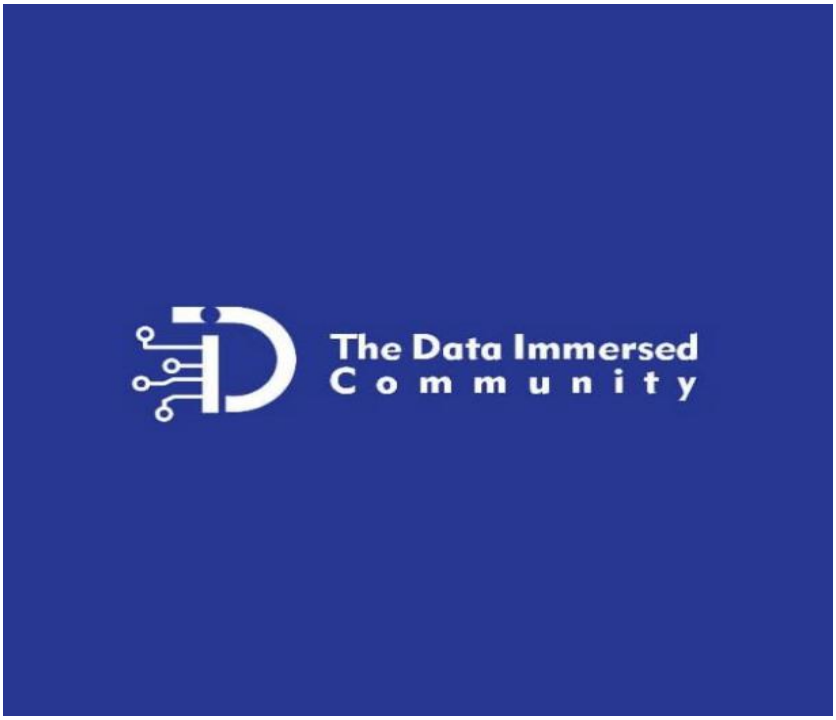


PYTHON CAPSTONE PROJECT:

ANALYSIS OF TELCO CUSTOMER CHURN DATA

BY

MUHAMMAD ABDULMATEEN ADEIZA

DATE: Saturday, 23rd of November, 2024

EXECUTIVE SUMMARY

This project analyzes customer churn at Telco, a tech product sales company, aiming to identify the primary factors contributing to churn and the resulting financial impact. The analysis reveals that customer characteristics such as being a senior citizen, having no dependents, and using month-to-month contracts are strongly associated with higher churn rates. Additionally, the study highlights the significant influence of service factors like tech support access and contract types, where long-term contracts and access to support correlate with lower churn rates.

The financial impact of churn is substantial, with an estimated revenue loss of $4.89 million, largely driven by high-value customers. Key recommendations include offering more incentives for long-term contracts, enhancing tech support services, and investigating the reasons behind higher churn rates among fiber optic internet users. Addressing these factors could significantly reduce churn and improve customer retention for Telco.

INTRODUCTION

BACKGROUND

Customer retention is a critical focus for businesses in today's competitive landscape, and understanding customer churn is essential to achieving sustainable growth. Churn analysis involves identifying the reasons why customers leave and uncovering actionable insights to improve retention strategies. This project focuses on leveraging Python for comprehensive churn analysis to enhance customer relationship management (CRM) and business performance.

Python offers an extensive ecosystem of libraries and tools for data analysis, visualization, and modeling, making it an ideal choice for tackling churn analysis. With its robust capabilities, businesses can analyze vast datasets, identify patterns, and predict customer behavior efficiently.

Through Python-based analytics, this project consolidates customer data, examines trends, and explores factors influencing churn. Advanced data processing techniques, machine learning models, and visualizations are utilized to uncover actionable insights, enabling businesses to:

- Identify high-risk customers.
- Understand key drivers of churn.
- Optimize retention strategies.

In the realm of CRM, Python empowers organizations to extract value from their data, drive targeted marketing, and reduce churn-related losses. By harnessing data-driven decision-making, businesses can build stronger relationships, foster loyalty, and achieve long-term success.

PROJECT OVERVIEW

This project utilizes Python to analyze customer churn data, showcasing its practical application in deriving meaningful insights that inform business decisions and retention strategies. By leveraging the comprehensive dataset provided by Telco through Python, this analysis highlights how businesses can use data-driven approaches to understand customer behavior and gain a competitive edge in today's dynamic market landscape.

PROBLEM STATEMENT

Telco, a telecom company providing subscription-based services, is facing challenges in retaining customers and mitigating churn. These losses signal inefficiencies in customer retention strategies, potentially resulting in significant revenue loss and reduced customer satisfaction. Identifying the root causes of customer churn and implementing effective strategies to address them are crucial for improving operational efficiency and sustaining business growth in a competitive market.

OBJECTIVES

1. Understand the dataset
2. Preprocess the data
3. Perform data analysis
4. Generate key Insights
5. Provide recommendations
6. Build an interactive dashboard using python

DATA TRANSFORMATION

DATA CLEANING AND STANDARDIZATION

Upon importing the dataset into the analysis environment, comprehensive data cleaning and transformation processes were conducted to ensure accuracy, consistency, and relevance of the data. These included:

1. Removing Unnecessary Columns: Columns such as Count, Country, and State were removed because they contained only a single value and did not contribute meaningfully to the analysis. Similarly, the Latitude-Longitude column was excluded since separate Latitude and Longitude columns provided the required information. The Zip Code column was also dropped as it offered no analytical value.
2. Adjusting Data Formats: Certain columns, like Total Charges, required conversion to numerical data types, as they were initially imported as strings, to facilitate computations and analysis.
3. Grouping Churn Reasons: The Churn Reason column, which contained numerous unique reasons, was reorganized by grouping related reasons into broader categories, simplifying the analysis and improving interpretability.

CREATION OF DATA VISUALIZATION DASHBOARD

To enable meaningful insights and support strategic decision-making, a dynamic dashboard was developed using Python's Streamlit library. This interactive dashboard provided a visual representation of key performance indicators (KPIs), trends, and actionable insights derived from the customer churn dataset. Stakeholders could easily explore data patterns and trends, empowering them to make informed decisions and plan strategic initiatives effectively.

The key KPIs tracked in the dashboard include:

- Total Customers: The overall number of customers in the dataset.
- Churned Customers: The count of customers who have left the company.
- Total Expected Revenue: The potential revenue the business could have earned from all customers.
- Total Actual Revenue: The revenue generated from customers who did not churn.
- Total Revenue Loss: The estimated revenue lost due to customer churn.

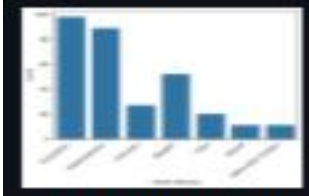
This dashboard served as a vital tool for highlighting areas of concern, monitoring performance, and identifying opportunities for growth and retention strategies.

Customer Churn Dashboard

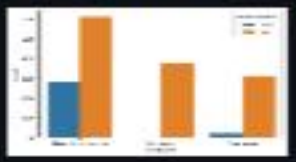
7,043	1,869	$30.99M	$16.06M	$4.89M

Visualizations

Reasons for Churning

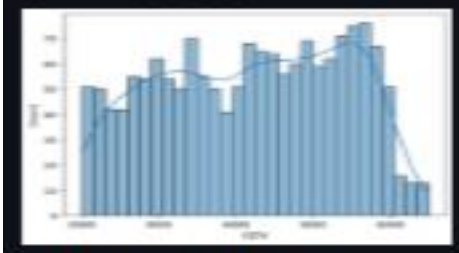


Churn Count by Contract Type

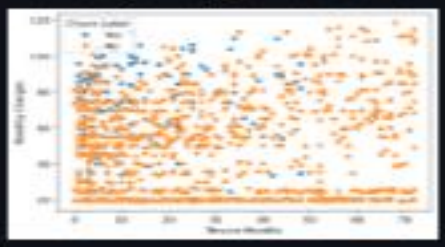


Churn Count by Internet Service Type

CLTV Distribution



Monthly Charges vs Tenure



Key Insights (Direct)

The main reasons why customers leave are:

- Competitors offering more appealing services,
- Dissatisfaction with the services and related aspects
- Challenges with service support Other factors cited include price, extra charges, relocation and even death.

Key Insights (Indirect)

1. High churn rates are observed among customers with month-to-month contracts.
2. Customers with long-term contracts exhibit lower churn.
3. CLTV varies widely but churn is not strongly correlated with high or low values.

DATA ANALYSIS

DIRECT INSIGHTS (REASONS FOR CHURNING)

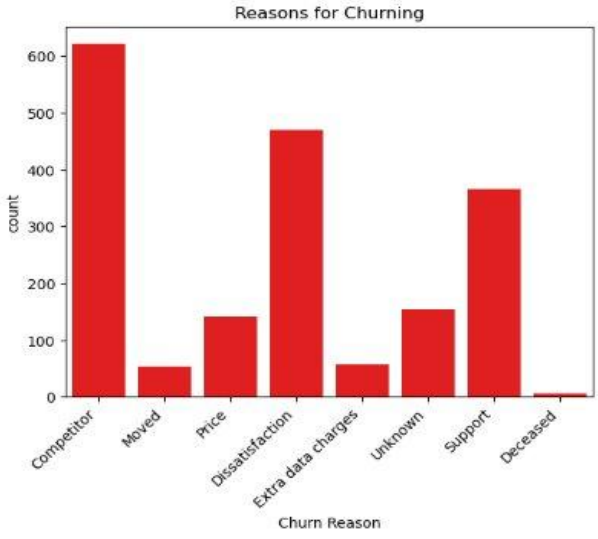
The analysis of churn reasons highlights the following key insights:

1. Competitors emerged as the leading cause of churn, cited by 621 customers, indicating the need to evaluate and enhance the company's competitive positioning.
2. Dissatisfaction with services ranked second, with 470 customers, emphasizing areas where customer satisfaction needs improvement.
3. Issues related to support services contributed to the churn of 366 customers, signaling the importance of improving customer support efficiency and accessibility.

Other notable reasons for churn include:

1. Unknown factors (154 cases).
2. Price concerns, cited by 142 customers, indicating sensitivity to costs.
3. Extra data charges (57 cases), highlighting a need to reassess pricing structures.
4. Relocation (53 cases), a natural but uncontrollable churn factor.
5. Deceased customers (6 cases), which are unfortunate but inevitable occurrences.

This breakdown offers actionable insights into prioritizing improvements in competitive offerings, customer satisfaction, and support services while addressing pricing concerns to minimize churn.



DATA ANALYSIS

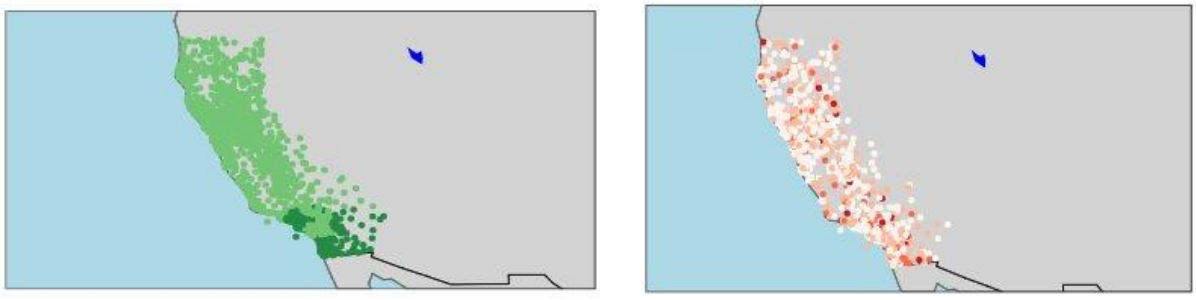
INDIRECT INSIGHTS (CONTEXTUAL INSIGHTS)

DEMOGRAPHY

The analysis of demographic factors provides the following insights into their potential impact on churn rates:

1. Location and Gender: Customers are evenly distributed across locations and genders, with identical churn rates observed. These factors do not appear to significantly influence churn.
2. Senior Citizenship: Senior citizens, who constitute less than a fifth of the customer base, have nearly double the churn rate compared to others. This suggests a notable correlation, though it is likely influenced by associated factors such as service preferences or pricing sensitivity.
3. Partner Status: Customers with partners exhibit lower churn rates compared to those without partners, suggesting that having a partner may provide stability in service usage.
4. Dependents: Customers without dependents have a churn rate exceeding 30%, higher than those with dependents. This trend could reflect differences in lifestyle or service priorities.

While demographic factors like senior citizenship, partner status, and dependents appear to influence churn rates, it is essential to recognize that these effects are likely indirect. The true drivers of churn may stem from other underlying factors, such as pricing, service satisfaction, or contract types, which correlate with these demographic attributes. Further analysis is necessary to untangle these relationships and identify actionable areas for improvement.



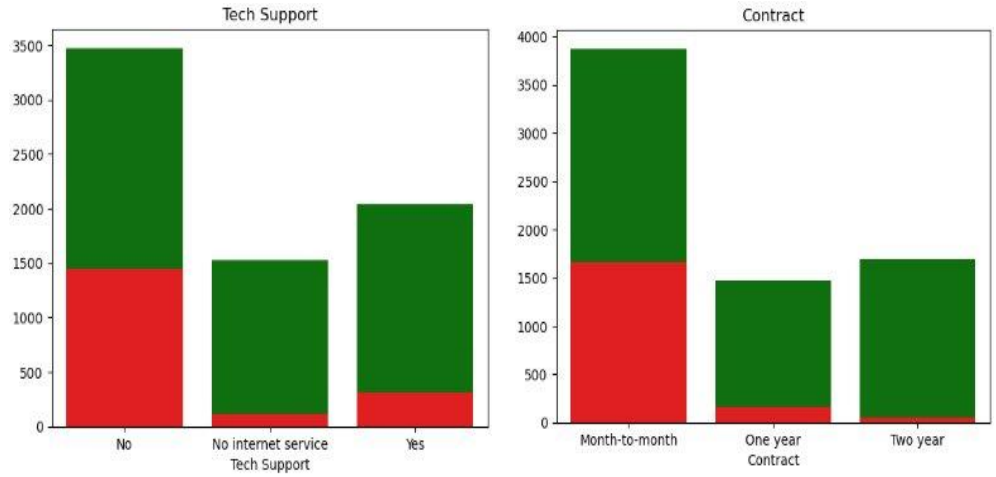
Charts showing the even distribution of customers and customer churn across California.

CUSTOMER SERVICE

Analyzing service-related features reveals several factors impacting customer churn:

1. Phone Service: The majority of customers use phone services, but churn rates remain similar regardless of phone service usage, indicating minimal impact on churn.

2. Internet Service: Fiber Optic is the most common internet service, yet it experiences higher churn rates compared to DSL. Customers without internet service have the lowest churn rates, suggesting that internet service type moderately influences customer retention.
3. Tech Support: A significant portion of customers does not utilize tech support, and this group exhibits notably higher churn rates. This emphasizes the critical role of tech support in retaining customers, as it directly contributes to customer satisfaction and retention.
4. Contract Type: Month-to-month contracts are the most common but are associated with the highest churn rates. In contrast, customers on longer-term contracts experience reduced churn, highlighting the importance of promoting extended contract options to improve retention.
5. Paperless Billing: Paperless billing users exhibit higher churn rates, but this is largely driven by the prevalence of month-to-month contracts within this group. The direct impact of paperless billing on churn appears to be minimal.



CUSTOMER BEHAVIOR

1. Tenure Months: Customers with shorter tenures exhibit higher churn rates, with churn decreasing as tenure lengthens. This trend highlights the importance of engaging and retaining customers during the early stages of their relationship with the company. Strategies aimed at improving customer satisfaction and loyalty within the first few months could significantly reduce churn.
2. Streaming TV: The availability of streaming TV services does not appear to influence churn rates significantly. Customers who subscribe to streaming TV and those who do not experience similar churn rates, suggesting this service has minimal impact on retention.
3. Streaming Movies: The impact of streaming movie services mirrors that of streaming TV, with no noticeable difference in churn rates between users and non-users. This indicates that offering streaming services alone may not be a decisive factor in influencing customer loyalty.

BILLING DETAILS

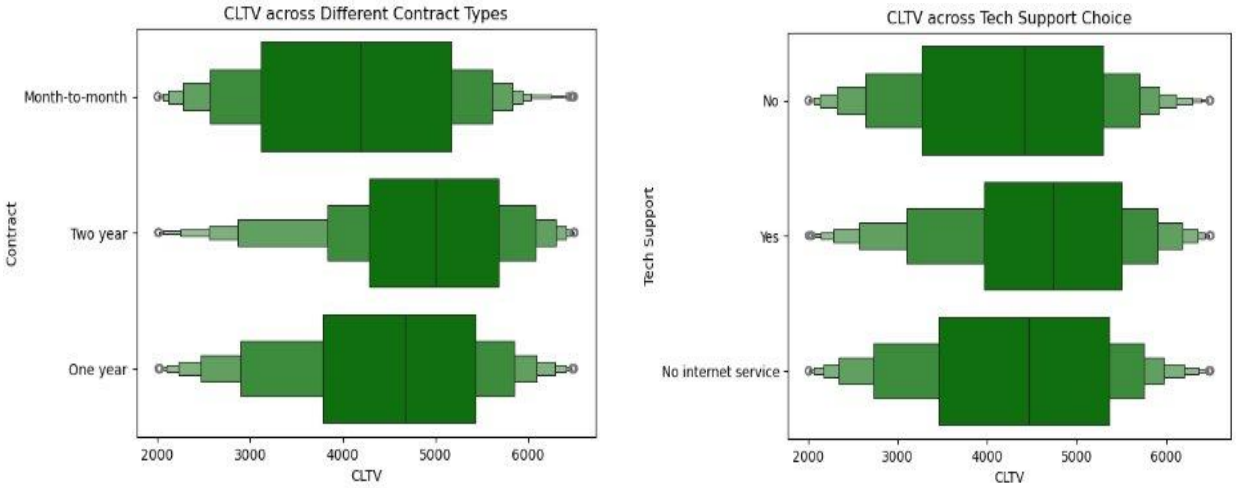
Understanding the financial aspects of customer behavior is critical in identifying churn patterns. This section examines the influence of payment methods and pricing on customer churn.

1. Payment Method: Customers who use electronic checks make up about 33% of the customer base but experience a significantly higher churn rate of approximately 50%. In contrast, other payment methods, such as bank transfers, credit cards, and mailed checks, have considerably lower churn rates. However, this trend is likely influenced more by the contract type (e.g., month-to-month contracts) associated with electronic check users rather than the payment method itself.
2. Monthly and Total Charges: The distributions of monthly and total charges are consistent across all customers, and no clear relationship between charges and churn is observed. This suggests that pricing structures, on their own, do not play a significant role in driving churn.

FINANCIAL IMPACTS – CUSTOMER LIFETIME VALUE (CLTV)

Customer churn has a significant financial impact on businesses, as it not only represents the loss of current revenue but also the potential lifetime value that could have been generated. Below are key financial insights derived from the analysis:

1. Revenue Loss from Churn: The average unrecovered value per churned customer is approximately $2,617.62, resulting in a total estimated revenue loss of $4,892,329. This highlights the substantial financial burden churn imposes on the business, underscoring the need for effective retention strategies.
2. High-Value vs. Low-Value Customers: Despite similar churn rates across customer lifetime value (CLTV) segments, the absolute number of churned high-value customers is greater due to their larger representation in the customer base. This amplifies the financial repercussions of churn among high-value customers, who contribute disproportionately to total revenue.
3. Contract Type and Financial Impact: Long-term contracts are slightly more favored by high-value customers, though not by a significant margin. Promoting long-term contracts among high-value customers could help secure more predictable revenue streams and mitigate churn-related losses.
4. Tech Support and Retention: High-value customers show a mild preference for tech support. Expanding tech support offerings could enhance customer satisfaction and retention, particularly for this segment.
5. Tenure and Revenue Consistency: There is no clear relationship between tenure and CLTV, indicating that revenue loss from churn spans across customers with varying lengths of service.



KEY INSIGHTS

1. **Customer Characteristics and Churn:**

1. Senior citizens, customers without dependents, and those with month-to-month contracts experience significantly higher churn rates.
2. Long-term contracts and the availability of tech support are associated with lower churn rates, indicating that more stability and better service options may contribute to improved retention.
3. However, while demographic factors like age, dependents, and contract type seem to influence churn rates, they likely do not directly drive churn. Instead, these factors are often reflective of other underlying factors, such as service quality and customer engagement.

2. **Churn by Payment Method:**

   Customers using electronic checks exhibit the highest churn rate (~50%), which is likely linked to their preference for month-to-month contracts that are less likely to secure customer loyalty. Other payment methods (bank transfer, credit card) show lower churn rates.

3. **Churn by Tenure:**

   Churn is higher among customers with shorter tenures and decreases as tenure increases. This suggests that customers who have been with the company for a longer period are less likely to leave, highlighting the importance of customer engagement early in the relationship.

4. **Revenue Impact:**

1. The average unrecovered value per churned customer is $2,617.62, resulting in a total revenue loss of $4.89 million.
2. Churn rates across CLTV segments are similar, but the total number of churned high-value customers is higher because this group represents a larger portion of the customer base.

5. **Service Preferences and Churn:**

1. Fiber optic internet customers have higher churn rates than DSL users or those without internet service, suggesting that pricing or service issues may be contributing factors.
2. Streaming services (TV or movies) have minimal impact on churn, implying that service offerings in this area may not significantly influence retention.

6. **Satisfaction and Support:**

   Dissatisfaction with service, lack of adequate support, and offers from competitors are the primary drivers behind customer churn. This emphasizes the need for addressing service quality and improving support mechanisms to enhance customer retention**.**

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. About $5m in potential revenue was lost with the churned customers.
2. High churn among short-tenure, senior citizens, and electronic check users highlights vulnerabilities in customer retention strategies.
3. The CLTV analysis underscores the revenue impact of churn, emphasizing the importance of retaining high-value customers.
4. Long-term contracts and tech support services are key retention levers, with a noticeable influence on reducing churn rates.
5. Customer Demography has little to no impact on customer churn.

RECOMMENDATIONS

1. Enhance Retention for High-Churn Groups: Develop targeted retention campaigns for short-tenure customers, such as personalized offers and loyalty programs.
2. Promote Long-Term Contracts: Incentivize customers to opt for longer contracts by offering discounts, better deals, or value-added services.
3. Optimize Support Services: Improve tech support availability and quality to address dissatisfaction and increase retention.
4. Address Issues for Electronic Check Users: Identify pain points specific to electronic check users (e.g., contract terms) and offer tailored solutions.
5. Focus on Competitor Analysis: Benchmark services and pricing against competitors to address customer concerns about better offerings elsewhere.
6. Monitor High-Value Customers: Implement proactive retention strategies for high-value customers, such as priority support and exclusive benefits, to minimize revenue loss.