

## **TITLE**

# Predicting Customer Churn in the Telecommunications Industry using Machine Learning Techniques

## **ABSTRACT**

In the telecommunications industry, predicting customer churn is a recurring problem that has a big impact on long-term viability, profitability, and competitiveness. The context and research challenges are first described here, which also highlights the sector's growing rivalry and the shortcomings of conventional churn control techniques. This research emphasizes the goals of finding important churn drivers, creating a prediction model based on machine learning models, via assessing various algorithms, and creating a deployable dashboard to help in decision-making. Recent research on churn prediction is combined with theoretical framework like Customer Relationship Management (CRM) in a review of relevant literature. Previous research shows the promise of deep learning and machine learning models, but it also highlights insufficient information in terms of interpretability, profit-sensitive evaluation, and a narrow concentration on telecommunication sectors hence the huge gap between technological customer churn prediction and business insights to inform decision-making. The methodology suggests using secondary public data from a telecommunication provider and adheres to the CRISP-DM framework. Cleaning, feature engineering, addressing class imbalance, and encoding are examples of data preprocessing procedures to be used. In order to improve performance and stakeholder trust, a number of models including Logistic Regression, Decision Trees, Random Forest, K-Nearest Neighbors (KNN), Support Vector Machine (SVM), Naive Bayes (NB) and Gradient Boosting (GB) will be compared. Interpretability approaches like SHapley Additive exPlanations (SHAP) and Local Interpretable Model-agnostic Explanations (LIME) will be used. The creation of a reliable churn prediction system with excellent predictive accuracy, interpretability, and scalability is one of the anticipated results. From an operational point of view, the system will facilitate constant monitoring, efficient resource allocation, and proactive customer retention tactics and strategies. In addition to providing methodological insights that can be applied to other telecommunications, this research offers a deployable and replicable methodology that solves the urgent commercial demand for customer churn reduction.