


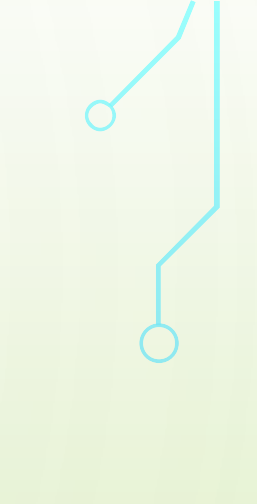
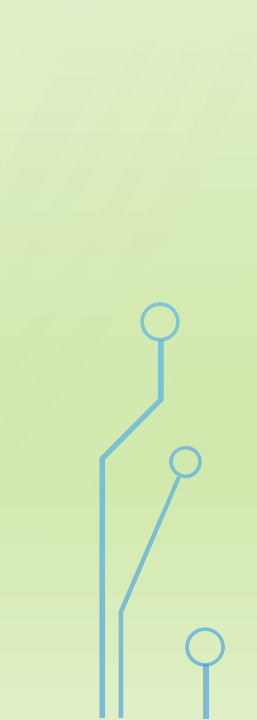
PREDICTING CUSTOMER CHURN

Thanks to Mentor.
Mr. A J Sanchez

By,
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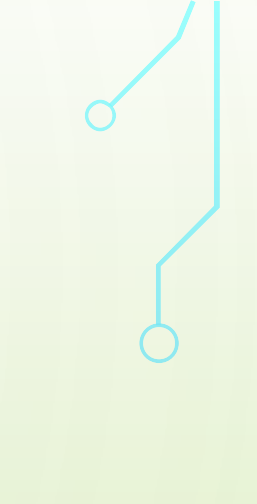
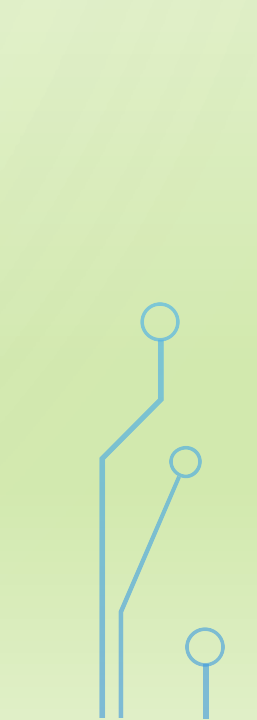


INTRODUCTION

- Churn quantifies the number of customers who have unsubscribed or canceled their service contract. Customers turning their back to a service or product are no fun for any business. It is very expensive to win them back once lost.
 - Keeping the right customers can be quite valuable for a company. Not only because customer acquisition is much more expensive, but as more and more business models are shifting towards subscription plans, a customer can be worth thousands of dollars in future.
 - Reducing churn ultimately leads to a sustainable growing business.
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PROBLEM STATEMENT

- The challenge here is to build a model that identifies customers with the intention to leave a service in the near future.
 - The data contains Demographic information like gender, age range, and whether they have partners and dependents, contains customer account information, services that each customer has signed up for and lastly customers who left within the last month – the column is called Churn.
 - My solution looks into building machine learning models to predict customer churn. Given the dataset, the model could estimate whether a customer may or may not be unsubscribed to a service.
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DATASET INFORMATION

- Dataset was available in Kaggle's website and was saved into local as 'BlackFriday.csv'
- The data available in the data set has below columns.

Variable	Definition
customerID	Customer ID
gender	Sex of User
SeniorCitizen	Senior Citizen
Partner	Partner
Dependents	Dependents
tenure	Tenure
PhoneService	Phone Service
MultipleLines	Multiple Lines
InternetService	Internet Service
OnlineSecurity	Online Security
OnlineBackup	Online Backup
DeviceProtection	Device Protection
TechSupport	Tech Support
StreamingTV	Streaming TV
StreamingMovies	Streaming Movies
Contract	Contract
PaperlessBilling	Paperless Billing
PaymentMethod	Payment Method
MonthlyCharges	Monthly Charges
TotalCharges	Total Charges
Churn	Churn

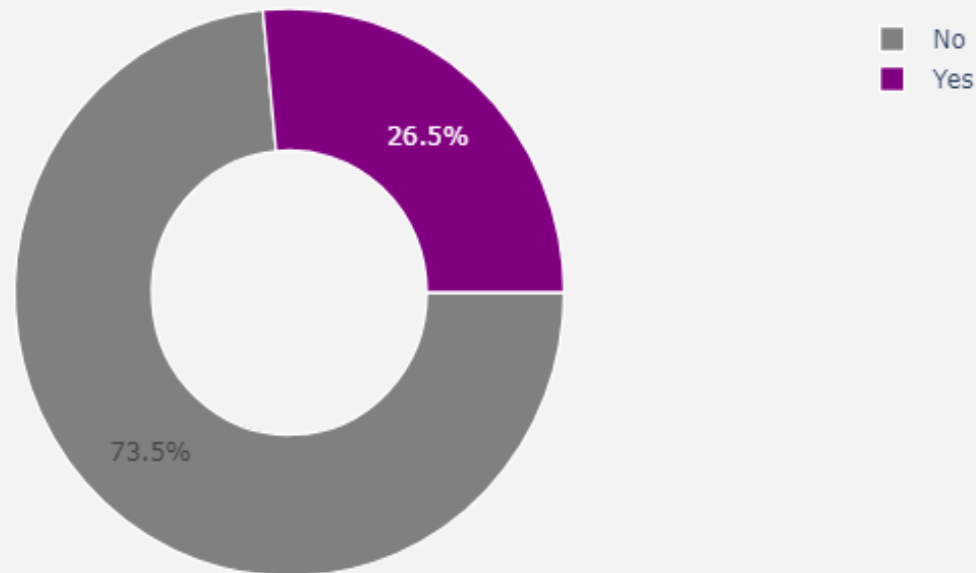
DATA WRANGLING STEPS

- Used pandas read_csv module to import the data set.
- Upon executing the read_csv function using the info() method, the csv file has 7043 entries and 21 columns with different formats of data. There were no missing values.
- Changing the data type of TotalCharges column resulted in error as there were blank spaces in the column. Rectified these errors by replacing them with the mean values of the column.
- Changed the data in few other columns like 'OnlineSecurity', 'OnlineBackup', 'DeviceProtection', 'TechSupport', 'StreamingTV', 'StreamingMovies', 'MultipleLines' and 'SeniorCitizen'. Also added an extra column called TenureGroup to group the data from Tenure column.

DATA STORYTELLING

- After I wrangled and cleaned the dataset, I started to explore the data in detail. To put great visualizations, I used 'Plotly' library.

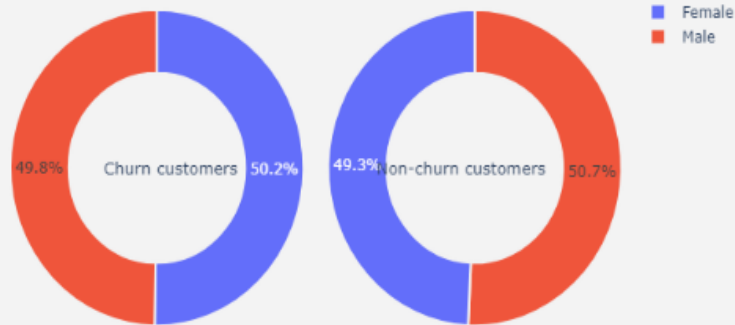
Customer churn in data



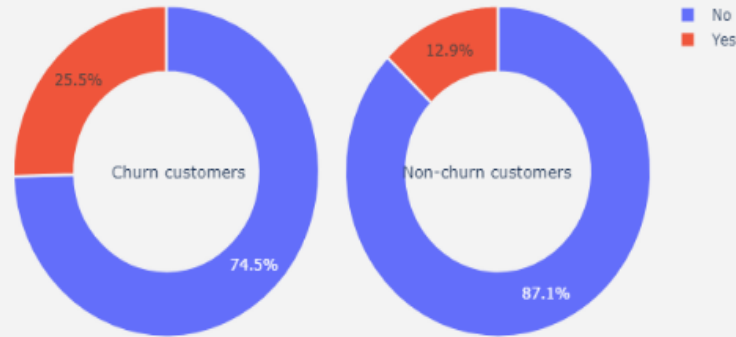
- Only 26.6% of the data represents churn customers and the majority are the non-churn customers.
- We might be dealing with a class imbalance problem as there are more non-churned customers than the churned ones.

Plots for some of the categorical columns

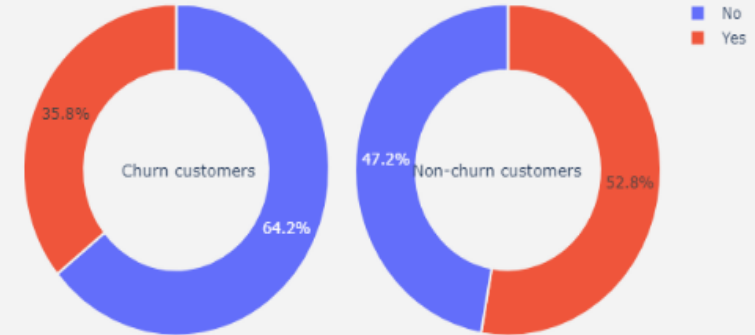
"gender" distribution in Customer Churn



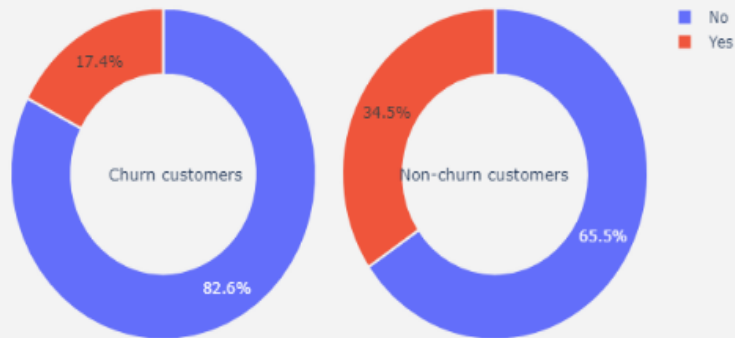
"SeniorCitizen" distribution in Customer Churn



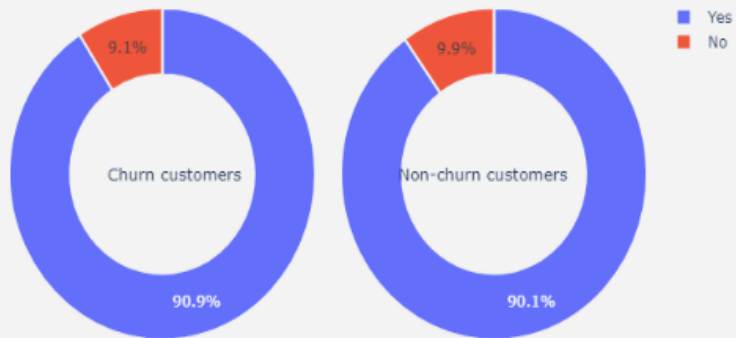
"Partner" distribution in Customer Churn



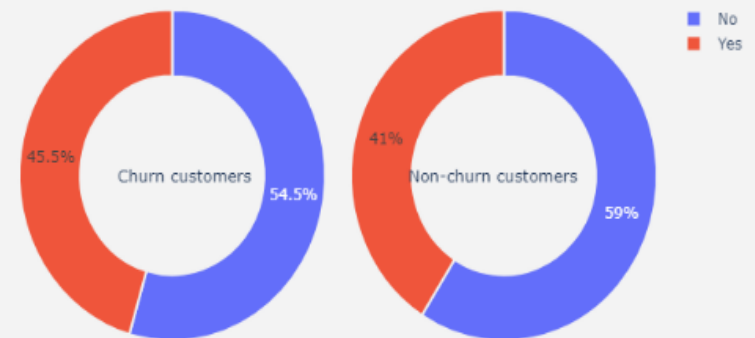
"Dependents" distribution in Customer Churn



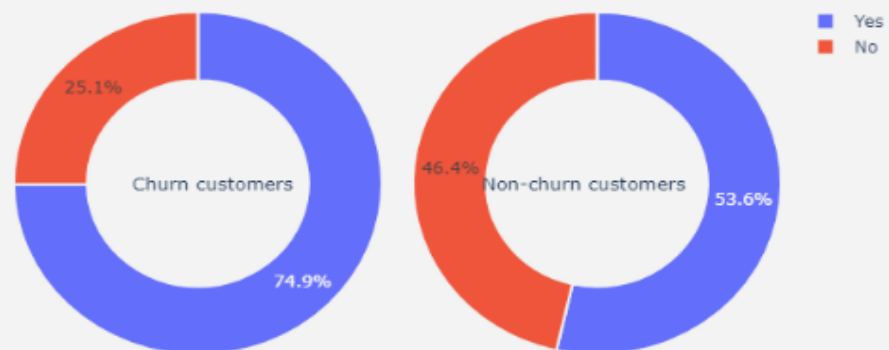
"PhoneService" distribution in Customer Churn



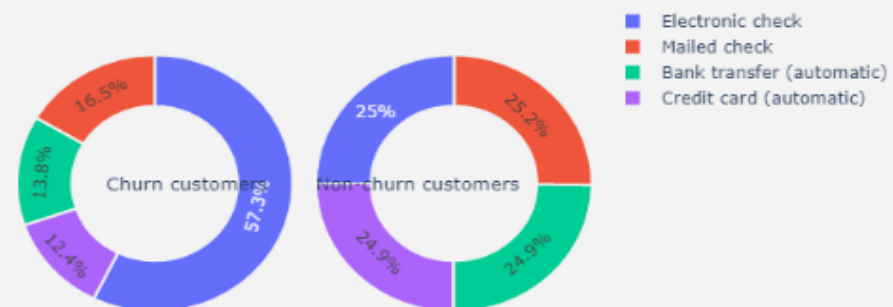
"MultipleLines" distribution in Customer Churn



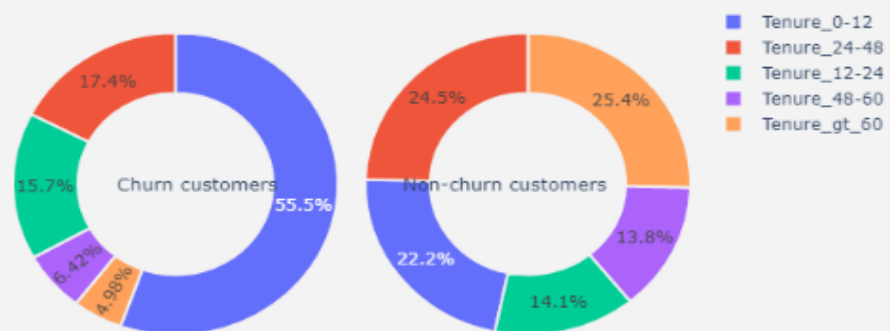
"PaperlessBilling" distribution in Customer Churn



"PaymentMethod" distribution in Customer Churn

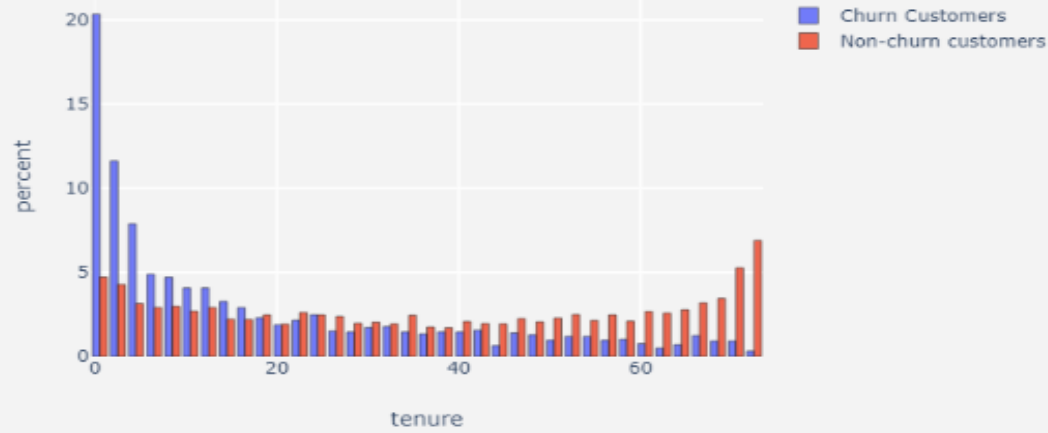


"Tenure_group" distribution in Customer Churn

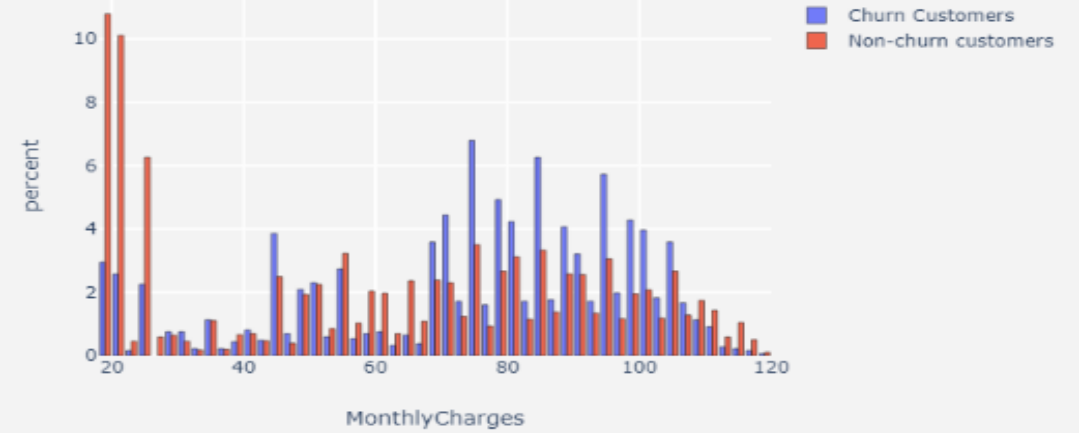


Histograms for all the numerical columns

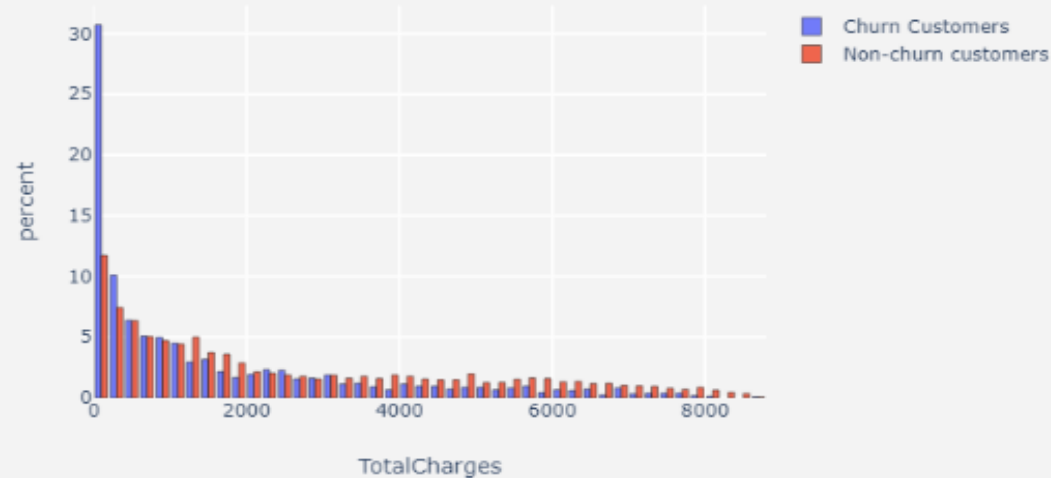
"tenure" distribution in Customer Churn



"MonthlyCharges" distribution in Customer Churn

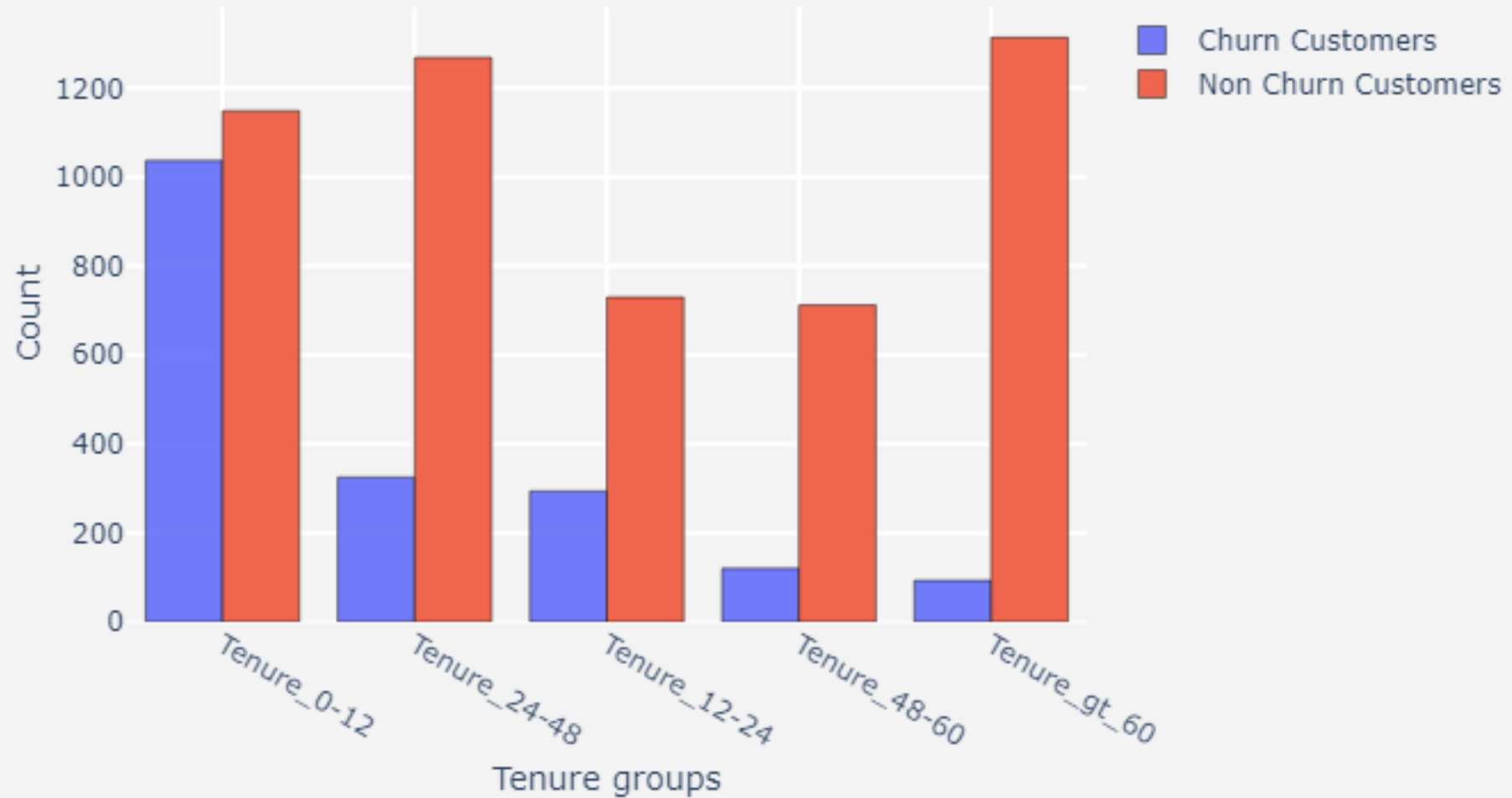


"TotalCharges" distribution in Customer Churn



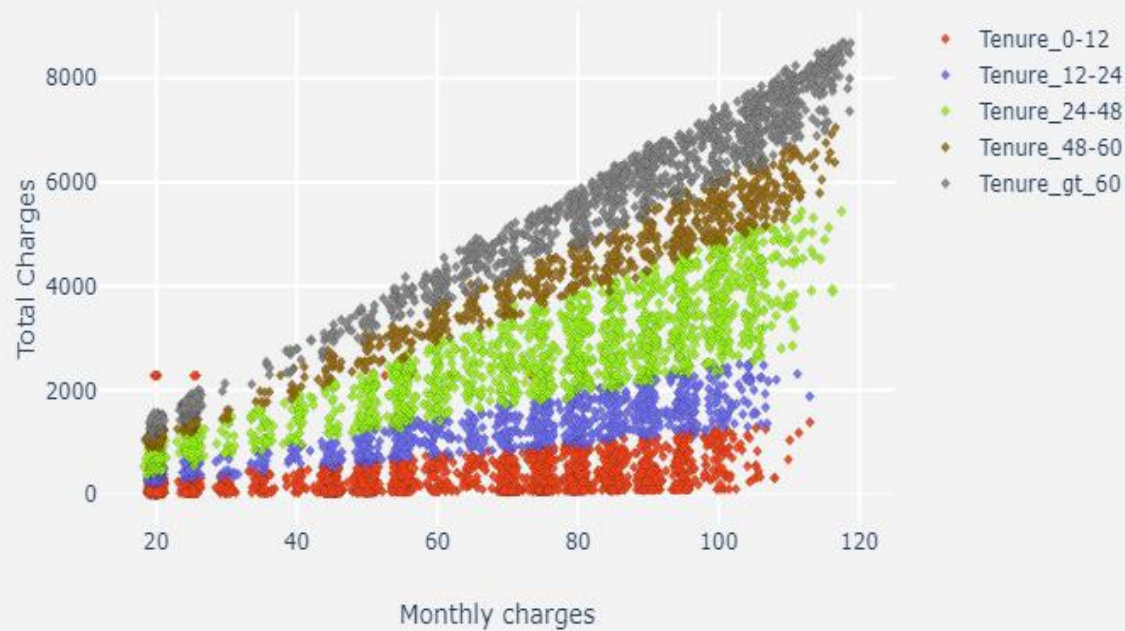
Customer Churn in Tenure groups

Customer churn in tenure groups

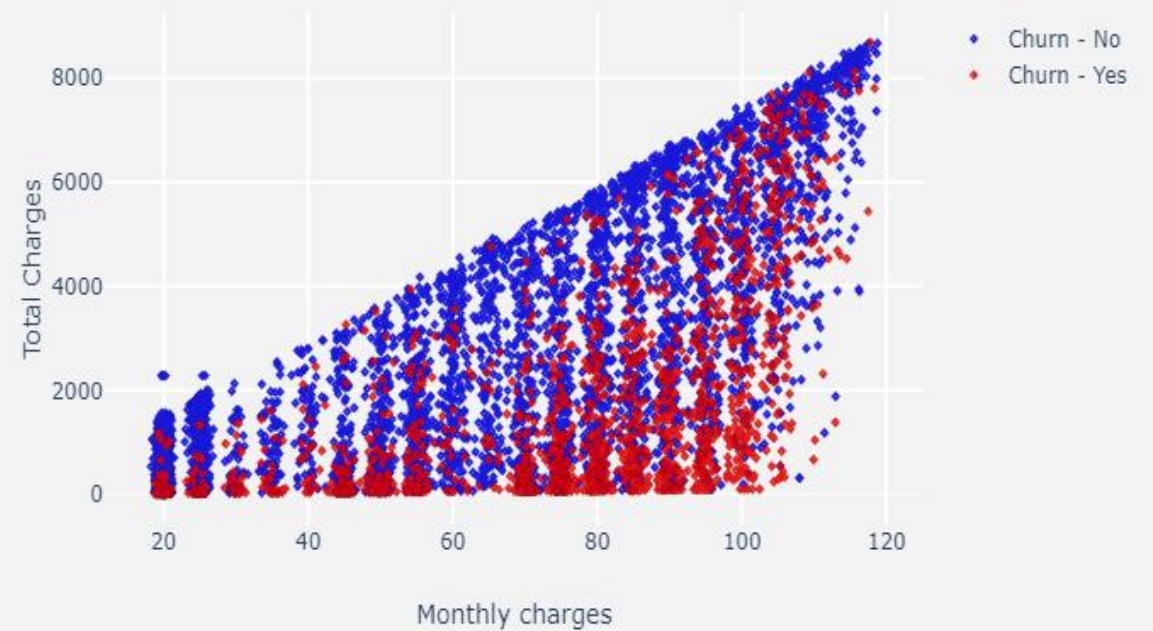


Monthly Charges and Total Charges by Tenure group and Churn group

Monthly Charges & Total Charges by Tenure group

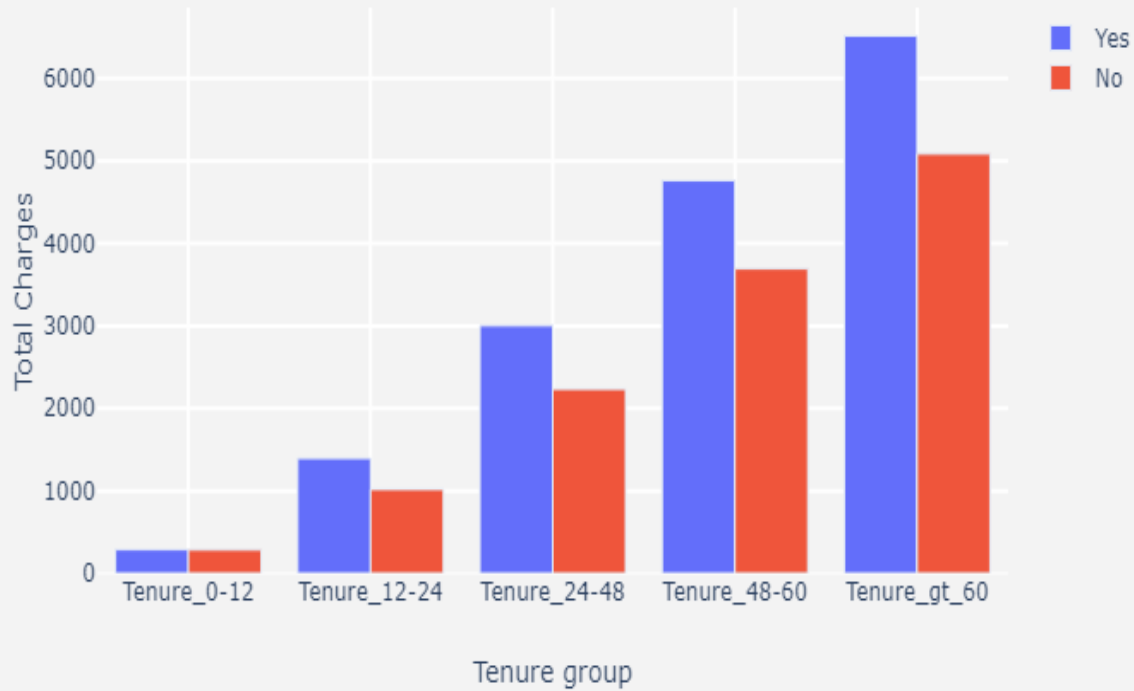


Monthly Charges & Total Charges by Churn group

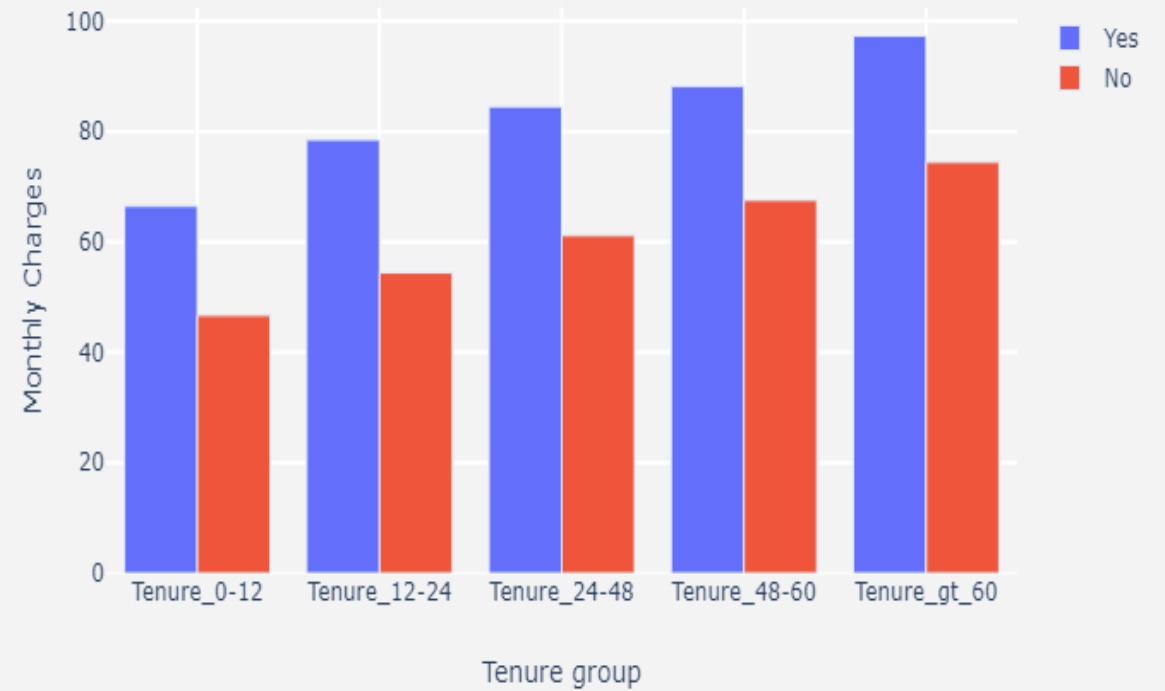


Average charges by Tenure Groups

Average Total Charges by Tenure groups



Average Monthly Charges by Tenure groups



HYPOTHESIS TESTING - CHI-SQUARE TEST

- The Pearson's Chi-Squared test, or just Chi-Squared test is a statistical hypothesis test that assumes (the null hypothesis) that the observed frequencies for a categorical variable match the expected frequencies for the categorical variable. The test calculates a statistic that has a chi-squared distribution, named for the Greek capital letter Chi (χ) pronounced "ki" as in kite.
- The Chi-Squared test uses something called a contingency table, by first calculating the expected frequencies for the groups, then determining whether the division of the groups, called the observed frequencies, matches the expected frequencies. The result of the test is a test statistic that has a chi-squared distribution and can be interpreted to reject or fail to reject the assumption or null hypothesis that the observed and expected frequencies are the same.

Inferential Statistics

- Imported the 'chi2' and the 'chi2_contingency' from the scipy.stats library and wrote a function for Contingency table for all the categorical columns and the numerical columns.
- The function returned a Contingency table for each categorical/numerical column against the target variable i.e. Churn, degrees of freedom, expected values, the test statistics such as Probability, Critical values, Chi-square statistic, significance and the p-value.
- If the p-value < 0.05 , it would mean there is a relationship between the 2 categorical variables.

Table shows the significance of all the Categorical and Numerical Columns.

Categorical Columns		Numerical Columns	
Column Name	Significance	Column Name	Significance
SeniorCitizen	YES	tenure	YES
Partner	YES	MonthlyCharges	YES
Dependents	YES	TotalCharges	NO
MultipleLines	YES		
InternetService	YES		
OnlineSecurity	YES		
OnlineBackup	YES		
DeviceProtection	YES		
TechSupport	YES		
StreamingTV	YES		
StreamingMovies	YES		
Contract	YES		
PaperlessBilling	YES		
PaymentMethod	YES		
Tenure_group	YES		
Gender	NO		
PhoneService	NO		