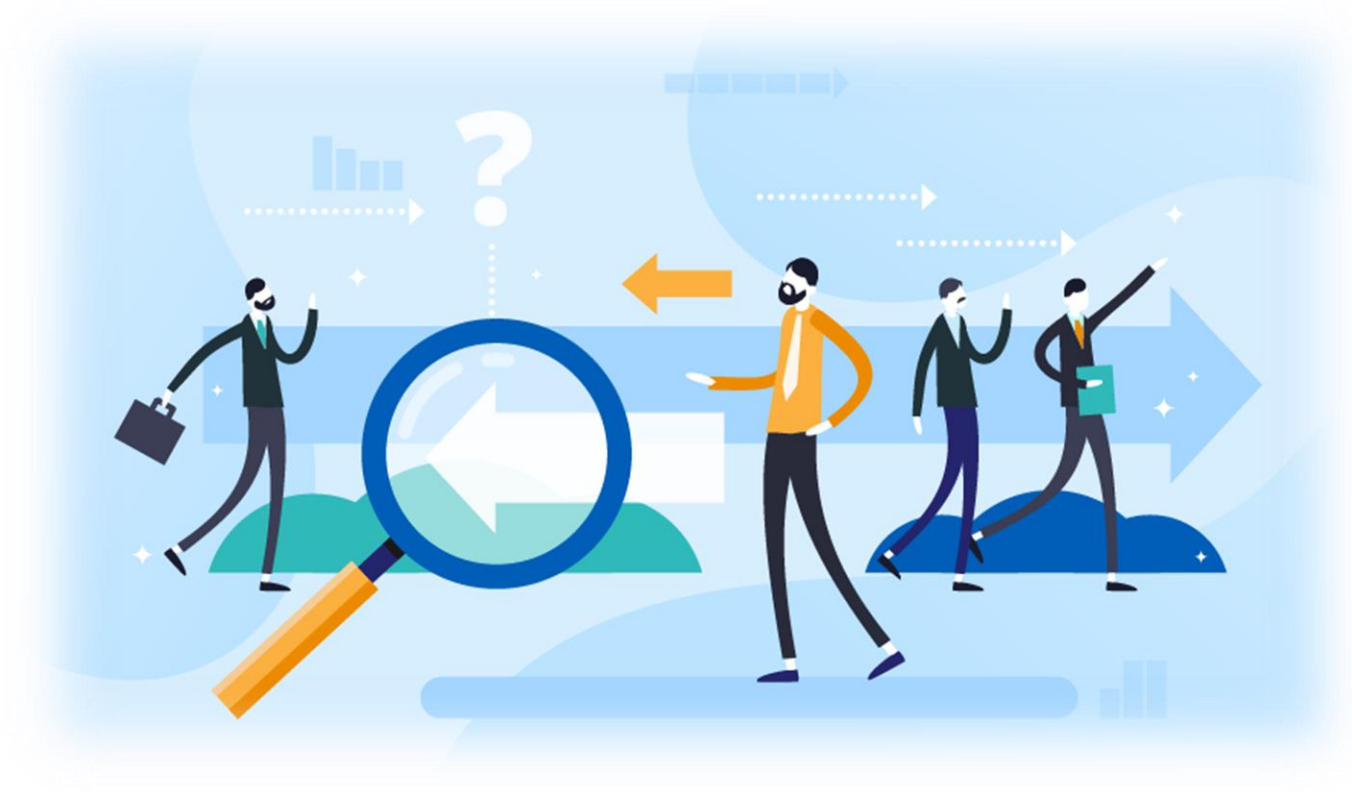
ANALYZING CUSTOMER CHURN

A DATA-DRIVEN APPROACH FOR RETENTION STRATEGIES AT SPEEDY CALL



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Abstract

This report investigates the factors influencing customer churn at Speedy Call, focusing on key variables such as Tenure, Contract Type, Monthly Charges, and Internet Service. The objective is to analyze how these factors relate to churn and customer retention. Using statistical methods such as correlation analysis, t-tests, and ANOVA, we examine the relationship between Churn and various factors. We find that Tenure is negatively correlated with churn, indicating longer tenures are linked to lower churn rates. Additionally, Contract Type significantly impacts churn, with Month-to-Month customers showing higher churn rates compared to One-Year and Two-Year contracts. Further analysis of Monthly Charges reveals significant differences between churners and non-churners. Lastly, Internet Service is shown to influence churn rates across different service types. The results suggest targeted retention strategies, particularly for Month-to-Month customers, could help reduce churn and improve customer loyalty.

CONTENT

Introduction

Customer churn is a significant challenge for telecommunications companies like Speedy Call, as it impacts long-term profitability and growth. This report aims to explore the relationship between customer churn and several key factors such as **Tenure**, **Contract Type**, **Monthly Charges**, and **Internet Service**. Understanding these factors is crucial for designing effective retention strategies. Through statistical analysis, including correlation, t-tests, and ANOVA, we assess how these variables influence the likelihood of customers leaving the service. The findings from this analysis will provide valuable insights into customer behavior and inform strategies to enhance customer retention. By identifying patterns and behaviors associated with churn, Speedy Call can implement targeted initiatives to improve customer satisfaction and reduce turnover.

- Objectives of the Study

1. Identifying Relationship between Churn and Tenure

2. Identifying Relationship between Churn and Contract

3. Compare the means of churners and non-churners of Monthly Charges.

4. One-Way ANOVA for InternetService and Churn Status

5. Compare churn rates for different Contract Types

Data

The analysis used the following variables from the SpeedyCall dataset:

1. **Tenure**: Number of months the customer has been with SpeedyCall.
2. **PhoneService**: Whether the customer has a phone service.
3. **InternetService**: Type of internet service (DSL, Fiber, None).
4. **Contract**: Type of contract (Month-to-month, One-year, Two-year).
5. **MonthlyCharges**: The monthly amount charged to the customer.
6. **Churn**: The target variable indicating if the customer churned.

Data Analysis

1. Identifying Relationship between Churn and Tenure

- Correlation Analysis

Since the Churn is categorical variable, first Churn is coded as a binary variable (0 = No, 1 = Yes). Tenure is a numerical variable. Before the correlation analysis we have to check weather, Tenure has normal data or not. Histogram can be used to test the normality of Tenure variable.

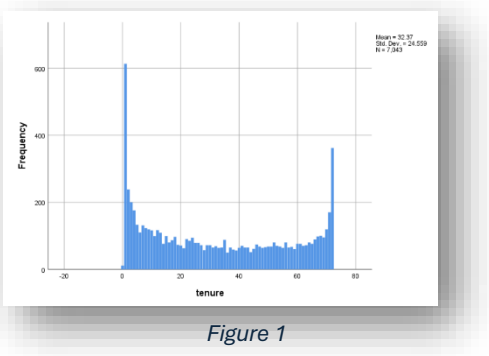

Figure 1

Visually, Tenure does not follow a normal distribution. There is a skewed distribution. Therefore, the spearman test can be used to correlation between churn and tenure.

Correlations

			Churn_numerical	tenure
Spearman's rho	Churn_numerical	Correlation Coefficient	1.000	-.367**
		Sig. (2-tailed)	.	.000
		N	7043	7043
	tenure	Correlation Coefficient	-.367**	1.000
		Sig. (2-tailed)	.000	.
		N	7043	7043

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 2

Since -0.367 falls in the moderate range, there is a meaningful, but not overly strong, negative relationship.

2. Identifying Relationship between Churn and Contract

- For categorical variables chi-square test can be used to determine association between variables.
  - Null Hypothesis (H_0) : There is no association between Churn and Contract Type.
  - Alternative Hypothesis (H_1) : There is an association between Churn and Contract Type.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1184.597[a]	2	.000
Likelihood Ratio	1386.810	2	.000
N of Valid Cases	7043		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 390.89.

Figure 3

The p-value = 0.000, which is less than the significance level of 0.05. Therefore, we can reject the null hypothesis at 5% level of significance. Hence there are enough evidence to conclude that the type of contract significantly affects whether a customer churns or not.

3. Compare the means of churners and non-churners of Monthly Charges.

To check the normality of Monthly Charges before performing the t-test, we can use the Kolmogorov-Smirnov (K-S) test. This test will help assess whether the distribution of Monthly Charges follows a normal distribution. If the K-S test shows a significant result ($p < 0.05$), the distribution of Monthly Charges is not normal, and we might consider using a non-parametric test like the Mann-Whitney U test instead of the t-test.

- Kolmogorov-Smirnov (K-S) test
  - Null Hypothesis (H_0): The distribution of the data (Monthly Charges) is normal.
  - Alternative Hypothesis (H_1): The distribution of the data (Monthly Charges) is not normal

Tests of Normality

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
MonthlyCharges	.126	7043	.000

a. Lilliefors Significance Correction

Figure 4

The test statistic is 0.126 and the significance value is less than 0.05. This result indicates that the data significantly deviates from a normal distribution ($p < 0.05$). Therefore, it can be concluded that the MonthlyCharges variable is not normally distributed. Given this violation of the assumption of normality, a non-parametric alternative, such as the Mann-Whitney U test, can be used instead of the t-test to compare the distributions between the two group.

- Mann-Whitney U test for Monthly Charges by Churn Status

To determine whether there is a significant difference in Monthly Charges between churners and non-churners, the Mann-Whitney U test is conducted.

- Null Hypothesis (H_0) : There is no significant difference in Monthly Charges between churners and non-churners.
- Alternative Hypothesis (H_1): There is a significant difference in Monthly Charges between churners and non-churners.

P value < 0.05, therefore null hypothesis is rejected at 5% significance level. According to that we have enough evidence at 5% significance level to conclude that the distributions of MonthlyCharges is different for customers who churned and those who did not churn.

4. One-Way ANOVA for InternetService and Churn Status

To examine whether there is a significant difference in Churn based on the type of InternetService, a one-way ANOVA is performed.

- Null Hypothesis (H_0) : There is no significant difference in Monthly Charges across different categories of InternetService.
- Alternative Hypothesis (H_1): There is a significant difference in Monthly Charges across different categories of InternetService.

ANOVA

Churn_numerical

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	142.763	2	71.381	408.470	.000
Within Groups	1230.261	7040	.175		
Total	1373.024	7042			

Figure 5

Since the p-value is 0.000 (less than 0.05), we reject the null hypothesis (H_0). This means there are statistically significant differences in churn rates across the different categories of InternetService.

Since the ANOVA indicates a significant difference (p-value < 0.05), we have to perform a post-hoc test to determine which groups differ from each other.

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Churn_numerical

Tukey HSD

(I) newInternet	(J) newInternet	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
.00	1.00	-.116*	.014	.000	-.15	-.08
	2.00	-.345*	.013	.000	-.38	-.31
1.00	.00	.116*	.014	.000	.08	.15
	2.00	-.229*	.011	.000	-.26	-.20
2.00	.00	.345*	.013	.000	.31	.38
	1.00	.229*	.011	.000	.20	.26

*. The mean difference is significant at the 0.05 level.

Figure 6

Since all significance values in the post hoc test are less than 0.05, we can conclude that the differences in churn rates between each pair of Internet service groups are not due to random chance but represent meaningful distinctions in customer behavior. This means that the type of Internet service affects customer churn, and each service type may need a different strategy to reduce churn.

5. Compare churn rates for different Contract Types

This section focuses on evaluating how customer churn rates differ across various contract types, including Month-to-Month, One-Year, and Two-Year contracts. The goal is to assess whether the length of the contract has a significant impact on the likelihood of customer churn.

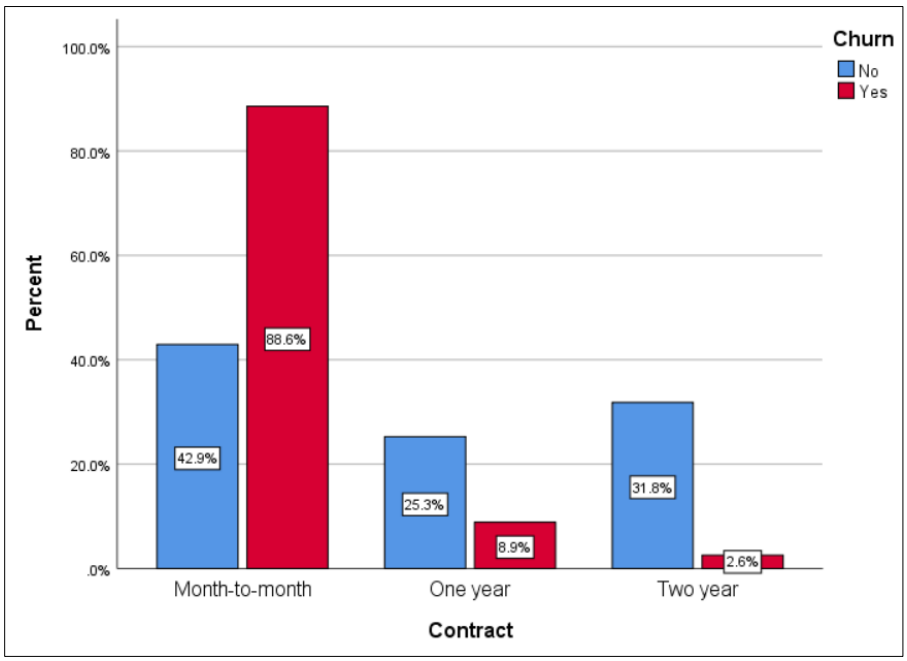

Figure 7

The results show that contract type has a big impact on customer retention:

- Month-to-Month customers have the highest churn rates, meaning customers with shorter contracts are more likely to leave.
- Customers with One-Year and Two-Year contracts have much lower churn rates, with Two-Year contracts showing the highest levels of retention.

This suggests that Speedy Call should focus on retaining Month-to-Month customers by offering incentives to encourage them to switch to longer contracts, which are less likely to result in churn.

General Discussion and Conclusion

- General Discussion

The analysis reveals several factors influencing customer churn at Speedy Call. Tenure is negatively correlated with churn, meaning longer tenures are associated with lower churn rates. Contract Type also plays a significant role, with Month-to-Month customers showing much higher churn rates compared to those with One-Year or Two-Year contracts. This suggests that Speedy Call could benefit from encouraging Month-to-Month customers to switch to longer contracts. Additionally, churners tend to have higher Monthly Charges, indicating that pricing might be a factor in churn. Lastly, differences in churn rates across Internet Service types suggest that each service category may require tailored retention strategies. These insights can help Speedy Call improve customer retention by targeting the factors most closely linked to churn.

- Conclusion

The analysis shows that **Tenure**, **Contract Type**, **Monthly Charges**, and **Internet Service** all impact customer churn at Speedy Call. Longer-tenured customers are less likely to churn, and **Month-to-Month** contracts have higher churn rates. Higher **Monthly Charges** are linked to increased churn, and churn rates vary across **Internet Service** types. Addressing these factors with targeted retention strategies can help reduce churn and improve customer loyalty.

REFERENCES

- Lecture materials
- https://guides.lib.uoguelph.ca/c.php?g=525348&p=5286104#:~:text=T%2DTEST%20VERSION)-,Click%20on%20Analyze.,the%20%E2%80%9CCustomize%20analysis%E2%80%9D%20circle.