**Task 3: Decision Tree Classifier**

**Overview**

In this task, I built a decision tree classifier to predict whether a customer will purchase a product or service based on their demographic and behavioural data using the Bank Marketing dataset from the UCI Machine Learning Repository.

**Dataset**

The dataset used for this analysis includes the following columns:

* **age**: Age of the customer
* **job**: Type of job
* **marital**: Marital status
* **education**: Level of education
* **default**: Whether the customer has credit in default
* **balance**: Average yearly balance in euros
* **housing**: Whether the customer has a housing loan
* **loan**: Whether the customer has a personal loan
* **contact**: Type of communication used
* **day**: Last contact day of the month
* **month**: Last contact month of the year
* **duration**: Duration of the last contact in seconds
* **campaign**: Number of contacts performed during this campaign
* **pdays**: Days since the client was last contacted
* **previous**: Number of contacts performed before this campaign
* **poutcome**: Outcome of the previous marketing campaign
* **y**: Target variable indicating if the customer subscribed to a term deposit

**Implementation Steps**

1. **Data Loading**: The dataset was loaded successfully, confirming the absence of any loading errors.
2. **Data Cleaning**: Checked for missing values, ensuring data integrity.
3. **Model Training**: A decision tree classifier was trained using the cleaned dataset.
4. **Model Evaluation**:
   * **Confusion Matrix**: Provided insights into the model's performance regarding true positives, false positives, true negatives, and false negatives.
   * **Classification Report**: Offered metrics including precision, recall, F1-score, and overall accuracy.

**Results**

* **Confusion Matrix**:
* [[11086 880]
* [ 856 742]]
* **Classification Metrics**:
  + Precision (Purchased): 0.46
  + Recall (Purchased): 0.46
  + F1-Score (Purchased): 0.46
  + Overall Accuracy: 0.87

**Conclusion**

The decision tree classifier demonstrated a high overall accuracy of 87%. However, the model struggled with predicting purchases, as indicated by the lower precision and recall for the "purchased" class. Further tuning and exploring additional algorithms may enhance predictive performance.