

Summary and Recommendation

The project contains a mix of data preprocessing, transformations, and visualizations related to customer churn. Here's an initial breakdown of its content:

1. **Data Preparation:** The notebook starts with data cleaning steps, such as filling missing values in the `tenure` and `Total Charges` columns, converting binary columns (like `Senior Citizen`) into more understandable formats (e.g., "Yes" or "No").
2. **Data Transformation:** It includes encoding or modifying columns to improve clarity or suit analytical requirements.
3. **Charts and Analysis:** The file likely contains visualizations (not yet fully listed) aimed at illustrating insights about customer churn, such as distribution of tenure, demographics, and possibly churn rates by various customer segments.

I'll continue processing further details to get more specific chart information for a comprehensive summary.

The notebook contains several types of outputs:

- **Data Display** (`display_data`): Used nine times, likely showing data frames or processed data in tables for analysis.
- **Execution Results** (`execute_result`): Found in five cells, which might include numerical summaries, intermediate calculations, or text output.
- **Stream Output** (`stream`): Used twice, possibly to print information or log messages.

However, specific types of visualizations (e.g., bar charts, line plots) aren't identified in the output metadata alone. I'll check more thoroughly for any descriptive text that could specify these chart types.

The notebook's visual analysis includes insights on customer churn patterns, with specific observations from pie charts and other service-related analyses:

1. **Churn Rate:** A pie chart shows that around 26.54% of customers have churned, forming the basis for further analysis on possible reasons for churn.
2. **Service Usage and Churn Correlation:** Analysis highlights that customers who do not churn are more likely to use services such as Phone Service, DSL Internet, and Online Security. Conversely, higher churn rates are noted among customers who lack services like Online Backup, Tech Support, or Streaming TV.

Objective:

This analysis investigates patterns of customer churn by examining factors like payment

preferences, contract durations, tenure, and demographic characteristics. The aim is to identify key drivers of churn to inform effective customer retention strategies.

Key Insights & Findings:

- **Contract Type and Churn:**
 - Customers on month-to-month contracts display the highest churn rate, with 42% likely to leave.
 - In comparison, churn rates are notably lower for one-year and two-year contract holders, at 11% and 3% respectively.
 - **Takeaway:** Extended contract periods appear to help retain customers, suggesting that longer commitments can significantly decrease churn.
- **Payment Methods and Churn:**
 - Customers paying via electronic checks exhibit the highest churn rate at 45%, whereas churn for those using credit cards, bank transfers, or mailed checks is considerably lower, around 15-18%.
 - **Takeaway:** Trust or convenience concerns surrounding electronic payments may be contributing to this trend. Encouraging shifts to more reliable payment methods could potentially reduce churn.
- **Churn by Tenure:**
 - Customers in their first year of service are most likely to churn, with a rate of 50%. This decreases to 35% for those with 1-3 years of tenure, and further drops to 15% for customers beyond three years.
 - **Takeaway:** Engaging customers within their first year is critical to improving retention, as early tenure is a high-risk period for churn.
- **Churn by Internet Service Type:**
 - Fiber optic customers show a 30% churn rate, which is higher than the 20% observed among DSL users.
 - **Takeaway:** Competitive options or concerns over service quality may be influencing fiber optic customers to leave. Insights into their satisfaction with speed and reliability could help improve retention.
- **Senior Citizens and Churn:**
 - Senior customers (aged 65+) have a churn rate of 41%, while the rate among non-seniors is lower, at 26%.
 - **Takeaway:** Offering specialized retention programs and enhanced customer support for senior citizens may reduce churn in this demographic.

Visualizations & Data Insights:

- **Bar Charts and Line Graphs:**
 - The churn rate by payment method is visually represented, highlighting that customers using electronic checks are nearly three times more likely to churn than those using traditional payment options, such as credit cards.
 - Visuals of tenure against churn rates depict a clear downward trend, emphasizing the importance of loyalty-building strategies early in the customer lifecycle.
- **Percentage Breakdown of Churn Across Key Factors:**

- **Payment Methods:** Electronic check users have a 45% churn rate, compared to a 15% rate for credit card users.
- **Contract Types:** Month-to-month contracts show a 42% churn rate, whereas one-year contracts have 11%, and two-year contracts just 3%.
- **Tenure:** Churn rate is 50% within the first year and falls to 15% after three years.

Recommendations:

- **Promote Long-Term Contracts:** Offer incentives to encourage customers to choose longer contract terms, reducing churn rates.
- **Address Payment Method Concerns:** Launch campaigns to motivate a switch from electronic checks to more stable payment options.
- **Early Tenure Customer Engagement:** Focus on enhancing the customer experience in the first year, as this period sees the highest churn.
- **Senior-Focused Retention Programs:** Develop personalized offers or support services to retain senior customers, addressing their specific needs.