III B.Tech – II Semester
(23E05601L) MACHINE LEARNING LAB

Experiment No: 11

AIM

To demonstrate the **Multi-Layer Perceptron (MLP)** algorithm for a classification problem.

THEORY

What is an MLP?

MLP (Multi-Layer Perceptron) is a type of **Artificial Neural Network** consisting of:

- Input layer
- One or more hidden layers
- Output layer

Key Features:

- Uses weighted neurons
- Learns using backpropagation
- Can model complex patterns
- Supports classification & regression

Activation Functions:

- Sigmoid
- ReLU
- Tanh
- Softmax

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Advantages

✓ Works for non-linear and complex data
✓ Supports multi-class classification
✓ Can approximate any function

Disadvantages

✗ Requires more training time
✗ Needs tuning & larger dataset
✗ Not interpretable like decision trees

USE CASE

Predict a student's **admission status** (admitted or not) based on:

- CGPA
- Internship experience
- Entrance exam score

CODE

```
import pandas as pd
from sklearn.tree import DecisionTreeClassifier, plot_tree
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score
import matplotlib.pyplot as plt

# Load dataset
df = pd.read_csv("exp11_decision_tree.csv")
print(df)

X = df[["Hours_Studied", "Previous_Score"]]
y = df["Pass"]

# Split data
X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.3, random_state=0
)
```

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```
# Train model
model = DecisionTreeClassifier(criterion="entropy", max_depth=3)
model.fit(X_train, y_train)

# Predict
pred = model.predict(X_test)
print("Predictions:", pred)

# Accuracy
print("Accuracy:", accuracy_score(y_test, pred))

# Plot tree
plot_tree(model, filled=True, feature_names=["Hours_Studied",
"Previous_Score"])
plt.show()
```

OUTPUT

```
Predicted: [1, 1, 0]
Actual: [1, 1, 0]
Accuracy: 1.0
```

Hours_Studied	Previous_Score	Pass
1	30	0
2	35	0
3	40	0
4	45	0
5	50	0
6	55	1
7	60	1
8	65	1
9	70	1
10	80	1