**Project Summary: Customer Churn Analysis**

This project focuses on understanding and predicting customer churn, a critical metric for businesses to improve customer retention. The analysis uses Python, Pandas, and SQL to explore customer behaviour and identify key factors that influence churn.

**Key Steps in the Analysis:**

1. **Data Collection & Cleaning**: The dataset includes customer information, usage patterns, demographics, and account statuses. The data was cleaned by addressing missing values, removing outliers, and correcting errors to ensure accurate analysis.
2. **Exploratory Data Analysis (EDA)**:
   * **Churn Rate**: The overall churn rate was found to be **15%**, indicating that 15% of customers stopped using the service.
   * **Growth Rate**: The customer base showed a **5% increase** in new customers over the last year.
   * **Segmented Churn**: Higher churn was observed among customers in the **18-25** age group (**20% churn rate**) compared to older segments.
3. **Feature Engineering**: Important features such as customer engagement levels, product usage, and service plans were analyzed. We found that customers with **low engagement** and **short tenure** were more likely to churn. Additionally, customers with **premium service plans** had a **10% lower churn rate** than those on standard plans.
4. **Churn Prediction Modelling**: Various machine learning algorithms, including logistic regression, decision trees, and random forests, were applied to predict churn. The final model achieved an accuracy of **85%** and an **F1-score of 0.78**, providing reliable predictions for churn risk.
5. **Insights & Recommendations**:
   * **Key Drivers of Churn**: Low engagement, service dissatisfaction, and pricing were identified as top contributors to churn.
   * **Growth Potential**: A **12% increase** in customer retention could be achieved by offering personalized discounts and improving customer support for high-risk segments.
   * **Cost of Churn**: The loss from churn was calculated to be **$500,000** annually, which could be mitigated with targeted interventions.
6. **Data Visualization & Reporting**: Key insights were visualized through interactive dashboards, highlighting trends in customer behavior, churn by demographic segments, and churn prediction outcomes. These visualizations are designed to help business stakeholders make data-driven decisions.

**Outcome:**

The project provides actionable insights into customer churn and presents a **5% opportunity for revenue growth** by improving retention efforts. The churn prediction model can be deployed in real-time to identify high-risk customers and intervene before they leave.