**REPORT**

Implementation:

The main Motive behind Bagging is to improve the Accuracy of classifier. In Bagging, the prediction on Test Data is done after taking classifier prediction from several classifiers. This way, we have increased the chance of predicting the correct output than by just classifying using single classifier. Generally, the concept works more efficiently with the use of unstable classifiers viz; Decision Trees, Neural Networks etc.

In our implementation, I have used Decision Trees to prove the concept of Bagging. I have used my Old project of Decision Trees (Binary Classifier), and created different Training Sets with Replacement Algorithm from the given Training Set and was able to create Different Decision Trees. The number of Trees will depend on the number of Trees user wants to create for the classification. As per the user data, Trees will be classified that many times, and Accuracy will be shown on Individual as well as on combined classifiers.

Implementation shows that there is Improvement in Accuracy as compared to single Decision Trees. The Accuracy increased by about 10-15% using Bagging.

2 Classifiers with Individual Accuracies and Combined Accuracy.

Below are the Decision Trees with different Iterations with their Accuracies:

/\*Output\*/

Program in Execution

Examples in Given Training Data is 800

Below are different Classifiers for given Input of Iterations

1 classifier with Training Set 1

Accuracy obtained on Test data on 1 classifier 68.96551724137932 %

attr5 = 0| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_1

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_1

| | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| |\_\_\_\_\_\_\_attr6

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | |\_\_\_\_\_\_\_attr2

| | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

|\_\_\_\_\_\_\_attr4

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | |\_\_\_\_\_\_\_attr6

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr3

| | | | |\_\_\_\_\_\_\_0

| |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr6

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr6

| | | | | |\_\_\_\_\_\_\_0

| | |\_\_\_\_\_\_\_attr3

| | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr6

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

attr5 = 1| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_1

| | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | |\_\_\_\_\_\_\_1

| |\_\_\_\_\_\_\_attr4

| | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | |\_\_\_\_\_\_\_attr2

| | | |\_\_\_\_\_\_\_0

|\_\_\_\_\_\_\_attr6

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr4

| | | | | |\_\_\_\_\_\_\_1

| | | |\_\_\_\_\_\_\_attr1

| | | | |\_\_\_\_\_\_\_1

| | |\_\_\_\_\_\_\_attr2

| | | | |\_\_\_\_\_\_\_1

| | | |\_\_\_\_\_\_\_attr4

| | | | | |\_\_\_\_\_\_\_1

| | | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_1

| |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_1

| | | | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_1

| | |\_\_\_\_\_\_\_attr4

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_1

| | | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

2 classifier with Training Set 2

Accuracy obtained on Test data on 2 classifier 31.03448275862069 %

attr6 = 0| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr4

| | | | | |\_\_\_\_\_\_\_1

| | | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_1

| | | | |\_\_\_\_\_\_\_attr4

| | | | | |\_\_\_\_\_\_\_1

| | |\_\_\_\_\_\_\_attr1

| | | |\_\_\_\_\_\_\_1

| |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_1

| | | | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_1

| | |\_\_\_\_\_\_\_attr4

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | |\_\_\_\_\_\_\_0

|\_\_\_\_\_\_\_attr5

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | |\_\_\_\_\_\_\_attr4

| | | |\_\_\_\_\_\_\_0

| |\_\_\_\_\_\_\_attr2

| | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_1

| | |\_\_\_\_\_\_\_attr4

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_1

| | | |\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_1

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

attr6 = 1| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr5

| | | | | |\_\_\_\_\_\_\_1

| | | | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_0

| | |\_\_\_\_\_\_\_attr4

| | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr5

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_0

| |\_\_\_\_\_\_\_attr3

| | | |\_\_\_\_\_\_\_0

| | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr5

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr4

| | | | |\_\_\_\_\_\_\_0

|\_\_\_\_\_\_\_attr1

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr5

| | | | | |\_\_\_\_\_\_\_1

| | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_1

| | | | |\_\_\_\_\_\_\_attr5

| | | | | |\_\_\_\_\_\_\_1

| | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_1

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr5

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| |\_\_\_\_\_\_\_attr4

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | |\_\_\_\_\_\_\_attr5

| | | | | |\_\_\_\_\_\_\_0

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

| | | |\_\_\_\_\_\_\_attr2

| | | | | |\_\_\_\_\_\_\_1

| | | | |\_\_\_\_\_\_\_attr3

| | | | | |\_\_\_\_\_\_\_0

Accuracy obtained after Bagging is 100.0%

It can be clearly seen that the Accuracy obtained after Bagging is increased as compared to 2 individual Decision Trees. Likewise, we can create more trees and see the results.

**Results:**

1) There is an Increase in Accuracy when used combined classifiers to classify the data.

2) sometimes, because of the Selection of Training Sets, might be a possibility that Accuracy Drops a Bit, but the chances are rare.