (Recall): [ ]
- False Positive Rate: [ ]
- Precision: [ ]
- F1 Score: [ ]

Comparison of 75/25 vs 25/75

- **a. Are error rates different, and if so, why?**
- **b. What is the effect of different datasets and the effect of different training/testing distributions of TEs on the accuracy, confusion matrices, and rates?**
- **c. When would you go with step 1 (75/25) and when with step 2 (25/75)?**
- **d. Comment and discuss.**

Dataset C

Hard Unipolar Activation

(Same structure as Dataset A and B)

Soft Unipolar Activation

(Same structure as Dataset A and B)

Part 2 – Soft vs Hard Comparison

- Placeholder text.

Extra Credit

- Placeholder text.

Conclusion

- Key takeaways from Dataset A, B, and C experiments.
- Overall differences between hard vs soft unipolar activation.
- When to prefer larger training split vs smaller one.
- Might not need this section can include it if we want to.