Output

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Number of training instances = 600

Number of training attributes = 20

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Decison Tree :

| XI = 0 :

| | XJ = 0 :

| | | XN = 0 :

| | | | XO = 0 :

| | | | | XB = 0 :

| | | | | | XQ = 0 : 0

| | | | | | XQ = 1 :

| | | | | | | XL = 0 : 1

| | | | | | | XL = 1 :

| | | | | | | | XF = 0 : 0

| | | | | | | | XF = 1 :

| | | | | | | | | XC = 0 : 1

| | | | | | | | | XC = 1 :

| | | | | | | | | | XH = 0 : 1

| | | | | | | | | | XH = 1 : 0

| | | | | XB = 1 : 0

| | | | XO = 1 :

| | | | | XH = 0 :

| | | | | | XP = 0 :

| | | | | | | XR = 0 :

| | | | | | | | XE = 0 : 1

| | | | | | | | XE = 1 : 0

| | | | | | | XR = 1 : 1

| | | | | | XP = 1 :

| | | | | | | XL = 0 : 0

| | | | | | | XL = 1 :

| | | | | | | | XS = 0 : 1

| | | | | | | | XS = 1 : 0

| | | | | XH = 1 :

| | | | | | XS = 0 : 1

| | | | | | XS = 1 :

| | | | | | | XL = 0 :

| | | | | | | | XC = 0 : 1

| | | | | | | | XC = 1 :

| | | | | | | | | XG = 0 : 1

| | | | | | | | | XG = 1 : 0

| | | | | | | XL = 1 :

| | | | | | | | XG = 0 : 0

| | | | | | | | XG = 1 :

| | | | | | | | | XB = 0 : 1

| | | | | | | | | XB = 1 : 0

| | | XN = 1 : 0

| | XJ = 1 :

| | | XQ = 0 :

| | | | XF = 0 :

| | | | | XO = 0 :

| | | | | | XB = 0 :

| | | | | | | XG = 0 : 0

| | | | | | | XG = 1 :

| | | | | | | | XM = 0 : 0

| | | | | | | | XM = 1 : 1

| | | | | | XB = 1 : 0

| | | | | XO = 1 :

| | | | | | XB = 0 :

| | | | | | | XD = 0 :

| | | | | | | | XM = 0 : 1

| | | | | | | | XM = 1 : 0

| | | | | | | XD = 1 : 0

| | | | | | XB = 1 :

| | | | | | | XK = 0 : 1

| | | | | | | XK = 1 :

| | | | | | | | XC = 0 : 1

| | | | | | | | XC = 1 :

| | | | | | | | | XP = 0 : 0

| | | | | | | | | XP = 1 :

| | | | | | | | | | XG = 0 : 1

| | | | | | | | | | XG = 1 : 0

| | | | XF = 1 : 0

| | | XQ = 1 :

| | | | XB = 0 :

| | | | | XF = 0 :

| | | | | | XS = 0 : 0

| | | | | | XS = 1 :

| | | | | | | XN = 0 : 1

| | | | | | | XN = 1 :

| | | | | | | | XO = 0 :

| | | | | | | | | XG = 0 : 0

| | | | | | | | | XG = 1 : 1

| | | | | | | | XO = 1 : 0

| | | | | XF = 1 :

| | | | | | XN = 0 :

| | | | | | | XS = 0 :

| | | | | | | | XH = 0 :

| | | | | | | | | XP = 0 : 0

| | | | | | | | | XP = 1 :

| | | | | | | | | | XL = 0 :

| | | | | | | | | | | XG = 0 : 1

| | | | | | | | | | | XG = 1 : 0

| | | | | | | | | | XL = 1 : 1

| | | | | | | | XH = 1 : 1

| | | | | | | XS = 1 :

| | | | | | | | XD = 0 :

| | | | | | | | | XR = 0 : 1

| | | | | | | | | XR = 1 :

| | | | | | | | | | XL = 0 : 1

| | | | | | | | | | XL = 1 : 0

| | | | | | | | XD = 1 : 0

| | | | | | XN = 1 :

| | | | | | | XL = 0 : 1

| | | | | | | XL = 1 :

| | | | | | | | XP = 0 :

| | | | | | | | | XE = 0 :

| | | | | | | | | | XG = 0 :

| | | | | | | | | | | XC = 0 : 1

| | | | | | | | | | | XC = 1 : 0

| | | | | | | | | | XG = 1 :

| | | | | | | | | | | XC = 0 :

| | | | | | | | | | | | XD = 0 : 0

| | | | | | | | | | | | XD = 1 : 1

| | | | | | | | | | | XC = 1 : 1

| | | | | | | | | XE = 1 : 1

| | | | | | | | XP = 1 : 1

| | | | XB = 1 :

| | | | | XO = 0 : 0

| | | | | XO = 1 :

| | | | | | XF = 0 :

| | | | | | | XM = 0 :

| | | | | | | | XE = 0 :

| | | | | | | | | XC = 0 : 0

| | | | | | | | | XC = 1 :

| | | | | | | | | | XK = 0 : 0

| | | | | | | | | | XK = 1 : 1

| | | | | | | | XE = 1 : 1

| | | | | | | XM = 1 : 0

| | | | | | XF = 1 : 0

| XI = 1 :

| | XK = 0 :

| | | XC = 0 :

| | | | XS = 0 :

| | | | | XG = 0 :

| | | | | | XM = 0 : 1

| | | | | | XM = 1 :

| | | | | | | XT = 0 : 1

| | | | | | | XT = 1 :

| | | | | | | | XL = 0 :

| | | | | | | | | XP = 0 : 1

| | | | | | | | | XP = 1 :

| | | | | | | | | | XB = 0 : 1

| | | | | | | | | | XB = 1 : 0

| | | | | | | | XL = 1 :

| | | | | | | | | XP = 0 : 0

| | | | | | | | | XP = 1 :

| | | | | | | | | | XQ = 0 : 1

| | | | | | | | | | XQ = 1 :

| | | | | | | | | | | XB = 0 : 1

| | | | | | | | | | | XB = 1 : 0

| | | | | XG = 1 :

| | | | | | XO = 0 : 1

| | | | | | XO = 1 :

| | | | | | | XH = 0 : 0

| | | | | | | XH = 1 :

| | | | | | | | XL = 0 : 1

| | | | | | | | XL = 1 : 0

| | | | XS = 1 :

| | | | | XR = 0 :

| | | | | | XN = 0 : 1

| | | | | | XN = 1 :

| | | | | | | XH = 0 :

| | | | | | | | XJ = 0 :

| | | | | | | | | XM = 0 :

| | | | | | | | | | XD = 0 : 0

| | | | | | | | | | XD = 1 : 1

| | | | | | | | | XM = 1 : 1

| | | | | | | | XJ = 1 : 1

| | | | | | | XH = 1 :

| | | | | | | | XT = 0 : 0

| | | | | | | | XT = 1 :

| | | | | | | | | XF = 0 : 0

| | | | | | | | | XF = 1 : 1

| | | | | XR = 1 :

| | | | | | XG = 0 :

| | | | | | | XM = 0 :

| | | | | | | | XH = 0 : 0

| | | | | | | | XH = 1 :

| | | | | | | | | XB = 0 : 1

| | | | | | | | | XB = 1 :

| | | | | | | | | | XF = 0 : 1

| | | | | | | | | | XF = 1 : 0

| | | | | | | XM = 1 :

| | | | | | | | XD = 0 : 0

| | | | | | | | XD = 1 : 1

| | | | | | XG = 1 : 0

| | | XC = 1 :

| | | | XD = 0 :

| | | | | XS = 0 :

| | | | | | XF = 0 :

| | | | | | | XB = 0 : 0

| | | | | | | XB = 1 :

| | | | | | | | XE = 0 : 0

| | | | | | | | XE = 1 : 1

| | | | | | XF = 1 :

| | | | | | | XP = 0 : 1

| | | | | | | XP = 1 :

| | | | | | | | XH = 0 : 1

| | | | | | | | XH = 1 :

| | | | | | | | | XL = 0 :

| | | | | | | | | | XJ = 0 : 1

| | | | | | | | | | XJ = 1 :

| | | | | | | | | | | XN = 0 : 0

| | | | | | | | | | | XN = 1 : 1

| | | | | | | | | XL = 1 : 0

| | | | | XS = 1 :

| | | | | | XJ = 0 :

| | | | | | | XM = 0 : 0

| | | | | | | XM = 1 :

| | | | | | | | XQ = 0 :

| | | | | | | | | XB = 0 : 1

| | | | | | | | | XB = 1 :

| | | | | | | | | | XF = 0 :

| | | | | | | | | | | XH = 0 : 0

| | | | | | | | | | | XH = 1 : 1

| | | | | | | | | | XF = 1 : 1

| | | | | | | | XQ = 1 : 0

| | | | | | XJ = 1 :

| | | | | | | XO = 0 :

| | | | | | | | XF = 0 :

| | | | | | | | | XE = 0 : 0

| | | | | | | | | XE = 1 : 1

| | | | | | | | XF = 1 : 1

| | | | | | | XO = 1 :

| | | | | | | | XR = 0 :

| | | | | | | | | XB = 0 :

| | | | | | | | | | XH = 0 : 0

| | | | | | | | | | XH = 1 : 1

| | | | | | | | | XB = 1 : 1

| | | | | | | | XR = 1 : 1

| | | | XD = 1 :

| | | | | XF = 0 : 0

| | | | | XF = 1 :

| | | | | | XO = 0 : 0

| | | | | | XO = 1 :

| | | | | | | XP = 0 : 0

| | | | | | | XP = 1 : 1

| | XK = 1 :

| | | XD = 0 :

| | | | XT = 0 :

| | | | | XF = 0 :

| | | | | | XB = 0 :

| | | | | | | XR = 0 : 0

| | | | | | | XR = 1 :

| | | | | | | | XO = 0 : 1

| | | | | | | | XO = 1 :

| | | | | | | | | XL = 0 : 1

| | | | | | | | | XL = 1 : 0

| | | | | | XB = 1 :

| | | | | | | XO = 0 : 0

| | | | | | | XO = 1 : 1

| | | | | XF = 1 :

| | | | | | XO = 0 : 1

| | | | | | XO = 1 :

| | | | | | | XH = 0 :

| | | | | | | | XL = 0 :

| | | | | | | | | XE = 0 : 0

| | | | | | | | | XE = 1 :

| | | | | | | | | | XG = 0 : 1

| | | | | | | | | | XG = 1 : 0

| | | | | | | | XL = 1 : 1

| | | | | | | XH = 1 :

| | | | | | | | XE = 0 : 1

| | | | | | | | XE = 1 :

| | | | | | | | | XL = 0 : 1

| | | | | | | | | XL = 1 : 0

| | | | XT = 1 :

| | | | | XB = 0 :

| | | | | | XC = 0 :

| | | | | | | XM = 0 : 1

| | | | | | | XM = 1 :

| | | | | | | | XJ = 0 : 0

| | | | | | | | XJ = 1 :

| | | | | | | | | XE = 0 : 0

| | | | | | | | | XE = 1 : 1

| | | | | | XC = 1 :

| | | | | | | XH = 0 : 1

| | | | | | | XH = 1 :

| | | | | | | | XL = 0 : 1

| | | | | | | | XL = 1 :

| | | | | | | | | XN = 0 : 1

| | | | | | | | | XN = 1 : 0

| | | | | XB = 1 : 0

| | | XD = 1 : 0

Number of nodes in the tree = 282

Number of Leaf Nodes in the tree = 141

Average Depth:4.170212765957447

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Pre-pruning Accuracy:

Test data size = 600

Accuracy of the model on the Training dataset = 99.83333333333333

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Number of validating instances = 600

Number of validating attributes = 20

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Test data size = 600

Accuracy of the model on the Validation dataset = 76.0

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Number of testing instances = 600

Number of testing attributes = 20

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Test data size = 600

Accuracy of the model on the Testing dataset = 72.66666666666667

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Post-pruning Accuracy:

Test data size = 600

Accuracy after pruning on validation data = 67.5

Test data size = 600

Accuracy after pruning on testing data = 68.5

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Randomly generated Decision Tree

| XH = 0 :

| | XD = 0 :

| | | XE = 0 :

| | | | XS = 0 :

| | | | | XM = 0 :

| | | | | | XQ = 0 : 0

| | | | | | XQ = 1 : 0

| | | | | XM = 1 :

| | | | | | XD = 0 : 0

| | | | | | XD = 1 : 0

| | | | XS = 1 :

| | | | | XG = 0 :

| | | | | | XP = 0 : 0

| | | | | | XP = 1 : 0

| | | | | XG = 1 :

| | | | | | XE = 0 : 1

| | | | | | XE = 1 : 0

| | | XE = 1 :

| | | | XB = 0 :

| | | | | XE = 0 :

| | | | | | XD = 0 : 0

| | | | | | XD = 1 : 0

| | | | | XE = 1 :

| | | | | | XS = 0 : 1

| | | | | | XS = 1 : 1

| | | | XB = 1 :

| | | | | XB = 0 : 0

| | | | | XB = 1 : 0

| | XD = 1 :

| | | XQ = 0 :

| | | | XP = 0 :

| | | | | XM = 0 : 0

| | | | | XM = 1 : 1

| | | | XP = 1 :

| | | | | XN = 0 : 0

| | | | | XN = 1 : 0

| | | XQ = 1 :

| | | | XB = 0 :

| | | | | XL = 0 : 0

| | | | | XL = 1 : 1

| | | | XB = 1 :

| | | | | XF = 0 : 1

| | | | | XF = 1 : 0

| XH = 1 :

| | XC = 0 :

| | | XP = 0 :

| | | | XK = 0 :

| | | | | XJ = 0 : 1

| | | | | XJ = 1 : 1

| | | | XK = 1 :

| | | | | XG = 0 : 0

| | | | | XG = 1 : 0

| | | XP = 1 :

| | | | XN = 0 :

| | | | | XH = 0 : 0

| | | | | XH = 1 : 1

| | | | XN = 1 :

| | | | | XM = 0 : 1

| | | | | XM = 1 : 0

| | XC = 1 :

| | | XB = 0 :

| | | | XF = 0 :

| | | | | XS = 0 : 0

| | | | | XS = 1 : 1

| | | | XF = 1 :

| | | | | XF = 0 : 0

| | | | | XF = 1 : 1

| | | XB = 1 :

| | | | XB = 0 :

| | | | | XL = 0 : 0

| | | | | XL = 1 : 0

| | | | XB = 1 :

| | | | | XL = 0 : 0

| | | | | XL = 1 : 0

Number of nodes in the tree = 111

Average Depth:4.486486486486487

Test data size = 600

Accuracy of the Random model on the Training dataset = 60.833333333333336

Test data size = 600

Accuracy of the Random model on the Validation dataset = 57.833333333333336

Test data size = 600

Accuracy of the Random model on the Testing dataset = 59.5