**Name: Aditee Mohanty**

**Class: CSE(AI) B div**

**Roll no.: 282023**

**PRN No.: 22310631**

**Subject: Machine Learning**

**Assignment 7 – Admission Prediction using Decision Tree Classifier**

**Objective**

Build a classification model using **Decision Tree** to help counselors predict if a student will be **admitted (1)** or **not admitted (0)** to a foreign university based on **GRE**, **TOEFL**, and other academic scores.

**Dataset Description**

The dataset contains the following features:

* **GRE Score (out of 340)**
* **TOEFL Score (out of 120)**
* **University Rating (out of 5)**
* **SOP (Statement of Purpose strength) (out of 5)**
* **LOR (Letter of Recommendation strength) (out of 5)**
* **CGPA (Undergrad GPA out of 10)**
* **Research (0=no, 1=yes)**
* **Chance of Admit (0–1)** – **Target Variable**, converted to binary (0: Not Admitted, 1: Admitted)

**1. Data Preprocessing**

* Dataset loaded using pandas.
* Checked for missing values – **None found**.
* Renamed columns to remove whitespace for easier access.
* Converted **Chance of Admit** to binary:
  + < 0.8 → 0 (Not Admitted)
  + ≥ 0.8 → 1 (Admitted)

**2. Data Preparation**

* Dropped irrelevant columns like Serial No..
* Defined:
  + X: Independent features
  + y: Target variable (Chance of Admit)
* Applied **train-test split** (75% training, 25% testing).

**3. Machine Learning Model**

* Used DecisionTreeClassifier from sklearn.tree.
* Trained model on training data using .fit() method.
* Predicted on test data using .predict() method.

**4. Model Evaluation**

| **Metric** | **Value** |
| --- | --- |
| **Confusion Matrix** | Printed in output |
| **Accuracy Score** | metrics.accuracy\_score |
| **Precision Score** | metrics.precision\_score |
| **Recall Score** | metrics.recall\_score |
| **F1 Score** | metrics.f1\_score |

These metrics help understand the model’s predictive performance and how well it distinguishes between admitted and not admitted students.

**5. Visualization**

The decision tree was visualized using plot\_tree() from sklearn.tree, which shows the feature splits and decision paths clearly.

**Conclusion**

The Decision Tree model provided an interpretable and efficient way to predict student admissions based on standardized scores and profile strength. It can help university counselors make informed decisions. To further improve prediction performance, advanced models like **Random Forest**, **Gradient Boosting**, or **XGBoost** can be explored.