Telco Customer Churn Prediction Project

Introduction

Customer churn is a major challenge for businesses, as retaining existing customers is often more cost-effective than acquiring new ones. This project focuses on analyzing and predicting customer churn by leveraging SQL Server for data preparation, Power BI for visualization, and Python for predictive modeling.

Abstract

The project integrates database management, business intelligence, and machine learning into an end-to-end workflow. SQL Server was used for data cleaning and preparation, Power BI for building interactive dashboards to identify churn patterns, and Python for developing predictive models. The outcome helps businesses understand key churn drivers and forecast potential customer losses.

Tools Used

- SQL Server Management Studio (SSMS) — Data cleaning, transformation, and querying - Power BI Desktop — Dashboard creation and visualization of KPIs - Python (Jupyter Notebook) — Data preprocessing, machine learning model training, and evaluation - Libraries: pandas, scikit-learn, matplotlib, seaborn, pyodbc, joblib

Steps Involved in Building the Project

1. Data Preparation in SQL Server: Imported raw customer data, performed cleaning, handled nulls, and created analysis-ready tables and views.

2. Power BI Visualization: Built interactive dashboards with KPIs (Churn Rate, Revenue, Customer Count), and visualized churn reasons, customer profiles, and service usage.

3. Machine Learning in Python: Processed data, trained models such as Logistic Regression and Random Forest, evaluated performance using accuracy, precision, recall, F1-score, and ROC-AUC.

4. Integration: Predictions were optionally written back to SQL Server for further use in Power BI reports.

Conclusion

The project successfully demonstrated how data-driven methods can provide actionable insights into customer churn. By combining SQL for structured data management, Power BI for interactive reporting, and Python for predictive analytics, the solution helps businesses identify at-risk customers and take preventive actions. This end-to-end approach highlights the importance of integrating multiple tools to solve real-world business challenges.