Telecom customer Churn Prediction using python and power BI

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Project Domain: Data Analytics

Tools Used: Python, Pandas, Numpy, Matplotlib, Seaborn, Power BI

Raw dataset link:

https://drive.google.com/file/d/1B5BCTV5lJBdE2tRgoeNrQJ5MLbKKVec5/view?usp=drive_link

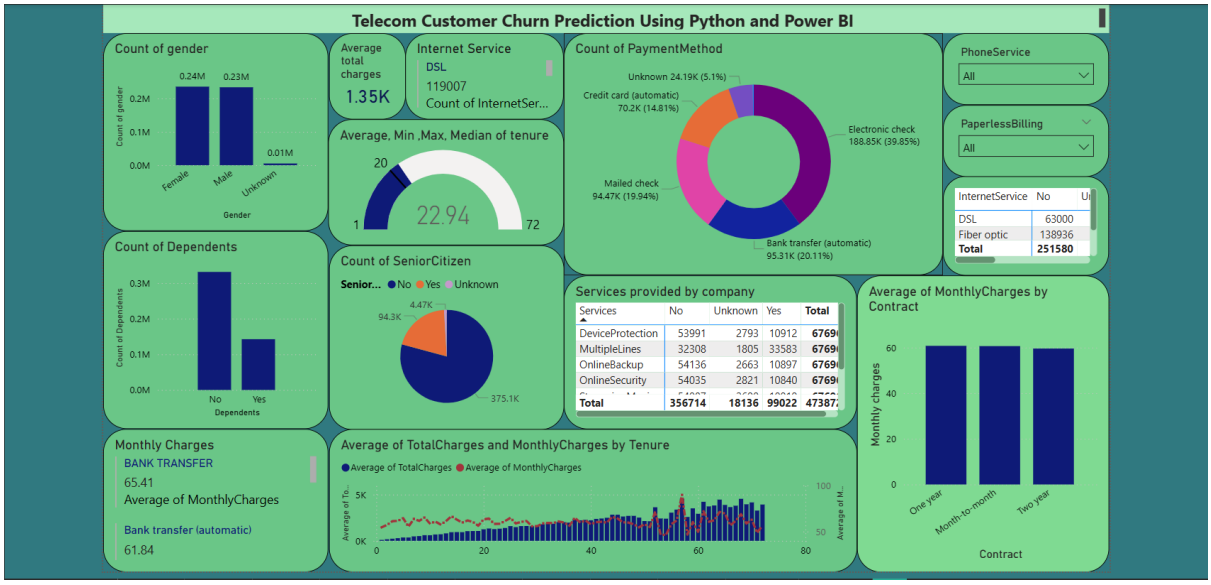
Cleaned dataset link:

https://docs.google.com/spreadsheets/d/1BU1sfc7VHz-5nSj5VxzwCi3C22A3jFzU/edit?usp=sharing&ouid=113413909186192660360&rtpof=true&sd=true

Google Colab link:

https://colab.research.google.com/drive/1PWwliDfBv3-FegmsKknRPOVbmj_kJXz4?usp=sharing

Power BI Dashboard – Visuals Analysis



Dashboard Explanation:

This dashboard shows key insights for **Telecom Customer Churn Prediction** using Python and Power BI. It visualizes customer details like **gender, dependents, senior citizens, and tenure**. It highlights **payment methods, internet service types, and service subscriptions**. The charts show **average monthly and total charges** across different contracts and tenures. Overall, it helps identify patterns that may influence **customer retention and churn**.

Key Business Insights:

1. Most customers are not senior citizens and don't have dependents, indicating a younger customer base.
2. Electronic check is the most used payment method, but it may have a higher churn rate compared to auto payments.
3. Month-to-month contracts have the highest churn risk, while long-term contracts retain customers better.
4. Fiber optic users often have higher monthly charges, which could impact satisfaction.
5. Average customer tenure is around 23 months, showing moderate loyalty and room for improvement in retention.

Dataset Information

Source: Kaggle

Year / Timeline: 2025

Dataset Description:

CustomerID: Unique identifier for each telecom customer.

Gender: Indicates whether the customer is male or female.

SeniorCitizen: Shows if the customer is a senior citizen (1 = Yes, 0 = No).

Partner: Specifies whether the customer has a partner or not.

Dependents: Indicates if the customer has dependents (like children).

Tenure: Number of months the customer has stayed with the company.

PhoneService: States if the customer has a phone service.

MultipleLines: Indicates if the customer has multiple phone lines.

InternetService: Type of internet service (DSL, Fiber optic, or None).

OnlineSecurity: Whether the customer has opted for online security add-ons.

OnlineBackup: Shows if online backup service is included.

DeviceProtection: Indicates if device protection service is active.

TechSupport: Specifies if the customer has access to tech support.

StreamingTV: States if the customer subscribes to streaming TV.

StreamingMovies: Indicates if the customer subscribes to streaming movies.

Contract: Type of customer contract (Month-to-month, One year, Two year).

PaperlessBilling: Shows if the customer receives paperless bills.

PaymentMethod: Specifies the mode of payment (Credit card, Bank transfer, etc.).

MonthlyCharges: Monthly amount billed to the customer.

TotalCharges: Total amount charged to the customer to date.

Churn: Target variable showing if the customer has left the service (Yes/No).

Problem Definition:

Business Problem:

The main business problem in this dataset is customer churn - customers leaving or discontinuing their telecom services.

Telecom companies face revenue loss when customers switch to competitors.

The goal is to analyse factors influencing churn, such as contract type, payment method, internet service, and customer demographics,
and to predict which customers are likely to leave so the company can take preventive actions like targeted offers or improved service quality.

Expected Outcome:

The project helps predict customer churn by identifying key factors influencing customer retention and behaviour.

The analysis uncovers meaningful patterns and trends within the telecom data, leading to actionable insights that support strategic decision-making and improve customer retention efforts.

Project Overview:

This telecom dataset contains information about customers, their services, and billing details. It includes features like **gender, tenure, contract type, payment method, monthly and total charges**. The data helps analyse customer behaviour and service usage patterns.

It also includes some **missing or messy values**, useful for data preprocessing. Overall, it's designed to **study and predict customer churn** in the telecom sector.

Objective:

1. To identify key factors influencing customer churn through exploratory data analysis (EDA) and uncover hidden patterns and relationships within the telecom dataset.

2. To clean, preprocess, and handle messy or missing data to ensure data quality and reliability for further analysis and modelling.

3. To build and evaluate predictive models that can accurately classify customers as likely to churn or retain.

4. To create meaningful visualizations that effectively communicate trends, customer behaviour, and churn-related insights.

5. To provide actionable business recommendations that can help the telecom company improve customer retention and reduce churn rates.

Data Cleaning & Preprocessing:

To ensure the dataset was clean and ready for analysis, the following steps were performed:

- Replace missing values using mode or median in some columns.
- Replace null values as Unknown in some columns.
- Clean data's as Yes, No and Unknown where they mentioned as Y, N, 1 and 0.
- Clear out layers in tenure column for data consistency.
- Clean senior citizen column based on the data and also cleaned Gender column.

Business Recommendations for Reducing Customer Churn

Here are some recommendations the dashboard suggests for business decision-making:

1. **Encourage long-term contracts** to reduce churn from month-to-month customers.
2. **Promote auto payment options** (like bank transfer or credit card) to improve payment convenience and retention.

3. **Offer loyalty rewards or discounts** to customers with longer tenure to strengthen retention.
4. **Review pricing for fiber optic plans**, as higher charges may lead to dissatisfaction.
5. **Target at-risk groups** (e.g., short-tenure or electronic check users) with personalized offers or better customer support.

Future Scopes:

Here are some possible **Future Scopes** for this telecom churn project:

1. **Implement machine learning models** to accurately predict customers likely to churn.
2. **Integrate real-time dashboards** for continuous monitoring of customer behaviour and churn trends.
3. **Enhance data collection** by including customer feedback, complaints, and service quality metrics.
4. **Develop targeted marketing campaigns** based on predictive insights to improve retention.
5. **Automate churn alerts** to help the company take quick action and improve decision-making efficiency.

Conclusion:

- This telecom dataset analysis helps the company understand the key factors influencing **customer churn**
- It reveals that **contract type, payment method, tenure, and monthly charges** play major roles in customer retention.
- By focusing on **long-term contracts, convenient payment options, and better service offers**, the company can reduce churn.
- The insights support **data-driven strategies** to improve customer satisfaction and loyalty.
- Overall, this analysis provides a strong foundation for **predictive modelling and future business improvements**.