

Department of Computer Science and Engineering

BANK CUSTOMER CHURN PREDICTION USING MACHINE LEARNING

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Problem Statement and Motivation

Problem statement:

- ❑ Customer churn is a critical concern for banks as retaining customers is more cost-effective than acquiring new ones. Predicting churn helps banks take proactive steps to retain valuable customers.

Motivation:

- ❑ With growing competition in the banking sector, early identification of customers likely to churn allows for timely intervention, enhancing customer satisfaction and loyalty.

Existing System

- ❑ Traditional churn analysis relies on manual methods or simple rule-based approaches.
- ❑ Lacks real-time prediction and accurate churn risk assessment.
- ❑ Limited use of modern ML techniques and visualization tools.

Objectives

- ❑ Develop a machine learning-based system to predict churn.
- ❑ Improve prediction accuracy using Random Forest algorithm.
- ❑ Integrate the model with a user-friendly GUI.
- ❑ Enable banks to make informed decisions to retain customers.

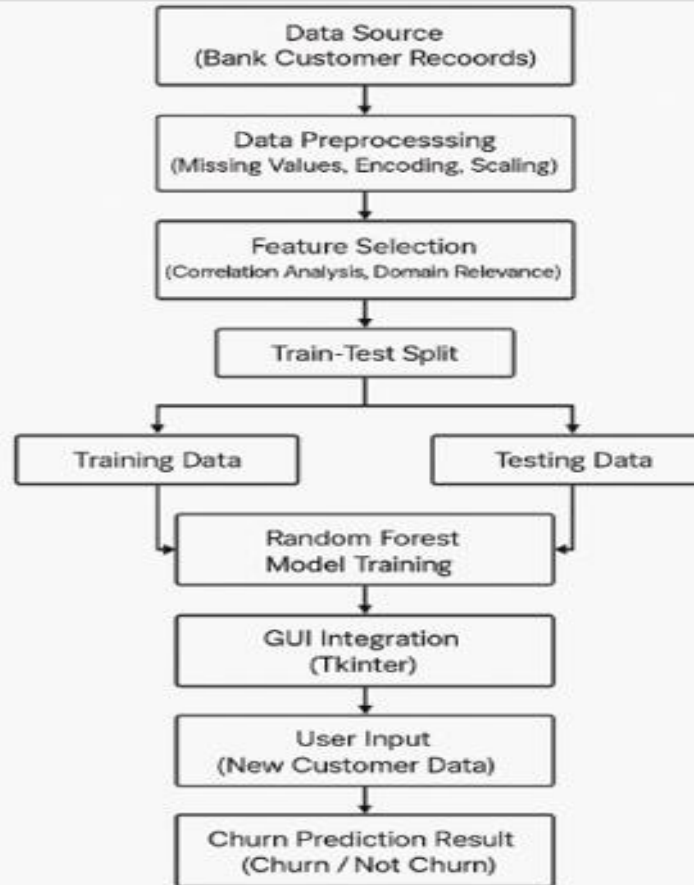
Abstract

- This project presents a machine learning-based solution to predict bank customer churn. Using a Random Forest classifier, the system analyzes customer behavior and demographics to assess churn probability. The model is integrated into a graphical user interface (GUI) to provide a practical and intuitive tool for bank employees. This solution helps banks reduce customer attrition and improve service strategies.

Proposed System

- ❑ Collect and preprocess bank customer data.
- ❑ Train ML model (Random Forest) for churn prediction.
- ❑ Evaluate model performance (accuracy, precision, recall).
- ❑ Develop a GUI for real-time churn prediction.

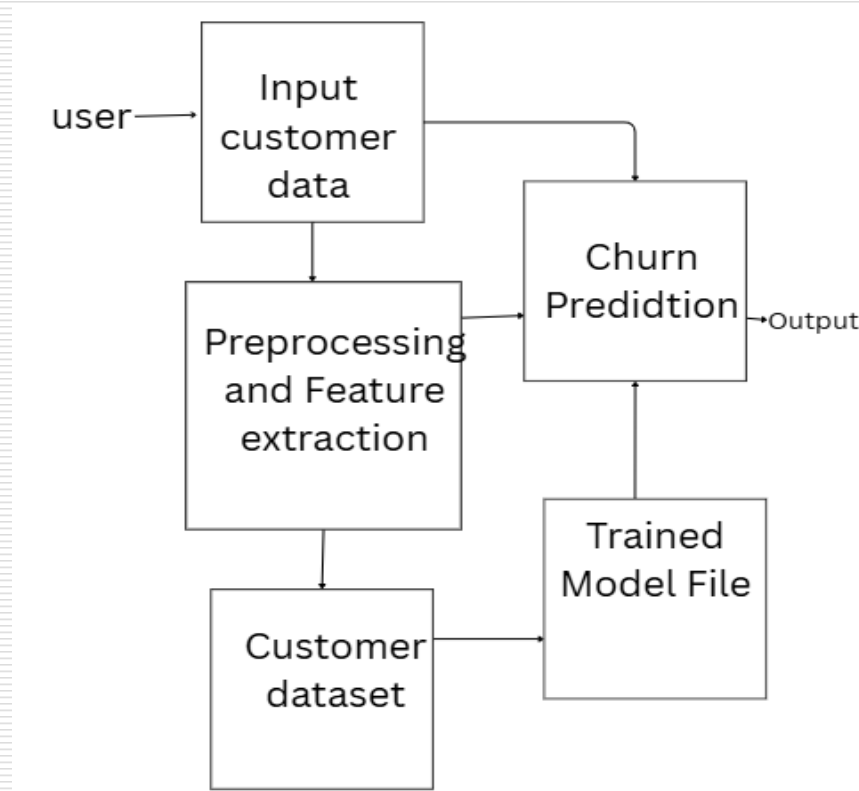
System Architecture



List of Modules

- ☐ Data Collection and Cleaning
- ☐ Feature Engineering
- ☐ Model Training and Evaluation
- ☐ GUI Development
- ☐ Churn Prediction and Report Generation

Functional Description for each modules with DFD and Activity Diagram



Implementation & Results of Module

Data Preprocessing

Cleaned the dataset, handled missing values, and encoded categorical variables.
Applied feature scaling using StandardScaler and split data into training and testing sets

Model Training

Trained a Random Forest Classifier on the preprocessed data for churn prediction.
Tuned hyperparameters to improve model accuracy and avoid overfitting.

Prediction Module

Used the trained model to predict customer churn from new input data.
Integrated prediction logic into the GUI for real-time user interaction.

GUI Integration

Developed a user-friendly GUI using Tkinter to collect customer details.
GUI displays prediction result—whether the customer is likely to churn or not.

Evaluation and Results

The model successfully predicts whether a customer is likely to churn or stay.
Achieved 86% accuracy with consistent performance across multiple test cases.

Bank Customers Churn Prediction Using Machine Learning

Customers Churn Prediction Using ML

CreditScore	608
Age	41
Tenure	1
Balance	83807.86
NumOfProducts	1
HasCrCard	0
IsActiveMember	1
EstimatedSalary	112542.58
Geography (1=Germany, 2=Spain, 3=France)	2
Gender (1=Male, 2=Female)	1

Predict

Prediction: No Exit

Conclusion & Future Work

Conclusion

- The developed system accurately predicts bank customer churn using a machine learning model, helping banks identify at-risk customers proactively.
With an intuitive GUI interface, it provides a practical tool for real-world deployment and decision-making support.

Future Work

- Enhance model performance using deep learning or ensemble methods.
- Include customer feedback loop for continuous learning and improvement.
- Deploy the model as a web-based application or API service for scalability.

References

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☐ Not Published



Thank You