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Perceptron

Comments:

- All the train data are linearly separable; hence our perceptron algorithm can find a decision boundary within 20 iterations which separates both the labels with 100% accuracy.
- Data points in train data are well separated hence possibility of different decision boundary with different weights, all depends on initial setting of the weight which is random.
- The test data on the other hand are closely related with very less separation.
- Different training set provided different solution, different decision boundaries as well as different accuracy.
- Even training on same train data provides different decision boundary as it all depends on initial setting of weight which is random according to the perceptron algorithm.
- Almost for all the training set the accuracy on test data is more than 95%.

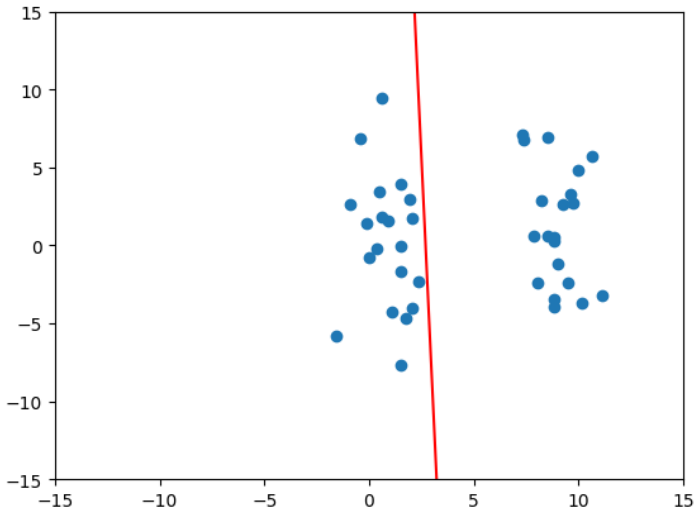
Train Set	Iteration	Model Accuracy on train set	Model Accuracy on test set
Set1	20	100%	97.5
Set2	20	100%	99.55
Set3	20	100%	98.95
Set4	20	100%	98.9
Set5	20	100%	99.35
Set6	20	100%	99.95
Set7	20	100%	99.65
Set8	20	100%	99.55
Set9	20	100%	99.85
Set10	20	100%	99.8

PLEASE FIND THE DETAILS OF EACH TRAIN DATA SET

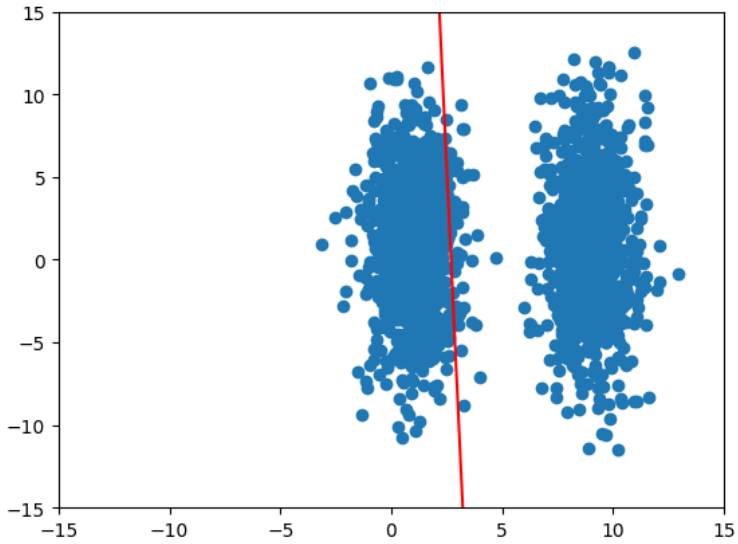
Set1.train:

- Iteration = 20, Was converging from iteration 10, just to be safe increased it to 20, anything more than 20 is useless as we are reaching 100% accuracy which means the weights are not changing.

- Accuracy on train set = 100%, Plot and decision boundary with train set:

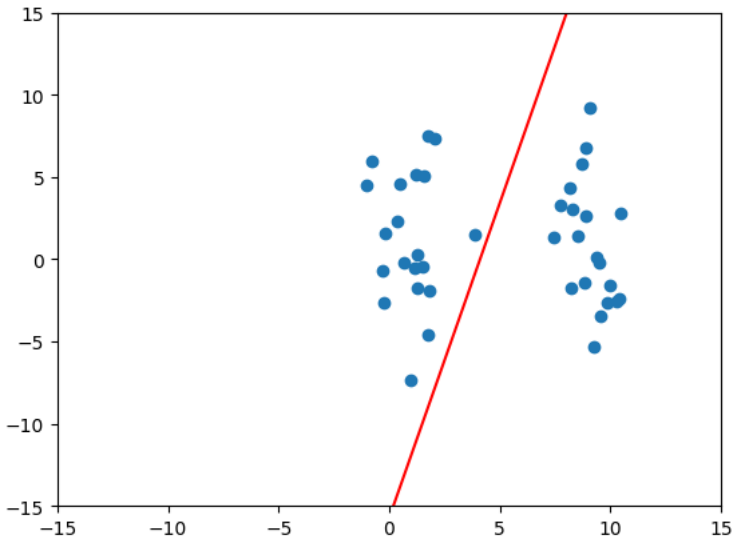


- Accuracy on test set: 97.5, Plot and decision boundary with test set:

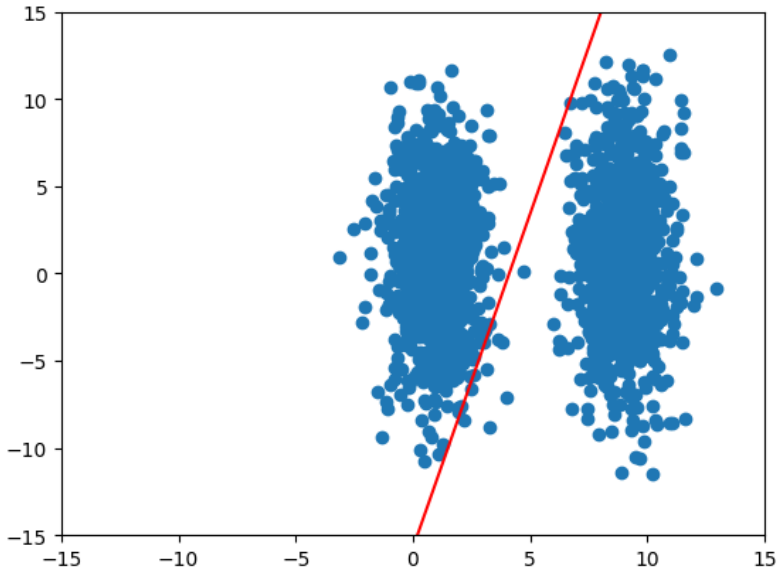


Set2.train:

- Iteration = 20, Anything more than 20 is useless as we are reaching 100% accuracy which means the weights are not changing.
- Accuracy on train set = 100%, Plot and decision boundary with train set:



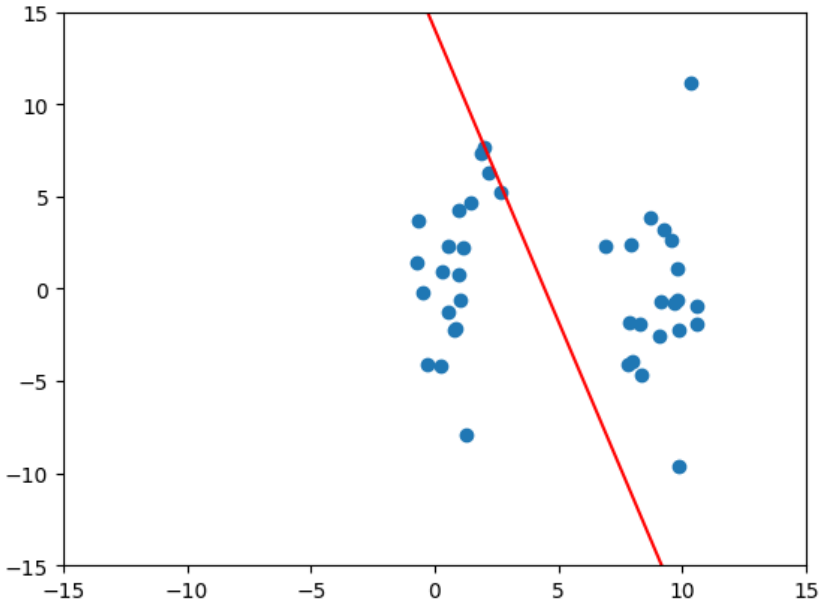
- Accuracy on test set: 99.55, Plot and decision boundary with test set:



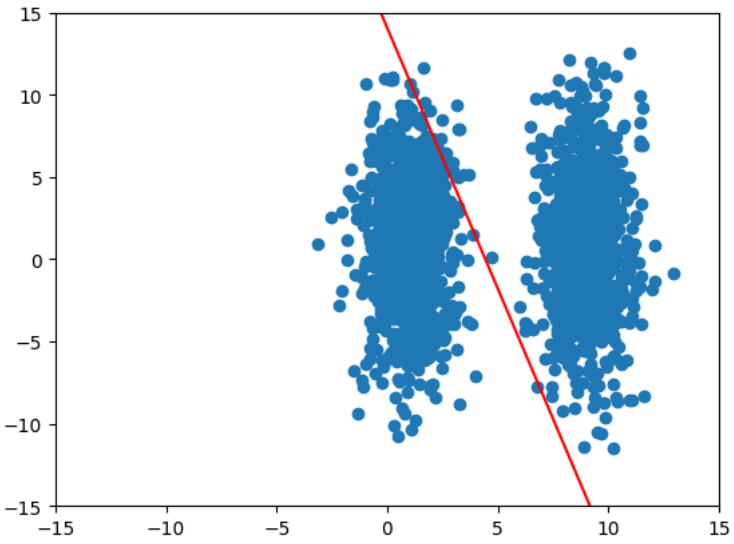
Set3.train:

- Iteration = 20, Anything more than 20 is useless as we are reaching 100% accuracy which means the weights are not changing.

- Accuracy on train set = 100%, Plot and decision boundary with train set:



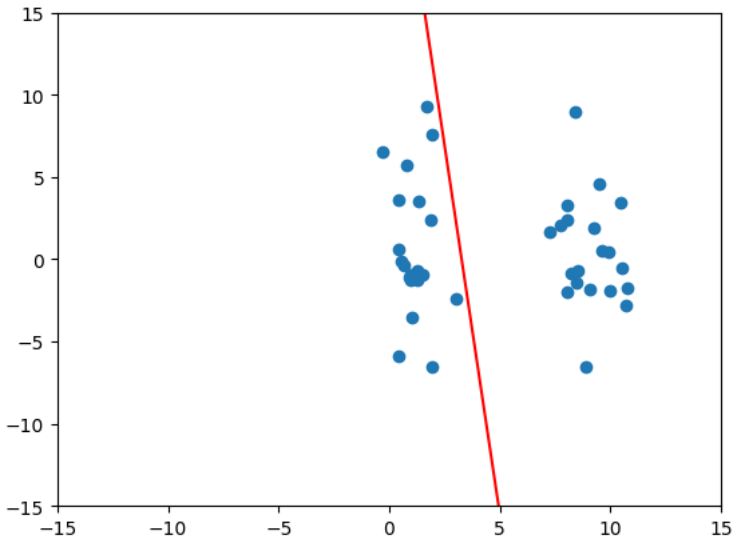
- Accuracy on test set: 98.95, Plot and decision boundary with test set:



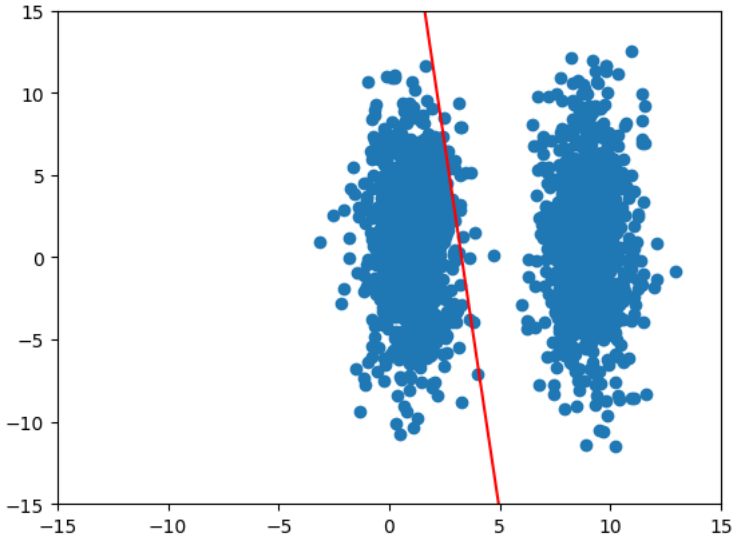
SET4.train:

- Iteration = 20, Anything more than 20 is useless as we are reaching 100% accuracy which means the weights are not changing.

- Accuracy on train set = 100%, Plot and decision boundary with train set:



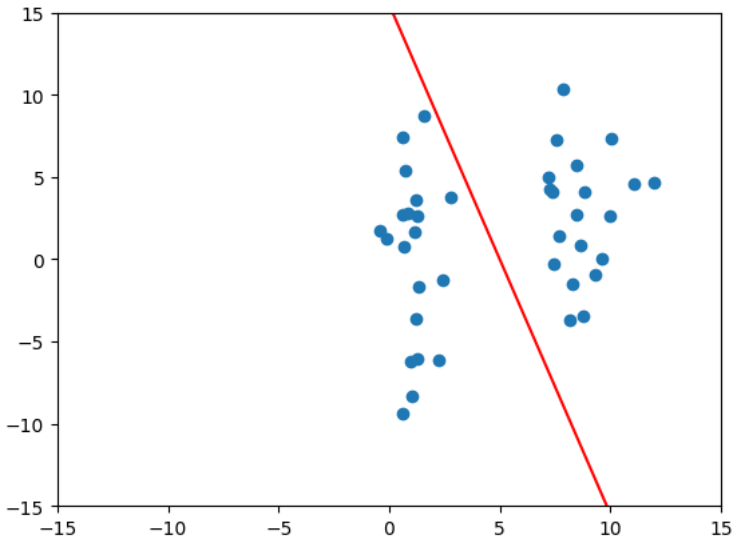
- Accuracy on test set: 98.9, Plot and decision boundary with test set:



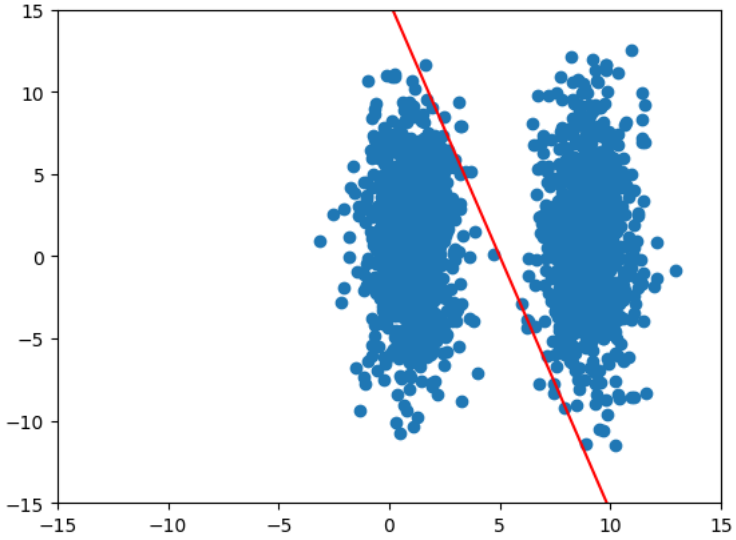
Set5.train:

- Iteration = 20, Anything more than 20 is useless as we are reaching 100% accuracy which means the weights are not changing.

- Accuracy on train set = 100%, Plot and decision boundary with train set:



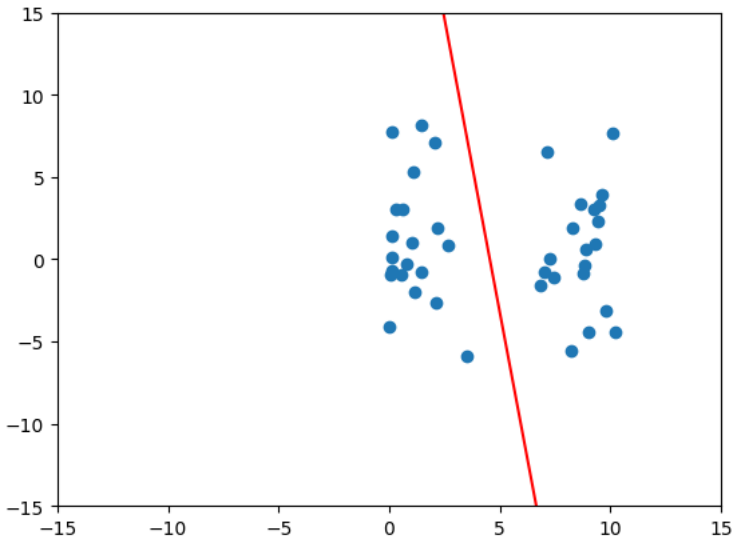
- Accuracy on test set: 99.35, Plot and decision boundary with test set:



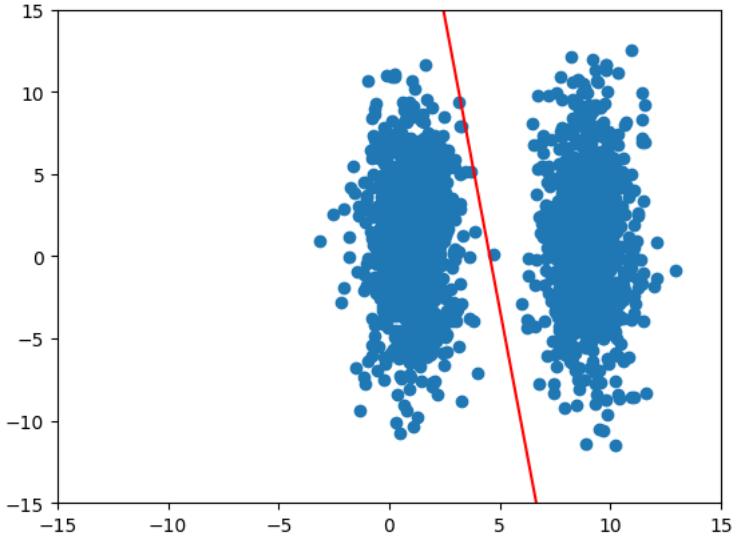
Set6.train:

- Iteration = 20, Anything more than 20 is useless as we are reaching 100% accuracy which means the weights are not changing.

- Accuracy on train set = 100%, Plot and decision boundary with train set:



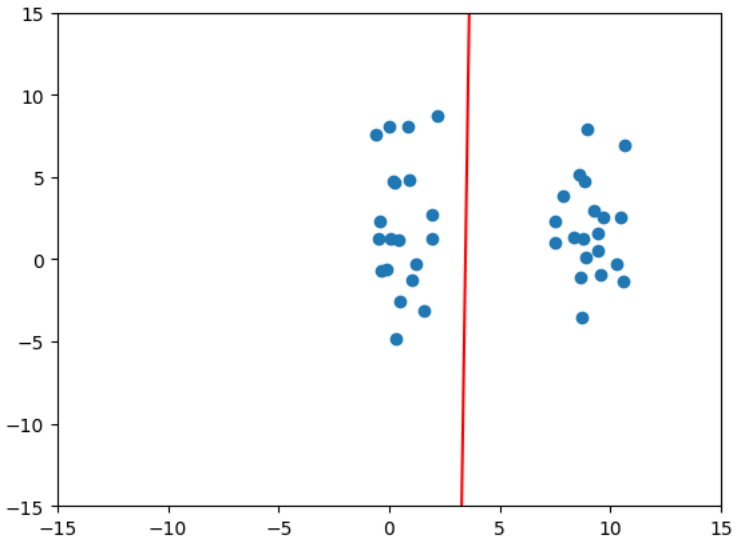
- Accuracy on test set: 99.95, Plot and decision boundary with test set:



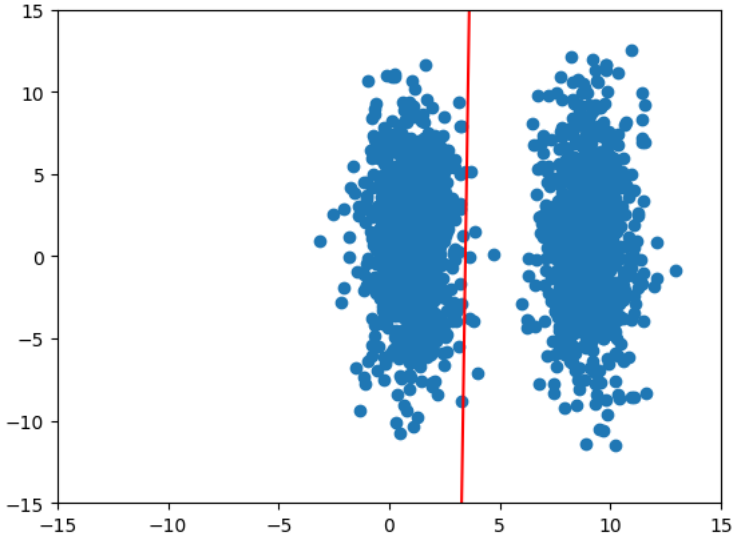
Set7.train:

- Iteration = 20, Anything more than 20 is useless as we are reaching 100% accuracy which means the weights are not changing.

- Accuracy on train set = 100%, Plot and decision boundary with train set:



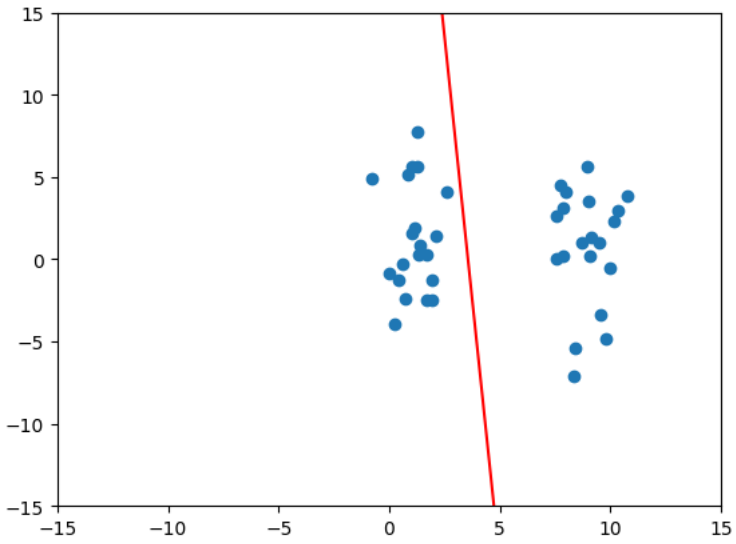
- Accuracy on test set: 99.65, Plot and decision boundary with test set:



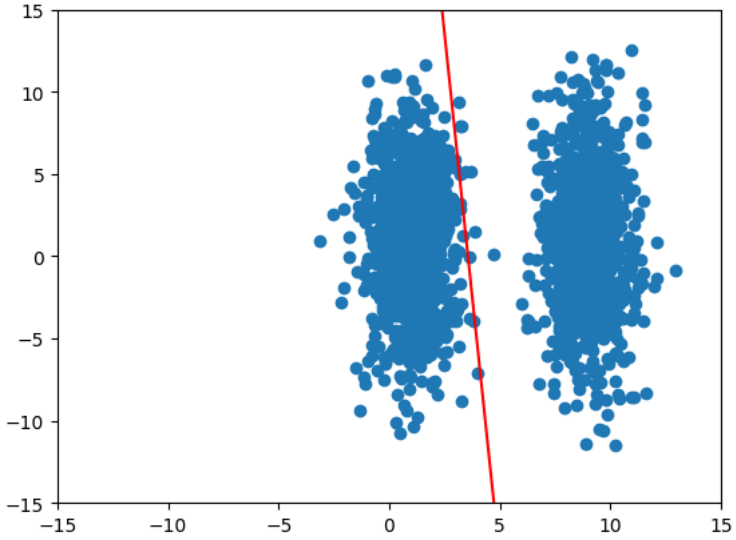
Set8.train:

- Iteration = 20, Anything more than 20 is useless as we are reaching 100% accuracy which means the weights are not changing.

- Accuracy on train set = 100%, Plot and decision boundary with train set:



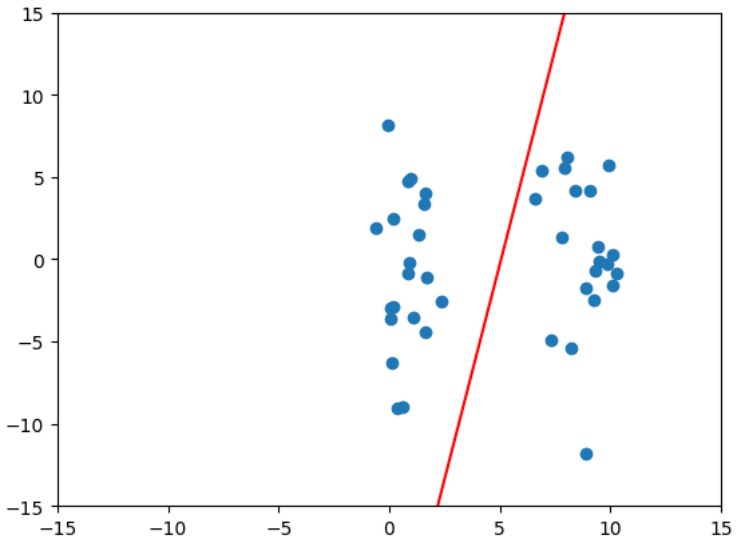
- Accuracy on test set: 99.55, Plot and decision boundary with test set:



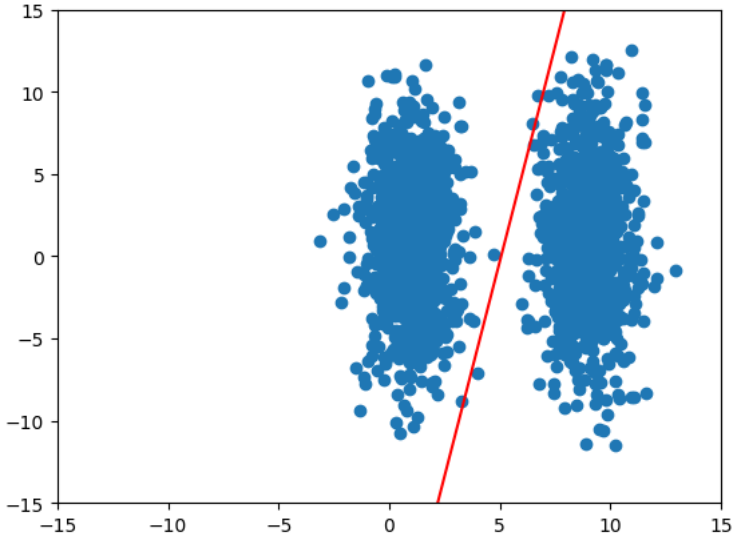
Set9.train:

- Iteration = 20, Anything more than 20 is useless as we are reaching 100% accuracy which means the weights are not changing.

- Accuracy on train set = 100%, Plot and decision boundary with train set:



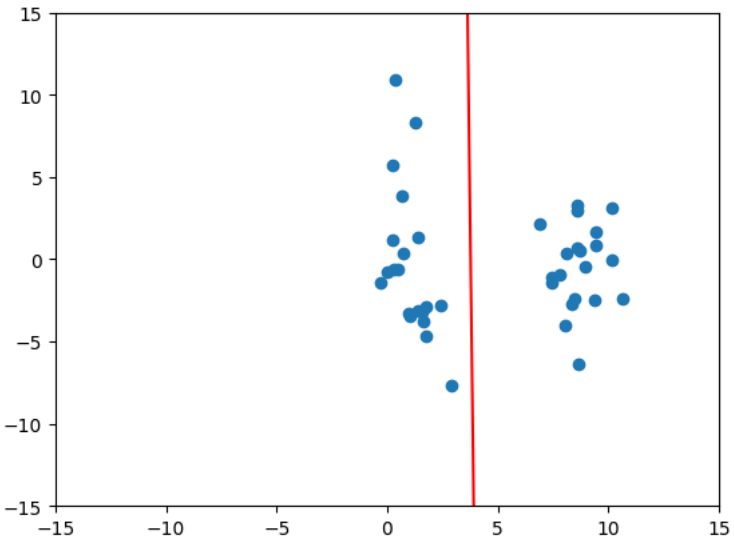
- Accuracy on test set: 99.85, Plot and decision boundary with test set:



Set10.train:

- Iteration = 20, Anything more than 20 is useless as we are reaching 100% accuracy which means the weights are not changing.

- Accuracy on train set = 100%, Plot and decision boundary with train set:



- Accuracy on test set: 99.8, Plot and decision boundary with test set: