

Churn Prediction Model Evaluation Report

1. Overview

This report presents the evaluation of three machine learning models (Decision Tree, Naive Bayes, KNN) on three variations of the dataset: Cleaned, Standardized, and Normalized. Each model was trained using SMOTE for class balancing and evaluated using Accuracy, Precision, Recall, F1-score, and ROC-AUC. Hyperparameter tuning was applied to Decision Tree and KNN using GridSearchCV.

2. Top Performing Models

Model	Dataset	Accuracy	F1-score	ROC-AUC	Best Params
Decision Tree	Cleaned	0.8290	0.8744	0.8085	{'criterion': 'gini', 'max_depth': 10}
Decision Tree	Standardized	0.8305	0.8736	0.8192	{'criterion': 'entropy', 'max_depth': 10}
Decision Tree	Normalized	0.8263	0.8706	0.8140	{'criterion': 'gini', 'max_depth': 10}
Naive Bayes	Cleaned	0.8220	0.8702	0.7959	Default
Naive Bayes	Standardized	0.8163	0.8592	0.8187	Default

3. Best Model Details

The best-performing model is a Decision Tree trained on the Cleaned dataset. It achieved an F1-score of 0.8744 and ROC-AUC of 0.8085.

Best Parameters: {'criterion': 'gini', 'max_depth': 10}