End-to-End Customer Churn Analysis & Prediction Project Report

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Purpose: Portfolio Project for HR Review

This report presents my end-to-end project on customer churn analysis and prediction for a telecom dataset. Using Power BI for visualization, SQL for data processing, and Python for machine learning, I analyzed churn patterns, identified key drivers, and built a predictive model. The dashboards (Summary, Churn Reasons, and Prediction) provide interactive insights into KPIs, segment breakdowns, and predicted at-risk customers. This project demonstrates my skills in data cleaning, visualization, modeling, and deriving business recommendations.

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# 📘 Introduction

In the telecom industry, customer churn represents a significant revenue loss, often driven by factors like competitor offers, service dissatisfaction, and pricing. This project uses a telecom customer dataset to perform exploratory analysis, visualize trends via Power BI dashboards, and predict future churn using a machine learning model. The resulting dashboards highlight key metrics (e.g., 27.0% churn rate) and enable proactive retention strategies. By handling the full data pipeline, this work showcases my ability to turn raw data into actionable business intelligence.

# 🎯 Project Goals

* Explore and visualize churn patterns across demographics, services, and geography.
* Identify high-churn segments to inform targeted marketing.
* Develop a machine learning model to predict churn among new joiners.
* Create interactive dashboards for easy stakeholder access.
* Provide recommendations to reduce churn based on insights.
* Track essential KPIs: Total Customers (6,418), New Joiners (411), Total Churn (1,732), Churn Rate (27.0%).

# 🛠 Technologies and Tools Used

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| Category | Tools/Libraries |
| Database | Microsoft SQL Server, SQL Server Management Studio (SSMS) |
| Business Intelligence | Microsoft Power BI Desktop |
| Machine Learning | Python 3+ (Jupyter Notebook), pandas, scikit-learn, matplotlib, seaborn |
| Data Export/Import | Microsoft Excel, CSV files |
| Design | Microsoft PowerPoint (for dashboard backgrounds and icons) |