



Artificial Intelligence

Spring 2025

LAB # 12

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Batch: BSCS-6

Question 01:

Decision Tree Algorithm:

Train a decision tree to predict whether a student will **Pass (1)** or **Fail (0)** based on their study habits. The dataset is given below

Hours_Studied	Sleep_Hours	Tuition_Attended	Pass
2	5	0	0
4	6	1	1
1	4	0	0
5	7	1	1
3	6	0	0
6	8	1	1
4	5	1	1
2	6	0	0

- Use this dataset in your code as features X and labels Y.
- Train a Decision Tree Classifier.
- Predict the result for a new student who:
 - Studied 3 hours
 - Slept 7 hours
 - Did attend tuition (Tuition_Attended = 1)
- Show the application and decision tree diagram.
- Visualize the decision tree.

```
import pandas as pd
from sklearn.tree import DecisionTreeClassifier, plot_tree
import matplotlib.pyplot as plt

data = {
    'Hours_Studied': [2, 4, 1, 5, 3, 6, 4, 2],
    'Sleep_Hours': [5, 6, 4, 7, 6, 8, 5, 6],
    'Tuition_Attended': [0, 1, 0, 1, 0, 1, 1, 0],
    'Pass': [0, 1, 0, 1, 0, 1, 1, 0]
}

df = pd.DataFrame(data)
```

```

X = df[['Hours_Studied', 'Sleep_Hours', 'Tuition_Attended']]
y = df['Pass']

model = DecisionTreeClassifier()
model.fit(X, y)

new_student = [[3, 7, 1]]
prediction = model.predict(new_student)
result = "Pass" if prediction[0] == 1 else "Fail"
print(f"Prediction for new student: {result}")

plt.figure(figsize=(10, 6))
plot_tree(model, feature_names=X.columns, class_names=["Fail", "Pass"],
          filled=True)
plt.title("Decision Tree for Student Performance")
plt.show()

```

C:\Users\MASTERCOMPUTERS\PycharmProject

```

warnings.warn(
    Prediction for new student: Fail
)

```

Decision Tree for Student Performance

