Customer Churn Prediction Project

Report Jared Ateka

2/13/2026

MACHINE LEARNING CLASSIFICATION ANALYSIS

PREPARED FOR PRESENTATION

Problem Statement

Objective:

▶ Predict whether a customer will churn (1) or not churn (0).

Business Goal:

▶ Identify customers likely to leave and take proactive retention actions.

Dataset Overview

- Total Test Samples: 667

- Class 0 (No Churn): 570

- Class 1 (Churn): 97
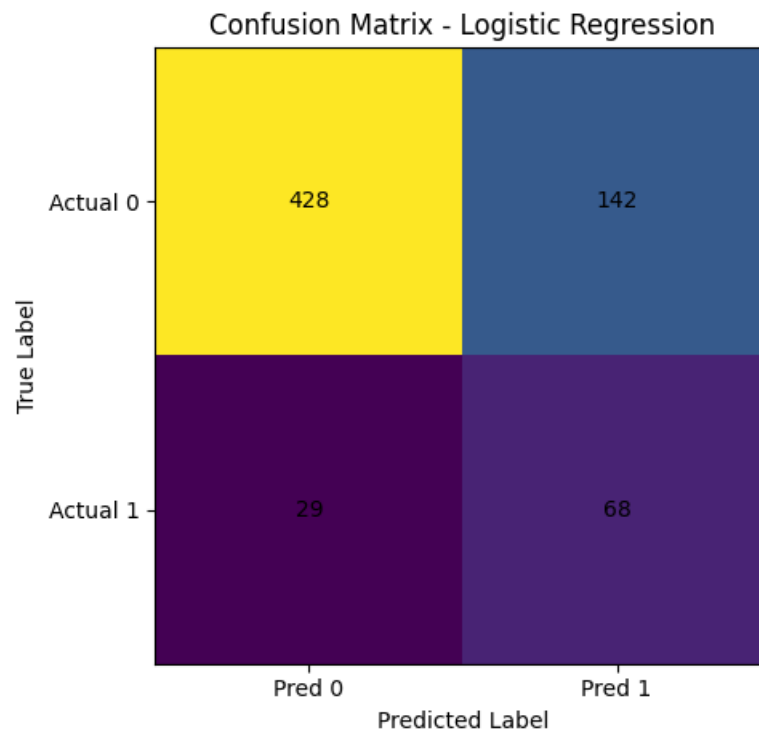
Note: Dataset is imbalanced (fewer churn cases).

Models Compared

1. Logistic Regression

2. Confusion Matrix

Evaluation Metrics:

- Accuracy

- Precision

- Recall

- F1 Score

Confusion Matrix - Logistic Regression

Confusion Matrix - Logistic Regression

Logistic Regression Results

Accuracy: 0.7466

Class 0 (No Churn):

- Precision: 0.94
- Recall: 0.75
- F1 Score: 0.84

Class 1 (Churn):

- Precision: 0.33
- Recall: 0.70
- F1 Score: 0.45

Interpretation of Results

- ▶ Accuracy (75%):
- ▶ Model correctly predicts 75% of customers overall.

- ▶ High Recall (0.70) for churn:
- ▶ Model detects 70% of actual churn customers.

- ▶ Low Precision (0.33) for churn:
- ▶ Many customers predicted as churn are actually not churn.

Business Interpretation

Pros:

• Good at catching churn customers (high recall).

• Suitable when missing a churn customer is costly.

Cons:

• Many false alarms (low precision).

• Retention resources may be wasted on non-churn customers.

Model Comparison Insight

Logistic Regression:

- Better recall for churn.

- Simpler and more interpretable.

Random Forest:

- Often higher overall accuracy.

- May balance precision and recall better.

Choice depends on business objective.

Recommendation

If business priority is to minimize churn loss:

→ Use Logistic Regression (higher recall).

If priority is reducing false positives:

→ Tune threshold or consider Random Forest.

Further improvement:

- Handle class imbalance (SMOTE)
- Hyperparameter tuning
- Cross-validation

Conclusion

- Model successfully predicts churn patterns.
- Recall is strong for churn detection.
- Precision needs improvement.

- Next Steps:
- Model optimization and deployment preparation.