

Building the Decision Tree:

- The datasets are first loaded into the python file using `pd.read_csv("filename")`.
- Then the potential splits for the data are calculated using the class.
- Then a function for dividing the attributes are made and then the decision tree algorithm has been built.
- Once the model is built with the training data, it has to be tested with the testing data.
- The results of all the training data, testing data and validation data are been shown below for the decision tree model that has been built.

Training Data:

The tree is built up like this with the training dataset. We are training the tree with this training data and then we are going to predict the tree with the test data set.

```
{'XI = 0': [{'XH = 0': [0,
                        {'XB = 0': [0,
                                    {'XN = 0': [0,
                                                {'XK = 0': [0,
                                                            {'XC = 0': [1,
                                                                0]]}}]]}],
{'XH = 0': [{'XP = 0': [0,
                        {'XT = 0': [0,
                                    {'XG = 0': [{'XK = 0': [1, 0]},
                                                  0]]}],
{'XC = 0': [{'XN = 0': [{'XD = 0': [{'XP = 0': [{'XO = 0': [{'XK = 0': [0,
                                                                 1]},
                                                                 0]},
{'XU = 0': [{'XG = 0': [0,
                        1]},
                        0]]}],
{'XB = 0': [{'XL = 0': [0,
                        {'XR = 0': [{'XJ = 0': [1,
                                                {'XF = 0': [0,
                                                                1]]}],
{'XM = 0': [0,
                        {'XE = 0': [1,
                                    0]]}}]]}],
,
{'XQ = 0': [1,
            {'XF = 0': [0,
                        {'XD = 0': [{'XM = 0': [0,
                                                1]},
                        1]]}}]]}],
{'XB = 0': [{'XG = 0': [{'XU = 0': [{'XK = 0': [1,
                                                0]},
                        0]},
                        0]]}],
0]]}}]]}]}
```

Testing Data:

Once the tree is built up, we are going to test the data with the model that is built. And the screenshots for them are as shown below:

```
In [115]: evaluate_test(df_test1,tree)
```

```
Out[115]: {'XH = 0': [{'XP = 0': [0,
    {'XT = 0': [0, {'XG = 0': [{'XK = 0': [1, 0]}, 0]}]}]},
    {'XC = 0': [{'XN = 0': [{'XD = 0': [{'XP = 0': [{'XO = 0': [{'XK = 0': [0,
        1]}],
        1]}],
        0]}],
        0]}],
    {'XU = 0': [{'XG = 0': [0, 1]}, 0]}]},
    {'XB = 0': [{'XL = 0': [0,
        {'XR = 0': [{'XJ = 0': [1, {'XF = 0': [0, 1]}]}],
        {'XM = 0': [0, {'XE = 0': [1, 0]}]}]}]}],
    {'XQ = 0': [1,
        {'XF = 0': [0, {'XD = 0': [{'XM = 0': [0, 1]}, 1]}]}]}]}],
    {'XB = 0': [{'XG = 0': [{'XU = 0': [{'XK = 0': [1, 0]}, 0]}, 0]}, 0]}]}]}
```

Validation Data:

After testing the dataset with the model that we have built, now we are going to validate the dataset with that same decision tree model.

```
In [116]: evaluate_test(df_validation1,tree)
```

```
Out[116]: {'XH = 0': [{'XP = 0': [0,
    {'XT = 0': [0, {'XG = 0': [{'XK = 0': [1, 0]}, 0]}]}]},
    {'XC = 0': [{'XN = 0': [{'XD = 0': [{'XP = 0': [{'XO = 0': [{'XK = 0': [0,
        1]}],
        1]}],
        0]}],
        0]}],
    {'XU = 0': [{'XG = 0': [0, 1]}, 0]}]},
    {'XB = 0': [{'XL = 0': [0,
        {'XR = 0': [{'XJ = 0': [1, {'XF = 0': [0, 1]}]}],
        {'XM = 0': [0, {'XE = 0': [1, 0]}]}]}]}],
    {'XQ = 0': [1,
        {'XF = 0': [0, {'XD = 0': [{'XM = 0': [0, 1]}, 1]}]}]}]}],
    {'XB = 0': [{'XG = 0': [{'XU = 0': [{'XK = 0': [1, 0]}, 0]}, 0]}, 0]}]}]}
```

```
*****
*****
```