

1. Decision Tree in the format provided in (A):

Using Information Gain:

.....Information Gain Decision Tree Printing.....

maintenance = high

| capacity = 2 : no

| capacity = 4 : no

| capacity = 5 : yes

maintenance = low : yes

maintenance = med

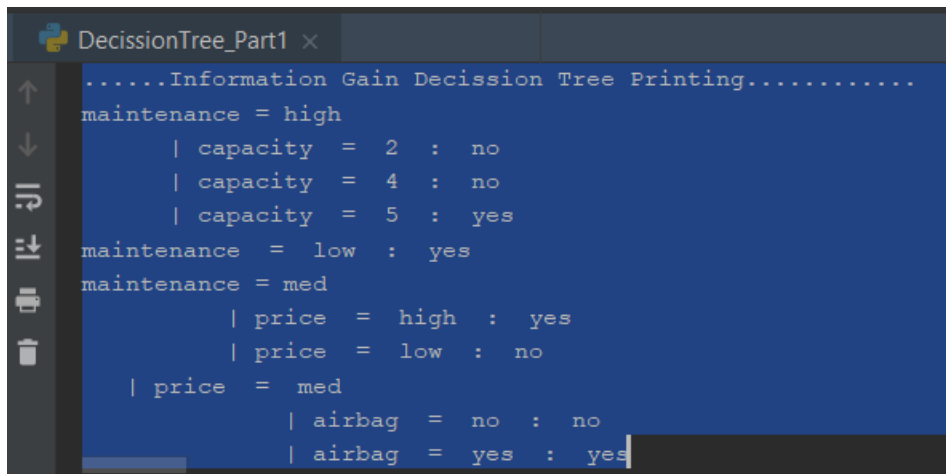
| price = high : yes

| price = low : no

| price = med

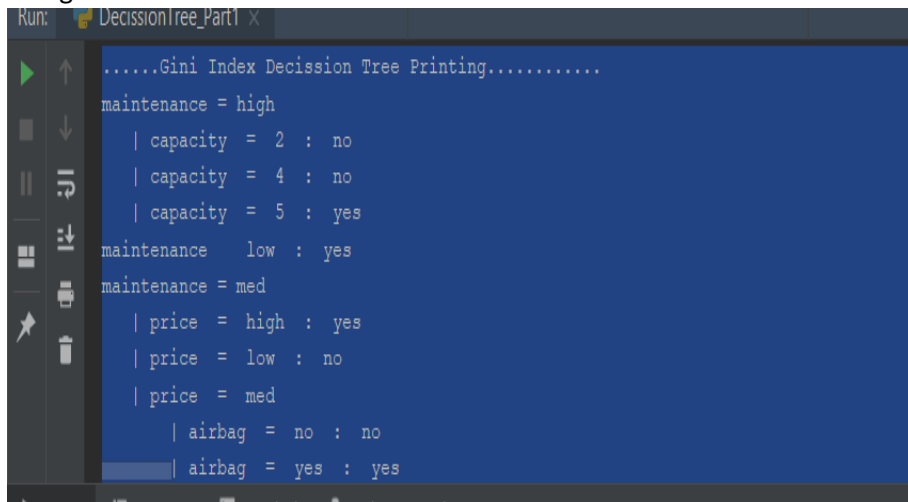
| airbag = no : no

| airbag = yes : yes



```
DecisionTree_Part1 x
.....Information Gain Decision Tree Printing.....
maintenance = high
  | capacity = 2 : no
  | capacity = 4 : no
  | capacity = 5 : yes
maintenance = low : yes
maintenance = med
  | price = high : yes
  | price = low : no
  | price = med
    | airbag = no : no
    | airbag = yes : yes
```

Using Gini Index:



```
Run: DecisionTree_Part1 x
.....Gini Index Decision Tree Printing.....
maintenance = high
  | capacity = 2 : no
  | capacity = 4 : no
  | capacity = 5 : yes
maintenance low : yes
maintenance = med
  | price = high : yes
  | price = low : no
  | price = med
    | airbag = no : no
    | airbag = yes : yes
```

2. The value of Information gain and gini index:

Implemented model:

Information gain of root node = 0.1860635600786077

And the selected root node: maintenance

```
run: DecisionTree_Part1 x
InfoGain Of root node ===== 0.1860635600786077
And the selected root node:: maintenance
```

Gini Index Of root node = 0.38888888888888884

And the selected root node: maintenance

```
GiniIndex Of root node ===== 0.38888888888888884
And the selected root node:: maintenance
```

Sckit learn model:

Information gain of root node = $0.99107606 - 0.8040 = 0.187$

And the selected root node: maintenance

```
)), ('impurity', array([0.99107606, 0.954434, 0., 0.97095059, 0.])
```

Gini Index Of class = 0.49382716

Gini index of root node= 0.389

And the selected root node: maintenance

```
('impurity', array([0.49382716, 0.46875, 0., 0.48, 0.]
```

3. The labels generated on the test data and accuracy on the test data using :

Implemented model:

Label on test data 1 : 2

Label on test data 2 : 1

Test data accuracy: 100%

```
Name: 1, dtype: object is profitable ..
Test Accuracy using Gini== 100.0 %

Test Accuracy using Information Gain== 100.0 %
```

Scikit learn model:

Label on test data 1 : 2

Label on test data 2 : 1

Test data accuracy: 100%

```
Test accuracy Score using Sklearn=== 100.0 %
```