

# A Survey on Customer Churn Prediction using Machine Learning Techniques

**Ms. Vikas Kumar Kumavat**

Student, Department of MSc. IT

Nagindas Khandwala College, Mumbai, Maharashtra, India

kumavatvikas27@gmail.com

**Abstract:** *Customer churn, where customers leave a bank and stop using its services, is a big challenge for the banking industry. Losing customers affects profitability, retention, and long-term growth. However, with machine learning, banks can predict and reduce churn more effectively.*

*This study analyzes customer churn by looking at key factors like demographics, account details, and engagement. We tested multiple machine learning models—Logistic Regression, Decision Tree, Random Forest, XGBoost, and Support Vector Machine (SVM)—on real customer data. Performance was measured using accuracy, precision, recall, F1-score, and ROC-AUC.*

*Results showed that XGBoost and Random Forest performed best, with XGBoost excelling in F1-score (balancing accuracy and false alarms) and Random Forest being strong in recall (spotting high-risk customers). Key factors influencing churn included account balance, tenure, number of products, and engagement level—customers with low balances, fewer products, and less activity were more likely to leave. These insights help banks take proactive steps to retain customers by offering personalized services and improving satisfaction. This research highlights how machine learning can help banks predict and reduce churn, strengthening customer relationships and long-term success.*

**Keywords:** Customer Churn, Machine Learning, Predictive Analytics, Banking Sector, Customer Retention, Feature Importance.