Customer Churn Analysis and Segment Insights

Project Title: Customer Churn Analysis for Telecom Industry
Data Analyst Internship Project — Elevate Labs

Introduction

This project was undertaken as part of the Data Analyst Internship at Elevate Labs. The goal was to analyze customer churn in the telecom sector using machine learning and data visualization tools. The project aimed to understand churn behavior, build predictive models, segment customers, and communicate insights effectively via an interactive dashboard.

Abstract

Customer churn is a critical issue for telecom companies. Retaining customers is more cost-effective than acquiring new ones. This project uses a data-driven approach to predict customer churn and uncover hidden patterns. We processed raw data, applied classification models, built custom customer segments, and created a business-focused Power BI dashboard. The results support better decision-making by highlighting churn trends and at-risk customers.

Tools Used

- Python (Jupyter Notebook)
- Pandas, Seaborn, Scikit-learn, Matplotlib
- Power BI

Steps Involved in Building the Project

- ◆ Phase 1: Data Understanding & Cleaning

    - - Loaded and explored the dataset
      - Checked data types, null values, and unique entries
      - Cleaned missing data (e.g., converted 'TotalCharges' to numeric)
      - Identified categorical and numerical columns

- ◆ Phase 2: Feature Engineering & Modeling

    - - Encoded categorical variables using Label and One-Hot Encoding
      - Split data into training and testing sets
      - Trained three models: Logistic Regression, Decision Tree, Random Forest

- Evaluated models using accuracy, precision, recall, and F1-score
- Extracted feature importance from Random Forest
- Created Customer Segmentation based on prediction and tenure

- ◆ Phase 3: Dashboard Creation (Power BI)

  - Exported cleaned and enriched dataset for Power BI
  - Designed dashboard titled 'Telecom Churn Insights'
  - Added KPI cards, charts (donut, bar, line), and slicers
  - Enabled interactivity for exploring churn trends across segments

Dashboard Creation

The final dataset was imported into Power BI to build an interactive dashboard titled "Telecom Churn Insights ". Key visuals include:
- KPI Cards: Total Customers, Churned Customers, Churn Rate, At-Risk Customers
- Donut Chart: Customer Segments
- Bar Charts: Churn by Contract Type, Monthly Charges by Segment, Churn by Payment Method
- Line Chart: Tenure vs. Monthly Charges
- Slicers: Gender, Contract, Payment Method, segment
The dashboard helps explore churn behavior, identify business risks, and supports data-driven decision-making.

Insights from the Power BI Dashboard

1. Churn is Highest Among Month-to-Month Contract Customers
2. At-Risk Customers Pay Higher Monthly Charges
3. Senior Citizens Show Higher Churn Rates
4. Electronic Check Payment Method is Linked with Higher Churn
5. Tenure is a Strong Indicator of Loyalty
6. Segment Distribution Offers Targeting Opportunities
7. Interactive Filters Enhance Business Understanding

Conclusion

This project showcases an end-to-end data analysis pipeline, from raw dataset to a business-ready dashboard. It combines technical accuracy with business value by leveraging machine learning and visual analytics. As part of the Data Analyst Internship at Elevate Labs, this project reflects practical skills in solving real-world data problems.