# TELCO CUSTOMER CHURN ANALYSIS PROJECT REPORT

## Abstract

Customer churn is a critical problem for telecom companies as acquiring new customers is more expensive than retaining existing ones. This project focuses on predicting customer churn using machine learning techniques on the Telco Customer Churn dataset. The objective is to identify patterns and factors influencing customer churn and provide actionable business insights.

## Problem Statement

To build a predictive model that identifies customers who are likely to churn, enabling telecom companies to take preventive measures.

## Dataset Description

The dataset contains customer demographic information, services subscribed, account details, and churn labels. It includes variables such as tenure, monthly charges, total charges, contract type, and payment method.

## Tools & Technologies

Python, Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn, Jupyter Notebook

## Data Preprocessing

Handled missing values, converted categorical variables using encoding techniques, and scaled numerical features for better model performance.

## Exploratory Data Analysis (EDA)

EDA revealed that customers with month-to-month contracts, higher monthly charges, and shorter tenure are more likely to churn.

## Model Building

Several machine learning models were tested, including Logistic Regression, Decision Tree, and Random Forest. Random Forest performed best due to its ability to handle non-linear relationships.

## Model Evaluation

The model was evaluated using accuracy, precision, recall, F1-score, and ROC-AUC metrics.

## Results

The Random Forest model achieved approximately 82% accuracy with strong recall for churned customers.

## Business Insights

Customers on month-to-month contracts are more likely to churn. High monthly charges without long-term contracts significantly increase churn probability.

## Recommendations

Introduce loyalty programs, promote long-term contracts, and offer discounts to high-risk customers.

## Conclusion

The project successfully demonstrates how machine learning can help predict customer churn and support data-driven decision-making.

## Future Scope

Future work may include deploying the model as a web application and using advanced models like XGBoost.