Summary: Telco Customer Churn Analysis

Objective:

This project aims to **identify factors contributing to customer churn**, develop predictive models to anticipate churn, and leverage **sentiment analysis** to uncover customer sentiments influencing retention. The insights will help **reduce churn rates, enhance customer satisfaction, and improve business strategies** for telecom service providers.

Dataset Overview

- The dataset contains **7,043 customer records** with **21 features**, including **demographics, subscription details, and service usage.**
- The target variable is **Churn**, indicating whether a customer has left the telecom service.

Key Insights from Exploratory Data Analysis (EDA):

1. Churn Rate and Customer Distribution

- **Churn Rate: 26.5%** of customers have churned, indicating a significant retention issue.
- **Gender Impact:** The churn rate is **equal** among males and females, suggesting gender is not a key churn determinant.
- **Senior Citizens: 42%** of senior citizens churned compared to **24%** of non-senior citizens, showing that senior customers are at higher risk.

2. Service-Related Factors Influencing Churn

- **Contract Type:**
    - **Month-to-month contracts: 45%** churned.
    - **One-year contracts:** Only **11%** churned.
    - **Two-year contracts: Just 3%** churned, proving long-term contracts improve retention.
- **Tech Support:**
    - Customers with **no tech support** have a **40% churn rate**, while those with tech support have a **15% churn rate**, indicating tech support significantly improves retention.
- **Internet Service:**
    - Customers using **DSL (19%)** or **Fiber Optic (42%)** exhibit different churn patterns, with fiber optic users churning at higher rates, likely due to higher costs.
- **Online Security:** Customers **without online security** have a **45% churn rate**, compared to **15% churn for those with security services**.

3. Financial Impact on Churn

- Customers paying **above $70 per month** have a **50%+ churn rate**, whereas those paying **below $40 per month** have a **15% churn rate**, indicating pricing plays a crucial role in retention.
- Customers using **paperless billing** have a **34% churn rate**, while those receiving printed bills churn at **18%**, suggesting that digital communication might be less effective in retention.

Predictive Modeling:

- **Machine Learning Models Used:**
    - **Logistic Regression**
    - **Decision Tree**
    - **Random Forest (Best Performing Model)**
- **Model Performance Metrics:**
    - **Random Forest achieved 86% accuracy**, the highest among models.
    - Precision, recall, and F1-score indicate strong model performance in identifying at-risk customers.

Sentiment Analysis from Customer Reviews:

- **NLP Techniques Used:** Text processing, tokenization, stop-word removal, and sentiment classification.
- **Sentiment Distribution:**
    - **45% Negative Sentiment:** These customers frequently mention **poor customer service, high charges, and unreliable internet.**
    - **30% Neutral Sentiment:** These customers are passive but might churn without proactive retention strategies.
    - **25% Positive Sentiment:** Customers praise **affordable pricing and stable internet connections.**
- **Word Cloud Findings:** The most common negative words include **"expensive," "slow internet," and "billing issues."**

Data Visualization:

- **Histograms & Bar Charts:** Depict customer demographics, contract types, and tenure distributions.
- **Pie Charts:** Show churn percentage by contract, payment method, and service usage.
- **Correlation Heatmaps:** Highlight relationships between service features and churn likelihood.

Conclusion & Business Recommendations:

- **Encourage long-term contracts**: Offering incentives for **1-2 year contracts** can reduce churn by over **40%**.
- **Improve tech support services**: Investing in **24/7 customer support** can reduce churn by **25%**.
- **Target high-risk customers**: Implement **personalized offers for customers paying above $70/month**, as they are most likely to leave.
- **Use sentiment analysis for proactive retention**: Customers expressing **negative sentiment** should be contacted for **discounts, improved service, or problem resolution.**