Abstract

# Application

Customer retention is a major challenge for telecom industries, where customer churn directly impacts revenue and growth. The proposed application is a ***Customer Churn******Prediction Syste****m* that analyzes customer details such as contract type, monthly charges, payment method, tenure, and service usage to predict whether a customer is likely to discontinue the service. The system uses machine learning algorithms to automatically identify at-risk customers, allowing companies to take proactive retention measures. A simple, interactive interface enables telecom managers to input customer data and instantly receive predictive results for improved decision-making..

# Importance of the Application

# Traditional methods for churn analysis rely on manual inspection and historical trend analysis, which are time-consuming and often inaccurate. By leveraging supervised machine learning models, this system provides a faster and more data-driven approach to detect potential churners. Early prediction helps organizations retain valuable customers through personalized offers, reducing marketing costs and improving overall customer satisfaction. The model also enhances interpretability by identifying key features that influence churn, such as billing issues or contract duration.

**Methods Used and Advantages**

1. **Decision Tree Classifier**

The Decision Tree algorithm is used as a baseline model to classify customers into churn or non-churn categories based on their attributes.

***Advantages:***

* + Easy to interpret and visualize decision flow.
  + Handles both categorical and numerical data effectively.
  + Provides feature importance for better business insights**.**

1. **Random Forest Classifier**

The Random Forest model, an ensemble of multiple Decision Trees, is implemented to improve predictive performance and reduce overfitting.

***Advantages:***

* + Offers higher accuracy and stability.
  + Reduces variance through multiple decision paths.
  + Automatically manages missing or noisy data.

**Result:**

The system was trained on the *Telco Customer Churn Dataset* from Kaggle. After data preprocessing, feature encoding, and model tuning, the Random Forest model achieved an accuracy of approximately 85–90%, with strong precision and recall values. The confusion matrix confirmed balanced performance across churn and non-churn classes. The project demonstrates that integrating Decision Tree and Random Forest models provides a reliable, interpretable, and scalable solution for churn prediction. This tool can be deployed as a web-based dashboard for real-time churn monitoring and customer retention management.

OUTPUT:

A screenshot of a chart

AI-generated content may be incorrect.