Decision Tree Classifier Result

Out put
Prediction: Purchased = 1, Not Purchased = 0.

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	precision	recall	f1-score	support
0	0.96	0.90	0.93	79
1	0.83	0.93	0.87	41
accuracy			0.91	120
macro avg	0.89	0.91	0.90	120
weighted avg	0.91	0.91	0.91	120

Purchased , Class 1

- **How many are correctly predicted as purchased?**
  Precision = 0.83
  → Out of all predicted "Purchased", **83% were actually Purchased**.

- **How many are completely identified as purchased?**
  Recall = 0.93
  → Out of all actual "Purchased" cases, the model correctly identified **93%**.

- **What is the balance between correctness and completeness for purchased?**
  F1-score = 0.87
  → Good balance between catching most Purchases (high Recall) and not making too many false alarms.

- **Support = 41**
  → There were **41 actual "Purchased" cases** in the test set.

Not Purchased, Class 0

- **How many are correctly predicted as not purchased?**
  Model Precision = 0.96
  → Out of all predicted "Not Purchased", **96% were correct**.

- **How many are completely identified as not purchased?**
  Recall = 0.90
  → Out of all actual "Not Purchased", the model caught **90%** of them.

- **What is the balance between correctness and completeness for not purchased?**
  F1-score = 0.93
  → Balance between Precision & Recall.

- **Support = 79**
  → There were **79 actual "Not Purchased" cases** in the test set.

📊 Overall Metrics

How many total predictions are correct overall?

Accuracy = 0.91 (91%)

→ The model predicted correctly in **91% of the 120 cases**.

What is the average performance across both classes, treating them equally?

👉 **Macro Avg**

- **Precision = 0.89** → On average, **89% of predicted Purchased/Not Purchased cases were correct**.
- **Recall = 0.91** → On average, the model correctly identified **91% of actual Purchased/Not Purchased cases**.
- **F1-score = 0.90** → Overall, the model maintained a **good balance between correctness and completeness** across both classes. ✅

What is the average performance across both classes, considering their proportion (support)?

👉 **Weighted Avg**

- **Precision = 0.91** → Taking class sizes into account, **91% of predicted Purchased/Not Purchased cases were correct**.
- **Recall = 0.91** → On average, the model correctly identified **91% of actual Purchased/Not Purchased cases**, weighted by class frequency.
- **F1-score = 0.91** → Overall, the model achieved a **balanced correctness and completeness**, adjusted for class distribution. ✅

🔎 Interpretation

- The model performs **very well overall** (91% accuracy).
- For **class 0 (Not Purchased)** → higher precision (0.96) but slightly lower recall (0.90).
- For **class 1 (Purchased)** → higher recall (0.93) but lower precision (0.83).
    - Meaning: it catches most buyers, but sometimes wrongly predicts a non-buyer as a buyer.
