

# Telecom Customer Churn – Executive Summary

Business Overview • Modeling &  
Evaluation • Recommendations

# Overview — Business & Data Understanding

- Business Problem: High Customer churn rate.
- Why it matters: gain insight into reducing churn rate or attempt to gain new customers.  
Which one is more cost effective.
- Dataset: Size. customers with usage, plan, and service interaction features.

# Data Profile – Churn Distribution

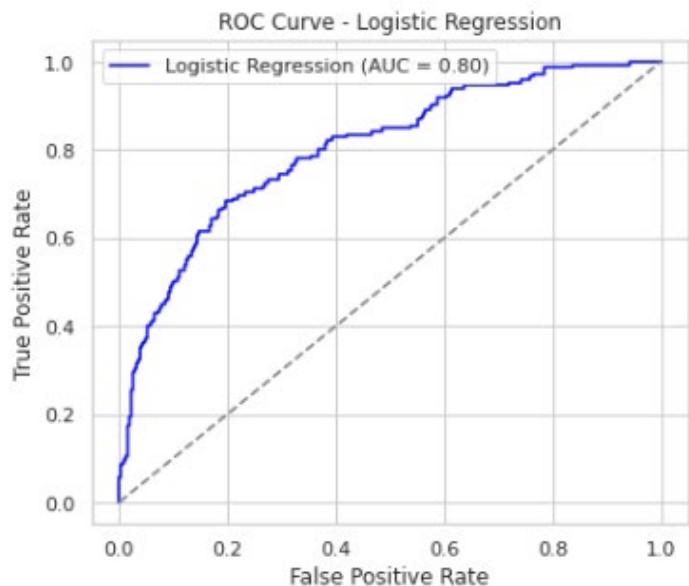
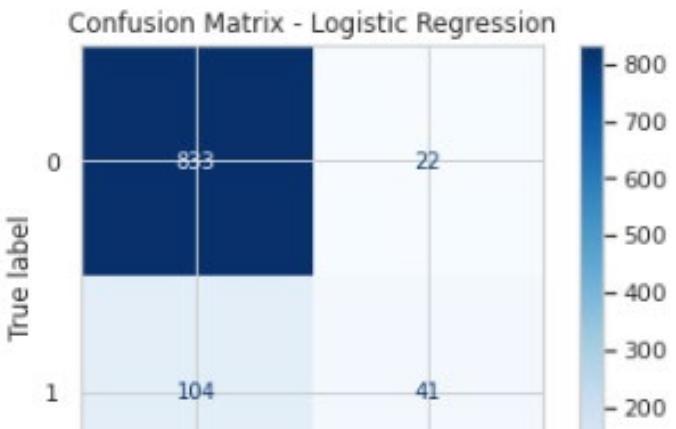
- Churn rate and imbalance:
  - Non-churn: 2850 customers (0.855)
  - Churn: 483 customers (0.145)
- Implication: Precision/Recall/F1 and ROC-AUC are used alongside Accuracy.

# Modeling Approach

- Pipeline: Clean → Encode (OneHot) → Scale (numeric) → Train → Evaluate.
- Baseline: Logistic Regression to benchmark performance.
- Tree-based modeling: Decision Tree (baseline and tuned via GridSearchCV).
- Metrics reported: Accuracy, Precision, Recall, F1, ROC-AUC.

# Baseline – Logistic Regression

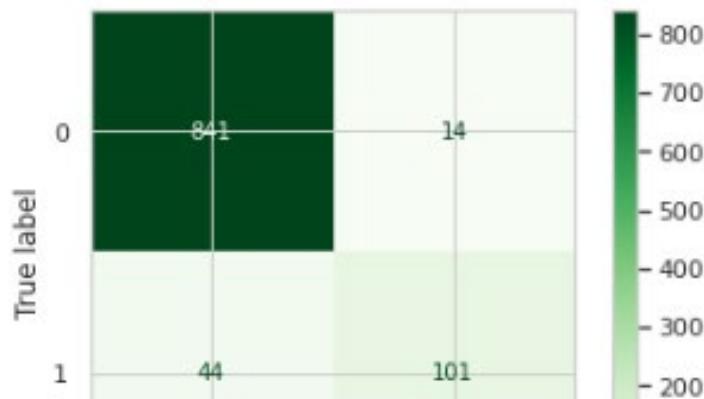
- Performance (Test Set)
  - Accuracy: 0.874
  - Precision: 0.651
  - Recall: 0.283
  - F1: 0.394
  - ROC-AUC: 0.803



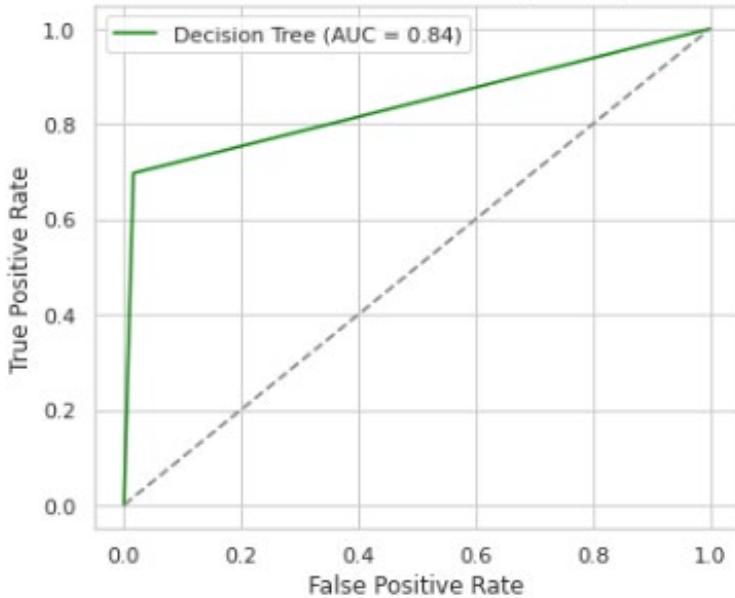
# Decision Tree – Baseline

- Performance (Test Set)
  - Accuracy: 0.942
  - Precision: 0.878
  - Recall: 0.697
  - F1: 0.777
  - ROC-AUC: 0.840

Confusion Matrix - Decision Tree (Baseline)

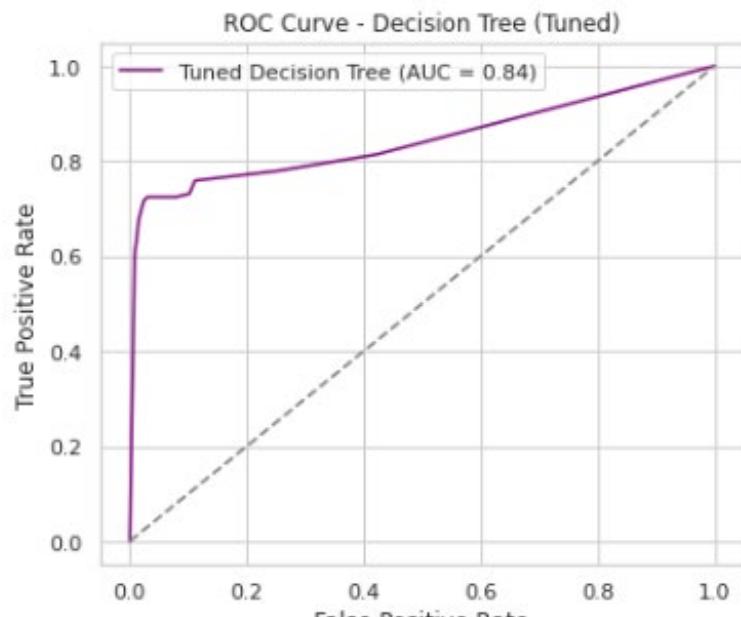
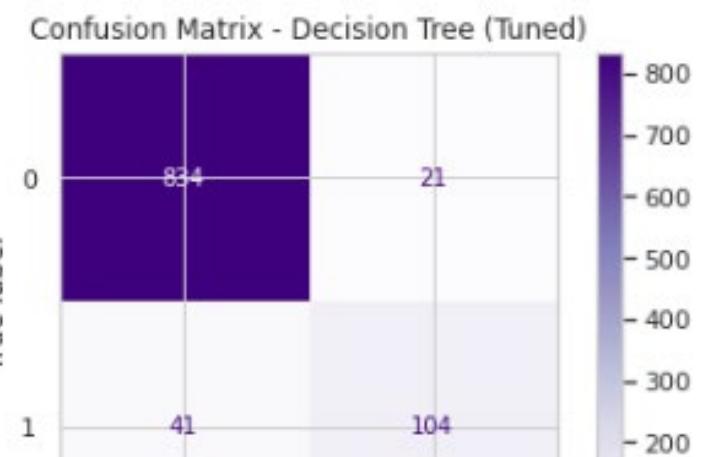


ROC Curve - Decision Tree (Baseline)

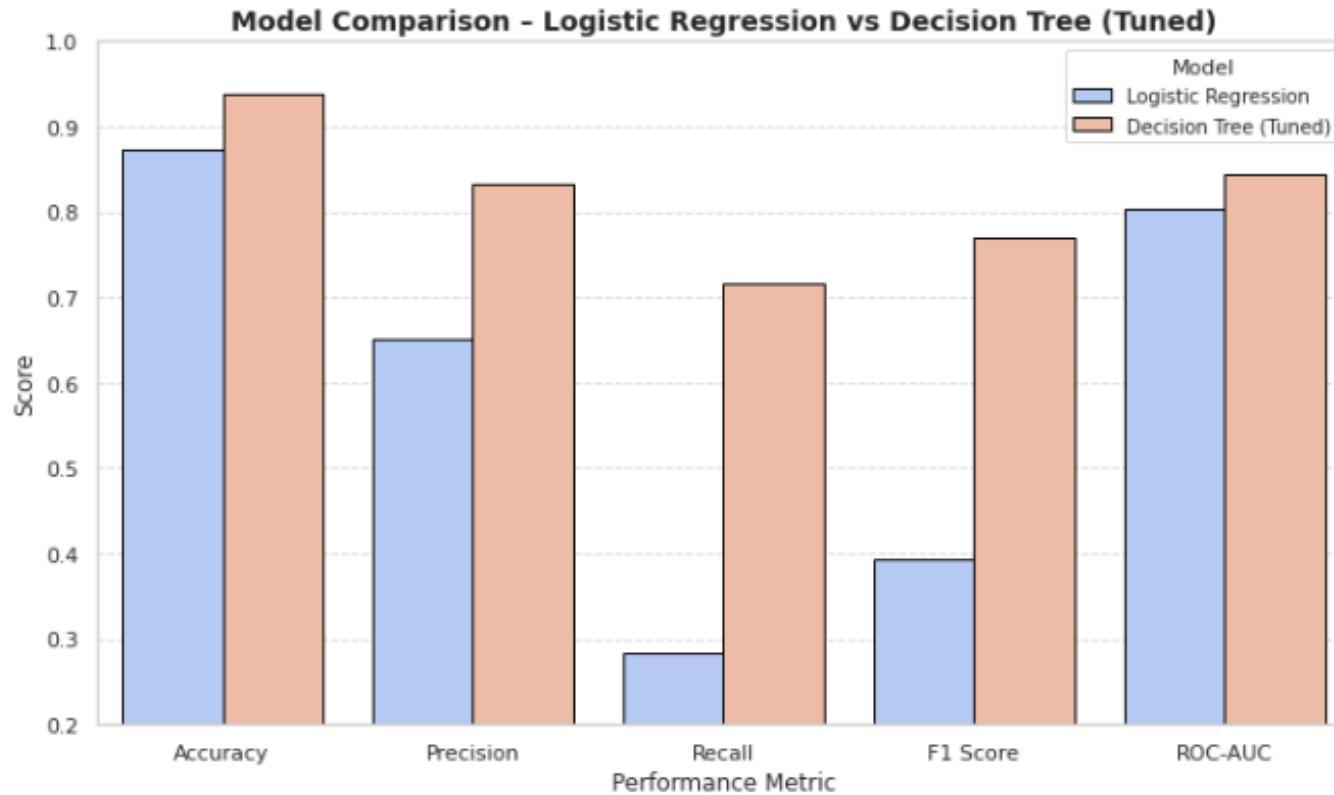


# Decision Tree — Tuned (GridSearchCV)

- Performance (Test Set)
  - Accuracy: 0.938
  - Precision: 0.832
  - Recall: 0.717
  - F1: 0.770
  - ROC-AUC: 0.844



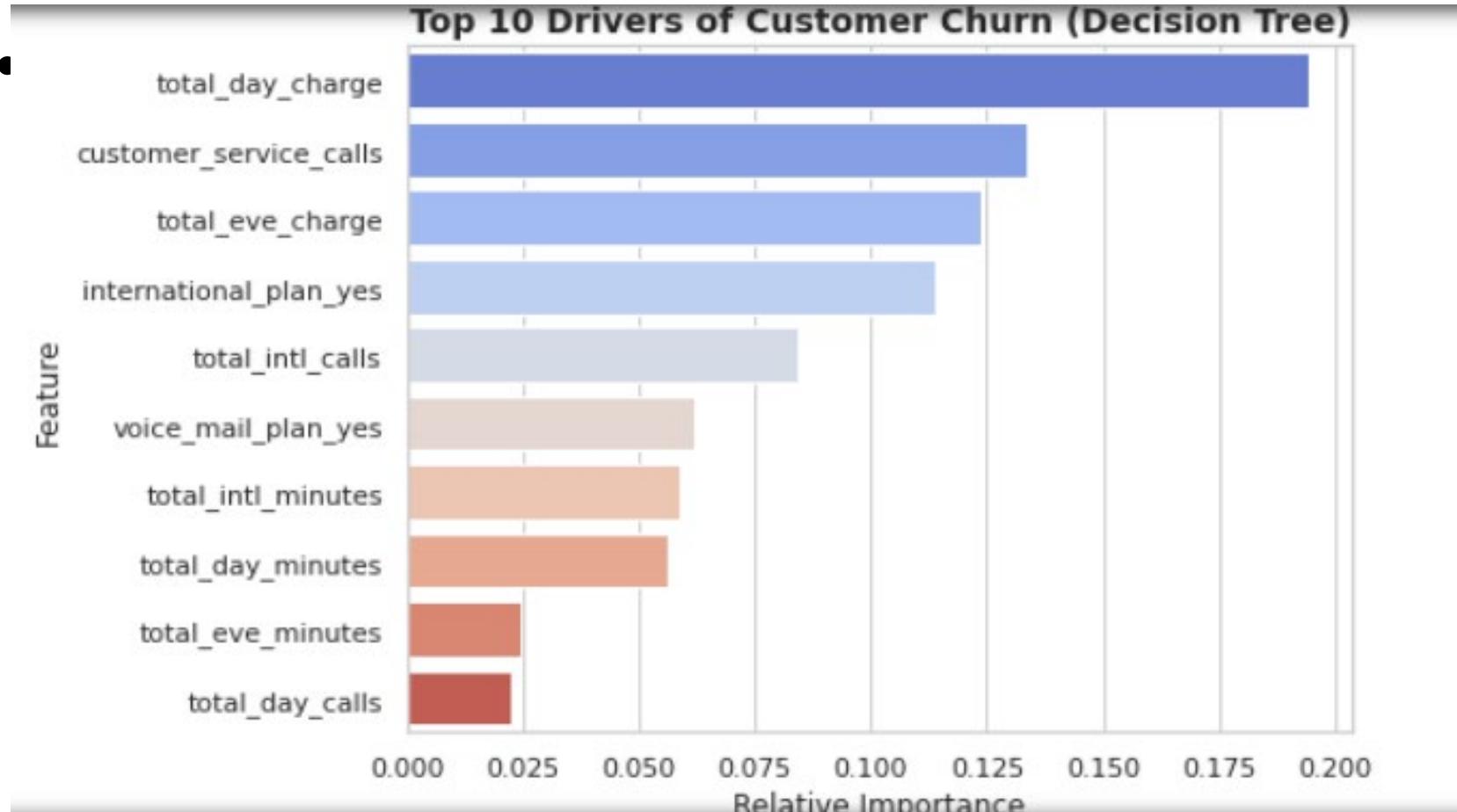
# Model Comparison – Results & Interpretation



**== Interpretation ==**

- Logistic Regression performs better on Precision and F1, indicating fewer false positives but weaker recall.
- Decision Tree (Tuned) improves Recall and ROC-AUC, showing stronger sensitivity in identifying churners.
- The trade-off is typical: Decision Tree captures more churners (better recall) but slightly sacrifices precision.
- Overall, for business use, the Tuned Decision Tree offers better balance – ideal for proactive churn prevention.

# Insights — Top Drivers of Churn (Decision Tree)



# Recommendations & Next Steps

- Target high-risk segments with tailored offers (contract upgrade incentives, discounts).
- Prioritize customers with frequent support calls; reduce resolution times & repeat issues.
- Review pricing/experience for international plan users and high-usage customers.
- Operationalize: Monthly risk scoring; A/B-test outreach; track Churn, Offer Uptake, Revenue Retained.