

# CUSTOMER CHURN ANALYSIS FOR TELECOM INDUSTRY

## Abstract

The telecom sector experiences constant customer turnover due to competitive offers, service dissatisfaction, or better alternatives. This project applies supervised machine learning to predict churn and suggest retention measures.

Using historical customer data, the model analyzes features such as tenure, contract type, monthly charges, internet service, tech support, and payment methods. The predictions are displayed on a Streamlit web interface, including:

- Churn Prediction: Indicates whether a customer is likely to churn.
- Confidence Score: Shows the probability of churn.
- Key Churn Drivers: Highlights factors influencing churn risk.
- Retention Recommendations: Provides actionable strategies to reduce churn.

By combining prediction with recommendations, telecom companies can improve customer retention, enhance satisfaction, and reduce revenue loss.

## Tools Used

- Programming Language: Python
- Framework: Streamlit
- Libraries: Pandas, Scikit-learn, Pickle, Time
- IDE: VS Code / Jupyter Notebook
- Data Storage: CSV
- Visualization: Matplotlib, Seaborn

## Steps Involved in Building the Project

### 1. Data Collection:

Collected telecom customer data including demographics, service usage, account details, and payment information.

### 2. Data Preprocessing:

- Handled missing and inconsistent values.
- Encoded categorical features into numerical values.
- Scaled numerical features like monthly charges and tenure.

### 3. Model Selection and Training:

- Explored classifiers like Logistic Regression and Random Forest.
- Trained models on historical data and evaluated using precision, recall, and F1-score.
- Selected the best-performing model for deployment.

### 4. Feature Importance Analysis:

Identified features with highest impact on churn, such as contract type, tenure, monthly charges, tech support, and payment method.

### 5. Web Application Development:

Developed a Streamlit interface for real-time input, integrated the trained model, and displayed:

- Churn Prediction (Yes/No)
- Confidence Score
- Key Churn Drivers
- Retention Recommendations

### 6. Testing and Validation:

Verified predictions and ensured recommendations are actionable.

### 7. Deployment:

Deployed locally for internal testing and prepared for cloud deployment for real-time use.

## Key Churn Drivers & Recommended Retention Offers

### Key Churn Drivers:

- Short-term contracts (Month-to-month)
- Low tenure (new customers under 12 months)
- Lack of technical support or online security
- High monthly charges
- Expensive internet plans (Fiber optic)
- Payment via Electronic Check
- Paperless billing

### Recommended Retention Offers:

- Discounts for annual or two-year contracts

- Loyalty rewards or cashback for new customers
- Free trial for tech support or online security
- Bundled packages (Internet + TV)
- Incentives for automatic payment methods
- Personalized digital engagement campaigns

These strategies target high-risk customers, reducing churn and improving satisfaction.

## **Conclusion**

The project demonstrates the power of AI-driven predictive analytics in reducing customer attrition. By predicting churn and identifying root causes, telecom companies can deploy targeted retention strategies.

### **Key integrations include:**

- Machine Learning for predictive accuracy
- Feature Analysis for actionable insights
- Streamlit for interactive web deployment

This approach enables telecom companies to retain high-value customers, optimize revenue, and enhance operational efficiency. Future enhancements may include real-time data integration, advanced ensemble models, and expanded predictive features.

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