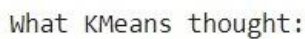


[illegible]
$$\begin{pmatrix}0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 2 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 2 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 2 & 2 & 1 & 1 & 2 & 2 & 2 & 2 & 1 & 2 & 1 & 2 & 1 & 2 & 2 & 2 & 2 & 2 & 1 & 2 & 2 & 2 & 2 \\ 2 & 1 \end{pmatrix}$$

Confusion Matrix for KMeans is

$$\begin{bmatrix} 50 & 0 & 0 \\ 0 & 48 & 2 \\ 0 & 14 & 36 \end{bmatrix}$$

	Sepal_Length	Sepal_Width	Petal_Length	Petal_Width
2	-1.385353	0.328414	-1.397064	-1.315444
118	2.249683	-1.052767	1.785832	1.448832
66	-0.294842	-0.131979	0.421734	0.395774
130	1.886180	-0.592373	1.331133	0.922303
61	0.068662	-0.131979	0.251221	0.395774

HEURISTIC VALUES	: {'A': 1, 'B': 6, 'C': 12, 'D': 10, 'E': 4, 'F': 4, 'G': 5, 'H': 7}
SOLUTION GRAPH	: {}
PROCESSING NODE	: A

HEURISTIC VALUES	: {'A': 11, 'B': 6, 'C': 12, 'D': 10, 'E': 4, 'F': 4, 'G': 5, 'H': 7}
SOLUTION GRAPH	: {}
PROCESSING NODE	: D

HEURISTIC VALUES	: {'A': 11, 'B': 6, 'C': 12, 'D': 10, 'E': 4, 'F': 4, 'G': 5, 'H': 7}
SOLUTION GRAPH	: {}
PROCESSING NODE	: A

HEURISTIC VALUES	: {'A': 11, 'B': 6, 'C': 12, 'D': 10, 'E': 4, 'F': 4, 'G': 5, 'H': 7}
SOLUTION GRAPH	: {'E': []}
PROCESSING NODE	: D

HEURISTIC VALUES	: {'A': 11, 'B': 6, 'C': 12, 'D': 6, 'E': 0, 'F': 4, 'G': 5, 'H': 7}
SOLUTION GRAPH	: {'E': []}
PROCESSING NODE	: A

HEURISTIC VALUES	: {'A': 7, 'B': 6, 'C': 12, 'D': 6, 'E': 0, 'F': 4, 'G': 5, 'H': 7}
SOLUTION GRAPH	: {'E': []}
PROCESSING NODE	: F

HEURISTIC VALUES	: {'A': 7, 'B': 6, 'C': 12, 'D': 6, 'E': 0, 'F': 0, 'G': 5, 'H': 7}
SOLUTION GRAPH	: {'E': [], 'F': []}
PROCESSING NODE	: D

HEURISTIC VALUES	: {'A': 7, 'B': 6, 'C': 12, 'D': 2, 'E': 0, 'F': 0, 'G': 5, 'H': 7}
SOLUTION GRAPH	: {'E': [], 'F': [], 'D': ['E', 'F']}
PROCESSING NODE	: A

FOR GRAPH SOLUTION, TRAVERSE THE GRAPH FROM THE START NODE: A	

{ 'E': [], 'F': [], 'D': ['E', 'F'], 'A': ['D'] }	

Maximally specific hypotheses - S

Maximally general hypotheses - G

S[0]: {'0', '0', '0', '0', '0', '0'}

G[0]: {'?', '?', '?', '?', '?', '?'}

S[1]: {'0', '0', '0', '0', '0', '0'}

G[1]: {'?', '?', 'normal', '?', '?', '?'}, ('?', 'warm', '?', '?', '?', '?'), ('?', '?', '?', '?', 'cool', '?'), ('rainy', '?', '?', '?', '?', '?'), ('?', '?', 'high', '?', '?', '?'), ('?', '?', '?', '?', 'warm', '?'), ('sunny', '?', '?', '?', '?', '?'), ('?', '?', '?', '?', '?', 'change'), ('?', '?', '?', 'strong', '?', '?'), ('?', '?', '?', '?', 'same'), ('?', 'cold', '?', '?', '?', '?')

we are in [('0', '0', '0', '0', '0', '0')]

S[2]: {'sunny', 'warm', 'normal', 'strong', 'warm', 'same'}

G[2]: {'?', '?', 'normal', '?', '?', '?'}, ('?', 'warm', '?', '?', '?', '?'), ('?', '?', '?', '?', 'warm', '?'), ('sunny', '?', '?', '?', '?', '?'), ('?', '?', '?', '?', '?', 'same'), ('?', '?', '?', 'strong', '?', '?')

we are in [('sunny', 'warm', 'normal', 'strong', 'warm', 'same')]

S[3]: {'sunny', 'warm', '?', 'strong', 'warm', 'same'}

G[3]: {'?', 'warm', '?', '?', '?', '?'}, ('?', '?', '?', '?', 'warm', '?'), ('sunny', '?', '?', '?', '?', '?'), ('?', '?', '?', '?', '?', 'same'), ('?', '?', '?', 'strong', '?', '?')

S[4]: {'sunny', 'warm', '?', 'strong', 'warm', 'same'}

G[4]: {'?', 'warm', '?', '?', '?', '?'}, ('sunny', '?', '?', '?', '?', '?'), ('?', '?', '?', '?', '?', 'same')

we are in [('sunny', 'warm', '?', 'strong', 'warm', 'same')]

S[5]: {'sunny', 'warm', '?', 'strong', '?', '?'}

G[5]: {'sunny', '?', '?', '?', '?', '?'}, ('?', 'warm', '?', '?', '?', '?')

AO*, Candidate

```
[[ 'sunny', 'hot', 'high', 'weak', 'no'], [ 'sunny', 'hot', 'high', 'strong', 'no'], [ 'overcast', 'hot', 'high', 'weak', 'yes'], [ 'rain', 'mild', 'high', 'weak', 'yes'], [ 'rain', 'cool', 'normal', 'weak', 'yes'], [ 'rain', 'cool', 'normal', 'strong', 'no'], [ 'overcast', 'cool', 'normal', 'strong', 'yes'], [ 'sunny', 'mild', 'high', 'weak', 'no'], [ 'sunny', 'cool', 'normal', 'weak', 'yes'], [ 'rain', 'mild', 'normal', 'weak', 'yes'], [ 'sunny', 'mild', 'normal', 'strong', 'yes'], [ 'overcast', 'mild', 'high', 'strong', 'yes'], [ 'overcast', 'hot', 'normal', 'weak', 'yes'], [ 'rain', 'mild', 'high', 'strong', 'no']] [ 'Outlook', 'Temperature', 'Humidity', 'Wind', 'Target']
```

The decision tree for the dataset using ID3 algorithm is

```
Outlook
sunny
  Humidity
    high
    no
    normal
    yes
overcast
  yes
rain
  Wind
    weak
    yes
    strong
    no
```

The test instance : ['rain', 'cool', 'normal', 'strong']

The predicted label : no

The test instance : ['sunny', 'mild', 'normal', 'strong']

The predicted label : yes

ID3

Input:

```
[[0.66666667 1.
 0.33333333 0.55555556]
 [1.
 0.66666667]]
```

Actual Output:

```
[[0.92]
 [0.86]
 [0.89]]
```

Predicted Output:

```
[[0.89783178]
 [0.88044121]
 [0.89139759]]
```

ANN

```

Iris Data set loaded...
Dataset is split into training and testing...
Size of training data and its label (135, 4) (135,)
Size of testing data and its label (15, 4) (15,)
Label 0 - setosa
Label 1 - versicolor
Label 2 - virginica
Results of Classification using K-nn with K=5
Sample: [5.4 3.4 1.7 0.2] Actual-label: 0 Predicted-label: 0
Sample: [6. 2.2 5. 1.5] Actual-label: 2 Predicted-label: 1
Sample: [5.5 2.4 3.7 1. ] Actual-label: 1 Predicted-label: 1
Sample: [7.7 2.8 6.7 2. ] Actual-label: 2 Predicted-label: 2
Sample: [6.7 3. 5. 1.7] Actual-label: 1 Predicted-label: 1
Sample: [5. 3.6 1.4 0.2] Actual-label: 0 Predicted-label: 0
Sample: [6.2 2.9 4.3 1.3] Actual-label: 1 Predicted-label: 1
Sample: [5.8 2.7 5.1 1.9] Actual-label: 2 Predicted-label: 2
Sample: [6.7 3.1 4.4 1.4] Actual-label: 1 Predicted-label: 1
Sample: [5. 3.3 1.4 0.2] Actual-label: 0 Predicted-label: 0
Sample: [5. 2.3 3.3 1. ] Actual-label: 1 Predicted-label: 1
Sample: [5.6 2.8 4.9 2. ] Actual-label: 2 Predicted-label: 2
Sample: [4.5 2.3 1.3 0.3] Actual-label: 0 Predicted-label: 0
Sample: [5.6 3. 4.1 1.3] Actual-label: 1 Predicted-label: 1
Sample: [6.3 3.3 6. 2.5] Actual-label: 2 Predicted-label: 2
Classification Accuracy : 0.9333333333333333
Confusion Matrix
[[4 0 0]
 [0 6 0]
 [0 1 4]]
Accuracy Metrics

```

	precision	recall	f1-score	support
0	1.00	1.00	1.00	4
1	0.86	1.00	0.92	6
2	1.00	0.80	0.89	5
accuracy			0.93	15
macro avg	0.95	0.93	0.94	15
weighted avg	0.94	0.93	0.93	15

KNN