

SUMMARY AND RECOMMENDATIONS

1. Data Loading and Preprocessing

- **Data Source:** The dataset "*Customer Churn.csv*" was loaded using Pandas.
- **Data Cleaning:**
 - The TotalCharges column contained spaces in place of missing values. These spaces were replaced with 0, and the column was cast to a float data type for numeric analysis.
 - **Missing Values:** A check was performed to ensure there were no missing values in the dataset.
 - **Duplicates:** The dataset was also checked for any duplicate records, particularly in the CustomerID column, and no duplicates were found.
- **SeniorCitizen Feature Transformation:** The SeniorCitizen column, initially a binary feature (0 for No, 1 for Yes), was converted to categorical values ("yes" and "no") to improve interpretability in the visualizations.

2. Exploratory Data Analysis (EDA):

The visualizations primarily focused on understanding the relationship between customer churn and various services offered by the company. Seaborn and matplotlib were used extensively for this purpose.

Churn Distribution

- A **countplot** was generated to show the overall distribution of customers who churned vs. those who didn't.
 - Around **26.5%** of the customers churned, while **73.5%** remained with the company.
 - This overall churn rate serves as a baseline for further analysis.

Churn by PhoneService

- **Countplot:** Visualized customer churn based on whether they had a phone service or not.
 - A higher percentage of customers who **didn't have PhoneService** (approximately **19%**) churned compared to those who had a phone service.
 - **Insight:** Lack of PhoneService may be associated with a higher churn rate.

Churn by InternetService

- **Stacked Bar Plot:** Displayed the percentage of churn for different types of internet services (DSL, Fiber Optic, and No Internet).
 - **Fiber Optic** users had the highest churn rate (**42.4%** of fiber optic users churned), while **DSL users** had a lower churn rate (**27%**).

- Customers with **No Internet Service** churned at a much lower rate (around **7%**).
- **Insight:** Fiber optic users are more likely to churn compared to DSL users, potentially indicating issues related to service quality or pricing.

Churn by Streaming Services (TV and Movies)

- **Countplots** were created for StreamingTV and StreamingMovies.
 - **StreamingTV:** Among customers with StreamingTV services, around **35%** churned, while **65%** stayed. Customers without StreamingTV churned less frequently.
 - **StreamingMovies:** Similar to StreamingTV, customers with StreamingMovies had a higher churn rate.
 - **Insight:** Streaming services seem to be associated with higher churn rates, suggesting that customers using these services may have higher expectations for overall service quality.

Churn by OnlineSecurity and TechSupport

- **Stacked Bar Charts:** These plots showed the proportion of churn for customers based on whether they had additional services like OnlineSecurity and TechSupport.
 - **OnlineSecurity:** Customers without OnlineSecurity had a churn rate of around **47%**, compared to **16%** for those who had the service.
 - **TechSupport:** Similarly, customers without TechSupport had a churn rate of approximately **49%**, while those with the service had a much lower churn rate.
 - **Insight:** The lack of additional security or support services seems to significantly increase the likelihood of customer churn.

Churn by SeniorCitizen

- **Countplot:** Visualized the proportion of churn among senior citizens.
 - **Percentage of Senior Citizens:** Around **26%** of senior citizens churned, which is slightly higher than the churn rate of non-senior citizens.
 - **Insight:** Although senior citizens form a smaller proportion of the customer base, they seem to churn at a slightly higher rate than non-senior citizens, possibly due to specific service needs not being met.

Churn by Payment Methods and Contract Type

- **Contract Type:**
 - **Month-to-month customers** had a churn rate of around **43%**, whereas customers on **two-year contracts** had a churn rate of only **3.9%**.
 - **Insight:** Customers with longer-term contracts are significantly less likely to churn, possibly due to commitment or incentives.
- **Payment Method:**
 - Customers using **Electronic Checks** had a higher churn rate (**35%**), while those using **Credit Cards** or **Bank Transfers** had lower churn rates (around **20-25%**).

- **Insight:** Payment methods that are easier to cancel (like electronic checks) may contribute to higher churn rates.

3. Stacked Bar Charts with Percentages

- Many of the key features were visualized using stacked bar charts, where the bars were divided into churned vs. non-churned groups. Percentages were displayed within the bars to better understand the proportion of churn for each service category.
- This technique was applied to features like `InternetService`, `OnlineSecurity`, `TechSupport`, and `StreamingTV`, allowing for easy comparison of churn rates across different categories.

4. Conclusions and Insights

- **High Churn Groups:**
 - Customers with **fiber optic internet**, those **without OnlineSecurity or TechSupport**, and those on **month-to-month contracts** exhibited the highest churn rates.
 - **Payment methods** also played a role, with **electronic check users** more likely to churn.
- **Lower Churn Groups:**
 - Customers with **DSL internet**, those with **additional support services** (like `OnlineSecurity` or `TechSupport`), and those on **longer-term contracts** churned less frequently.
- **Senior Citizens** churned at a slightly higher rate, but they form a relatively small portion of the customer base.

5. Recommendations

1. **Enhance Fiber Optic Service:**
 - Improve service quality and offer discounts to retain Fiber Optic customers who churn at a high rate (~42%).
2. **Promote Security and Support Services:**
 - Offer bundled discounts and free trials for `OnlineSecurity` and `TechSupport`, as customers without these services have higher churn (~49%).
3. **Incentivize Long-Term Contracts:**
 - Encourage month-to-month customers to switch to annual or two-year contracts by offering special deals and loyalty rewards.
4. **Promote Alternative Payment Methods:**
 - Offer incentives for switching from electronic checks (high churn ~35%) to automated payments (Credit Cards or Bank Transfers).
5. **Engage Senior Citizens:**
 - Provide senior-focused plans and proactive customer support to reduce slightly higher churn rates among senior customers.
6. **Optimise Streaming Services:**
 - Offer exclusive deals for `StreamingTV` and `StreamingMovies` users, while improving streaming quality to retain customers.

