✅ Task 8: Decision Tree – Bank Marketing Subscription Prediction

Dataset:
- Primary: UCI Bank Marketing Dataset
- Alternative: Kaggle Bank Marketing Dataset

Tools:
- Python
- Scikit-learn
- Matplotlib / Graphviz
- Alternatives: Weka, Orange Tool

Hints / Mini Guide:

1. Load the dataset and check which features relate to customer subscription behavior.
2. Handle missing values or unknown categories and clean inconsistent text values.
3. Encode all categorical features using OneHotEncoding or LabelEncoding.
4. Split dataset into train-test sets with a fixed random_state.
5. Train Decision Tree Classifier and limit max_depth to avoid overfitting.
6. Visualize the tree using plot_tree() so splits are understandable.
7. Predict on test data and generate classification report.
8. Compare train accuracy vs test accuracy to detect overfitting issues.
9. Write 3 key rules from the decision tree that explain subscription behavior.

Deliverables:

- Notebook
- Tree visualization image
- Evaluation report

Final Outcome:
- Intern gains skill in interpretable ML using decision rules.

Interview Questions Related To Above Task:

- Why Decision Trees overfit?
- What is max_depth?
- What is Gini Impurity?
- What is pruning?
- What is decision boundary?

📌 **Task Submission Guidelines**

- ⏰ **Time Window:**

Youcan complete the task anytime between 10:00 AM to 10:00 PM on the given day. Submission link closes at 10:00 PM

- 🔍 **Self-Research Allowed:**

Youare free to explore, Google, or refer to tutorials to understand concepts and complete the task effectively.

- 🛠️ **Debug Yourself:**

Tryto resolve all errors by yourself. This helps you learn problem-solving and ensures you don't face the same issues in future tasks.

- 💸 **No Paid Tools:**

Ifthe task involves any paid software/tools, do not purchase anything. Just learn the process or find free alternatives.

- 📁 **GitHub Submission:**

Create a new GitHub repository for each task.
Add everything you used for the task — code, datasets, screenshots (if any), and a short README.md explaining what you did.

📤 **Submit Here:**

After completing the task, paste your GitHub repo link and submit it using the link below:

- 👉 [Submission Link]