### **Option 2: Telco Customer Churn Prediction and Retention Strategy**

**Objective:**

* Develop a machine learning model to predict Telco customer churn (i.e., customers likely to stop using a product or service) and devise strategies to reduce churn rates based on your findings.

**Steps:**

1. **Data Collection:**

* Access the Telco customer churn dataset from Kaggle, which includes information on demographics, transaction history, customer service interactions, subscription details, and whether the customer churned.
* [Dataset Link: Telco Customer Churn on Kaggle](https://www.kaggle.com/datasets/blastchar/telco-customer-churn)

1. **Data Preprocessing:**

* Clean the dataset by handling missing values, encoding categorical variables, and scaling numerical features.
* Perform feature engineering to create new features that could influence churn, such as average transaction value, frequency of customer service interactions, and tenure with the company.

1. **Exploratory Data Analysis (EDA):**

* Analyze the data to identify key factors contributing to churn.
* Use visualization techniques (e.g., histograms, heatmaps, boxplots) to explore the relationship between different features and customer churn.
* Segment customers based on behavior, demographics, or engagement levels to better understand the drivers of churn.

1. **Model Development:**

* Split the data into training and testing sets.
* Develop and compare different machine learning models, such as Logistic Regression, Random Forest, Gradient Boosting Machines, and Neural Networks, to predict churn.
* Evaluate models using metrics like accuracy, precision, recall, F1-score, and Area Under the Curve (AUC) to choose the best-performing model.

1. **Interpretability and Feature Importance:**

* Use techniques like SHAP (SHapley Additive exPlanations) or LIME (Local Interpretable Model-agnostic Explanations) to interpret the model’s predictions.
* Identify the most influential features driving churn, which can inform targeted retention strategies.

1. **Retention Strategy Development:**

* Based on the model’s insights, propose actionable strategies to reduce churn, such as targeted marketing campaigns, personalized offers, or improved customer service for high-risk customers.
* Simulate the potential impact of these strategies on reducing churn and improving customer lifetime value (CLV).

1. **Deployment and Monitoring:**

* Build a system that flags customers at high risk of churning in real-time, allowing the business to take proactive measures.
* Use tools like Flask or FastAPI to create an API that integrates with a CRM system or marketing platform for automated retention actions.
* Monitor the performance of the churn model over time and update it as customer behavior evolves.

**Documentation and GitHub:**

* Document your process, including the data preprocessing steps, model development, retention strategies, and implementation challenges, in a README.md file.
* Push the entire project to a GitHub repository.
* Consider writing a technical article or case study on customer churn prediction and retention strategies, showcasing your methodology and results.

This project challenges you to not only predict an important business outcome (customer churn) but also to derive actionable insights that can directly influence business strategy. It involves working with complex, real-world data, applying machine learning models, and thinking critically about how to implement your findings in a business context.