# Telecom Churn Analysis - Project Report

## Introduction

Customer churn is a major concern for telecom service providers as it directly affects profitability. This project aims to provide business insights into why customers churn and help predict potential future churn using a combination of visualization and machine learning.

## Abstract

This analysis involved building an interactive Power BI dashboard backed by data stored and cleaned in MySQL, alongside a predictive model in Python using the Random Forest algorithm. A tooltip-enhanced visual experience was created to highlight churn reasons dynamically. This helped stakeholders gain both high-level and drill-down understanding of churn trends and customer behavior.

## Tools Used

- Power BI - For building interactive dashboards with drill-through and tooltip pages
- MySQL - For storing, cleaning, and transforming data (including creation of views)
- Python (Jupyter Notebook) - For building and testing the predictive churn model
- Scikit-learn, Pandas - For preprocessing and modeling
- Excel/CSV - For raw data inspection and initial formatting

## Steps Involved in Building the Project

- Data Import and Cleaning: Customer data was imported into MySQL. Missing values were imputed or categorized appropriately. Created SQL views for churned and newly joined customers.
- Exploratory Analysis: Used Power BI to visualize churn patterns by gender, age, state, contract type, and services used. Designed filters to drill down by marital status and monthly charges.
- Advanced Dashboard Features: Built a tooltip page to show detailed churn reasons (Competitor, Price, Attitude, Dissatisfaction, Other). Tooltip activates on hover over 'Total Churn by Churn Category', improving interactivity and insight delivery.
- Predictive Modeling in Python: Trained a Random Forest Classifier using cleaned data. Key

features: Internet Service, Contract Type, Tenure, Monthly Charges. Model predicts how many newly joined customers are likely to churn. Evaluated using classification metrics (Accuracy, Precision, Recall).

**Conclusion**

The Telecom Churn Analysis project integrates visual analytics with machine learning to empower better decision-making. With drill-down insights, tooltip-driven exploration, and predictive forecasting, it provides both diagnostic and forward-looking value to the business. This unified approach can help reduce churn and drive customer retention strategies.