

Customer Churn in Telecom Industry

Professor: Dr. Seongsoo Jang

Saketh Sabbana

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Executive Summary

In the last few years, the Telecom market has been facing pricing pressure worldwide. This raises the need for increasing customer retention in the sector and companies are using various strategies to achieve the same. Customer Segmentation and Personalized Marketing are some of the many ways in which companies are trying to retain customers. For this it is essential to have a good knowledge of all the factors influencing a customer's decision to churn. Here, we are looking at a dataset by IBM which contains a lot of significant factors to understand customer churning. After running models and performing various clustering methods, we notice some interesting insights. Our analysis shows that most churning customers do not opt for yearly contracts and instead go with monthly contracts. Most people churning do not have dependents either, which emphasizes the need for specific marketing for that segment.

Introduction

Companies can increase their profits by enhancing their customer databases, subsequently, improving the revenue figures. This can be achieved in two ways: Customer acquisition and retention of customers. Companies can look for new customers that don't have their products and try bringing them in as customers. The problem with this approach is that most markets are saturated. Especially in telecom industry, finding a customer who is not already associated with some other company is near to impossible. Either a customer is with the company or it's competitors. As a result, they are associated with high costs; with the cost of acquiring a new customer is estimated to be 6-7 fold that of the costs involved in the maintenance of its existing customers. Therefore, it is both expensive and not an easy task for telecom companies to enroll new members.

The alternative is to retain customers that are currently with the company as managing their accounts incurs lower costs. It is also spotted that the longer the customer is with the company, the less likely it is for them to leave. As a result, it becomes easier to keep them the longer they are there. Additionally, customer loyalty is priceless. A satisfied customer brings in their families, friends and others acting as a word-of-mouth advertising for the firm, which is not only free but also more credible. It is much easier to sell new products to an existing customer than to a new one because all barriers to purchase have already been surpassed. Treating the customers well and incentivizing them to refer to others, will help reap many benefits for companies. It can also be observed that 80% of companies' revenues come from only 20% of the existing customer bases.

In comparison, convincing prospective leads into becoming customers often involves a lot of time and effort, ultimately costing more. For this reason, in telecom sector, customer attrition, also known as customer churn that is the loss of clients or customers, has become more important than ever. Companies need to get a full view of the entire customer journey from acquisition, onboarding, upgrade cycles and even till the eventual disconnect. They need to customize the treatment to focus on customer segments that have high tendency to churn. In addition, they should build deeper relationships with their customers at scale.

Research Objectives

Our main objective is to understand why a customer is leaving a company in the telecom sector and build a predictive model to analyze who is likely to leave and also, to arrive at a meaningful conclusion to the study. The following research objectives were formulated to help us recognize the factors influencing the customer to churn.

- Is monthly price an influential factor in churning of customers?
- Which aspects of service provider services are important while a customer is deciding to leave?
- What are the differences in features used by the customers that churned and those that did not?
- Suggest few marketing retention strategies to attenuate the churning rate

Methods

Data Source: Kaggle(<https://www.kaggle.com/blastchar/telco-customer-churn>)

Each row represents a customer, each column contains customer's attributes described on the column Metadata. The raw data contains 7043 rows (customers) and 21 columns (features). This data has churning information of customers who left within 1 month.

The data contains the following columns:

customerID: Customer ID

Gender: Whether the customer is a male or a female

SeniorCitizen: Whether the customer is a senior citizen or not (1, 0)

Partner: Whether the customer has a partner or not (Yes, No)

Dependents: Whether the customer has dependents or not (Yes, No)

Tenure: Number of months the customer has stayed with the company

PhoneService: Whether the customer has a phone service or not (Yes, No)

MultipleLines: Whether the customer has multiple lines or not (Yes, No, No phone service)

InternetService: Customer's internet service provider (DSL, Fiber optic, No)

OnlineSecurity: Whether the customer has online security or not (Yes, No, No internet service)

OnlineBackup: Whether the customer has online backup or not (Yes, No, No internet service)

DeviceProtection: Whether the customer has device protection or not (Yes, No, No internet service)

TechSupport: Whether the customer has tech support or not (Yes, No, No internet service)

StreamingTV: Whether the customer has streaming TV or not (Yes, No, No internet service)

StreamingMovies: Whether the customer has streaming movies or not (Yes, No, No internet service)

Contract: The contract term of the customer (Month-to-month, One year, Two year)

PaperlessBilling: Whether the customer has paperless billing or not (Yes, No)

PaymentMethod: The customer's payment method (Electronic check, Mailed check, Bank transfer (automatic), Credit card (automatic))

MonthlyCharges: The amount charged to the customer monthly

TotalCharges: The total amount charged to the customer

Churn: Whether the customer churned or not (Yes or No)

Exploratory Data Analysis

First and foremost we cleaned the data, it had a lot of Null Values which we needed to remove to maintain consistency. Churn variable is the Boolean of whether or not a customer has left in the last month. We checked how many customers churned:

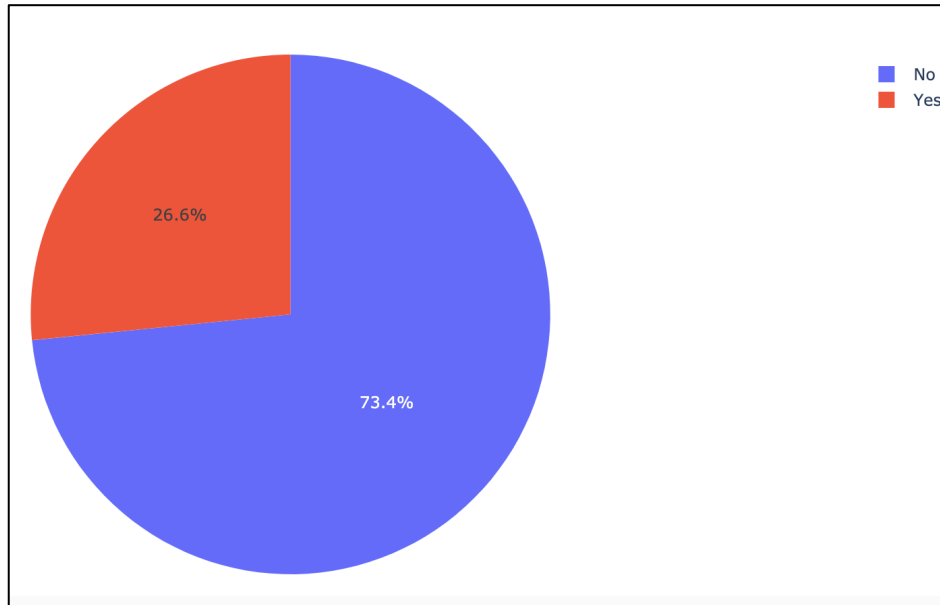


figure 2.1

From *figure 2.1* we can notice that in the month that the data was captured, the company has lost about 27% of its customer base. For any telecom company this is a huge number. So we separated the data to see if there are any noticeable differences between customers who churned and who did not churn.

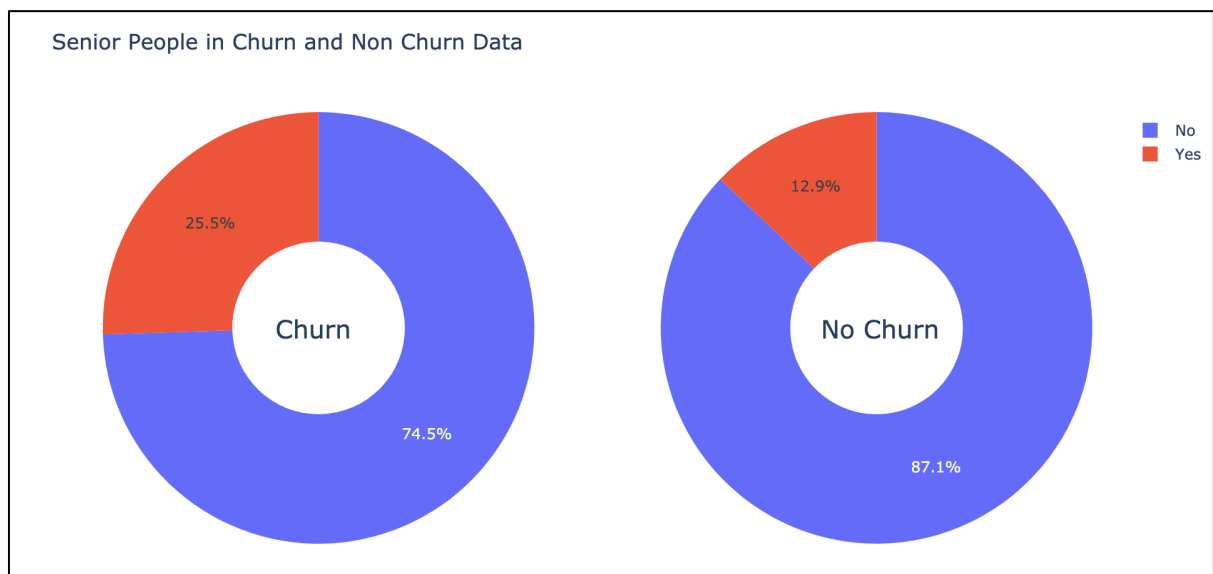


figure 2.2

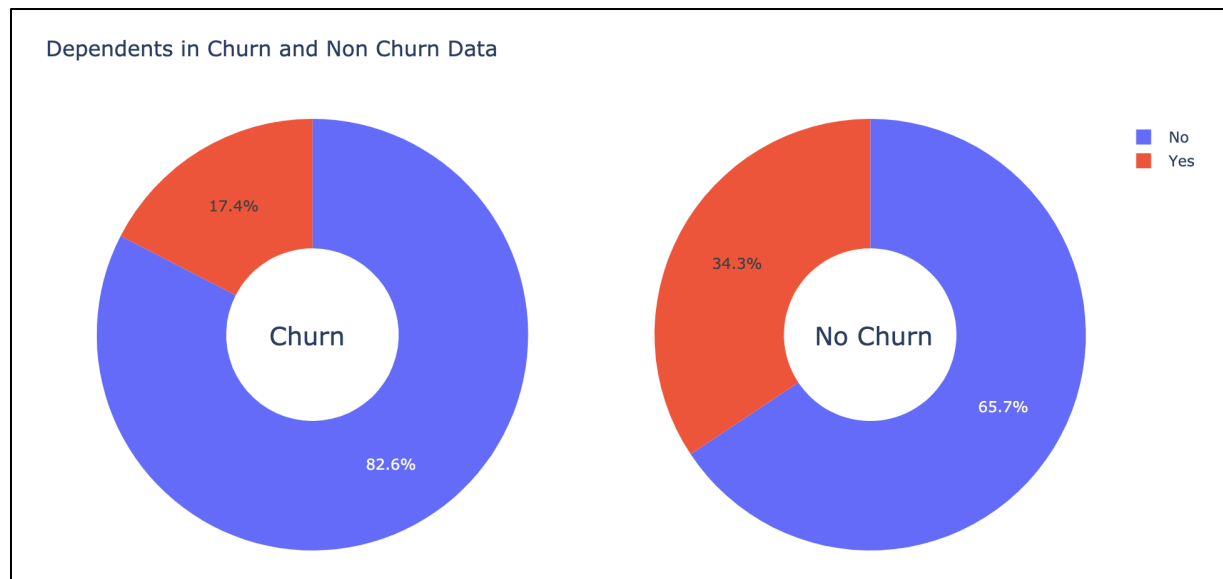


figure 2.3

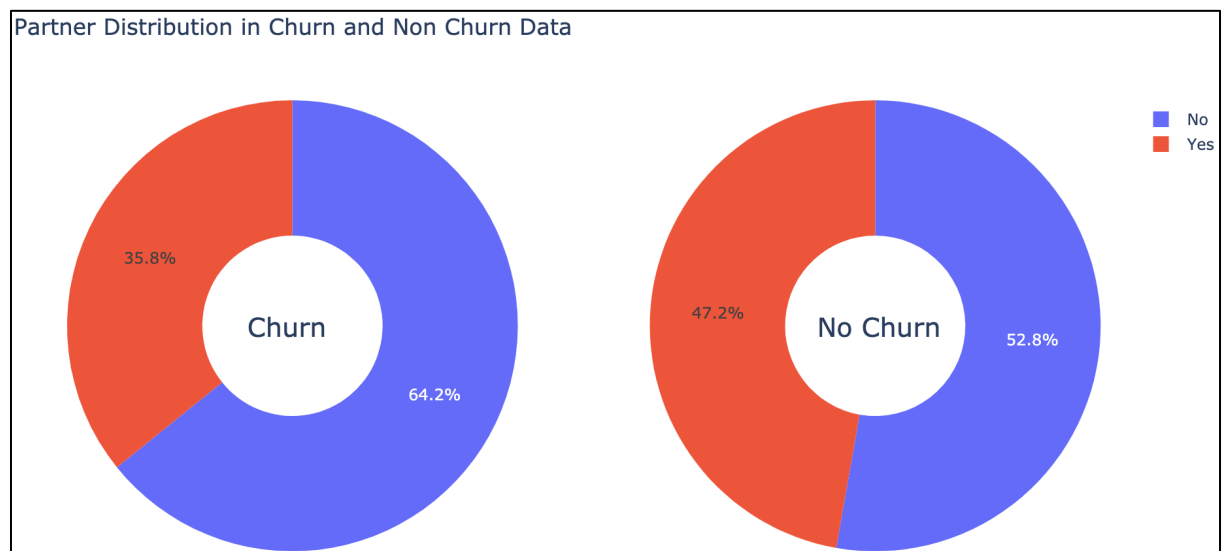


figure 2.4

From *figure 2.2* we see that a lot of senior people have decided to look for other options. We have found a possible reason explained later in the report. *figure 2.3* and *figure 2.4* indicates that customers who are leaving have no dependents or partners, which suggests that the telecom company should focus on customers with families or dependents. Maybe they should market more family related plans.

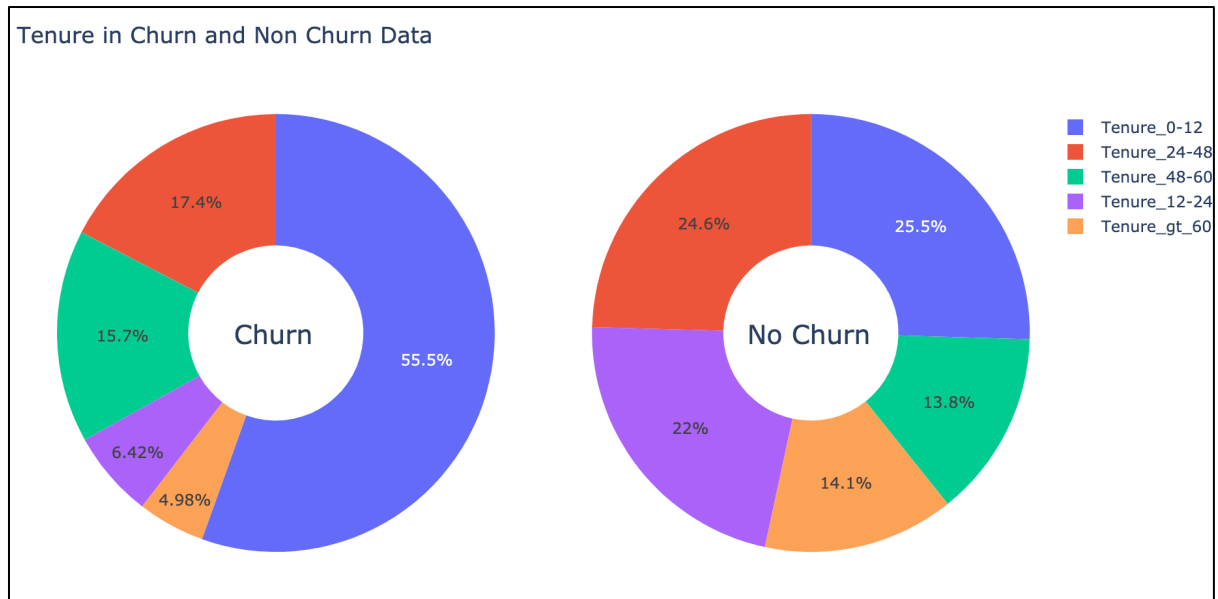


figure 2.5

We have binned the data based on the tenure of the customer(months) into 5 bins:

- **Tenure_0_12** – Customers who stayed with the company for less than a year
- **Tenure_12_24** - Customers who stayed with the company for 1-2 years
- **Tenure_24_48** - Customers who stayed with the company for 2-4 years
- **Tenure_48_60** - Customers who stayed with the company for 4-5 years
- **Tenure_gt_60** - Customers who stayed with the company for 5 years & above

The above figure (*fig 2.5*) shows us that among the people churning more than about 55% of the people have been with the company for less than a year. It is completely understandable that the majority of people shifting are newcomers, but 55.5% of churned people - a total of 1037 customers is a huge chunk, there is a gap that needs to be filled. Attractive offers, better experiences and better overall quality might be what is required and the same should definitely be an area of focus by the telecom company. Having a look at the average charges per tenure group:

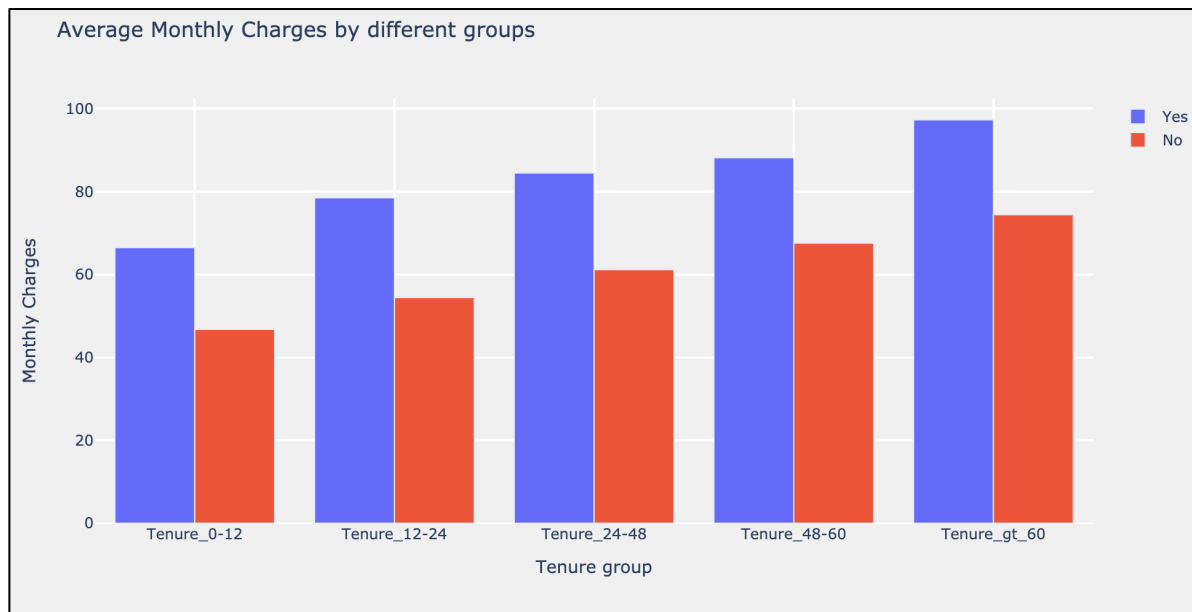


figure 2.6

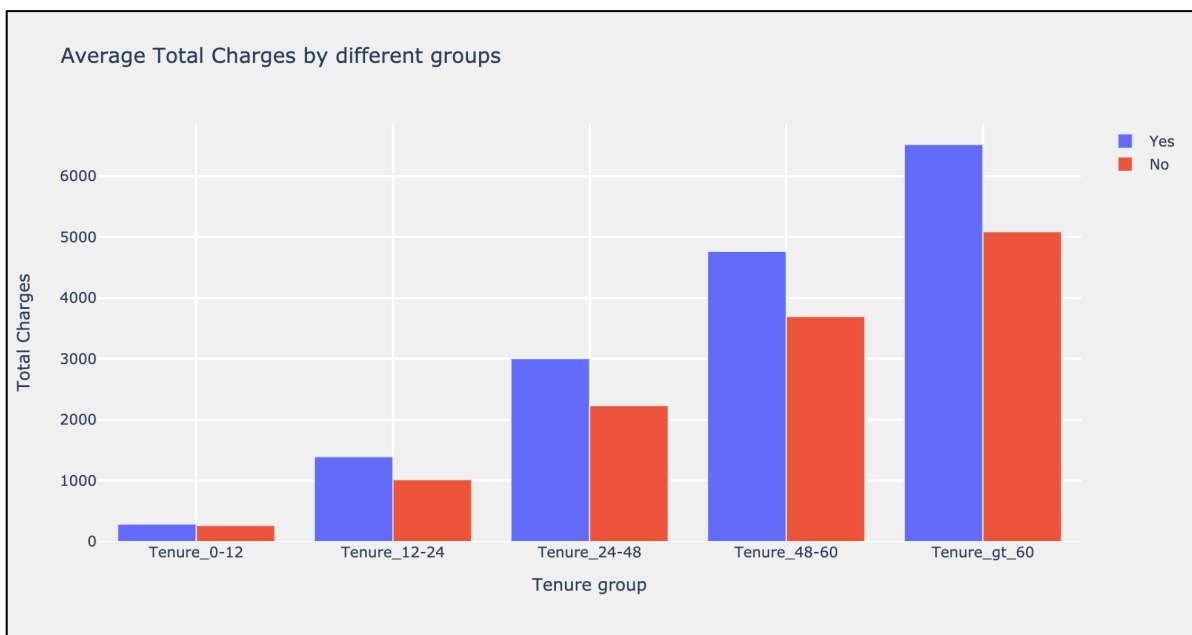


figure 2.7

Fig 2.6 and fig 2.7 show the data of average costs with respect to each tenure group in the churn data and the non-churn data respectively. From fig 2.6 we see that the average monthly charges for *tenure_group_0_12* is decent, but once we look at the fig 2.7 we understand they do not contribute much to the total charges. This defines our most important customers - the customers who have stayed with the company for more than 2 years at least. The monthly charges and the total charges keep increasing as the term increases, which is definitely a good sign.

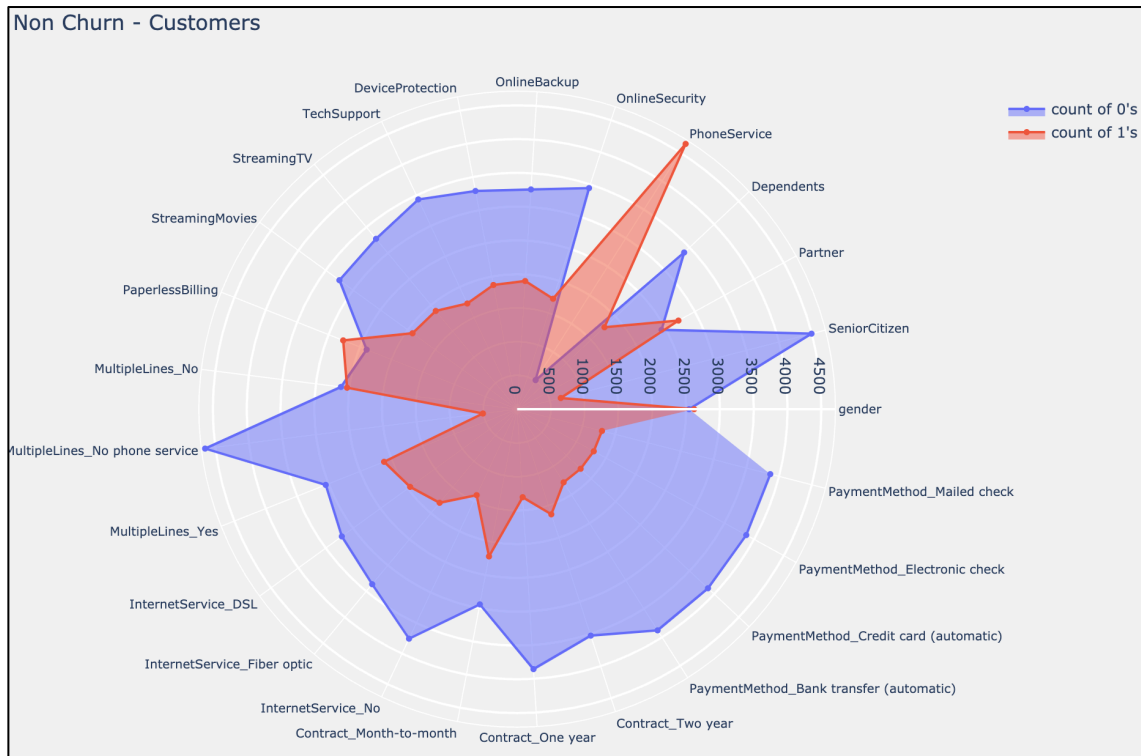


figure 2.8

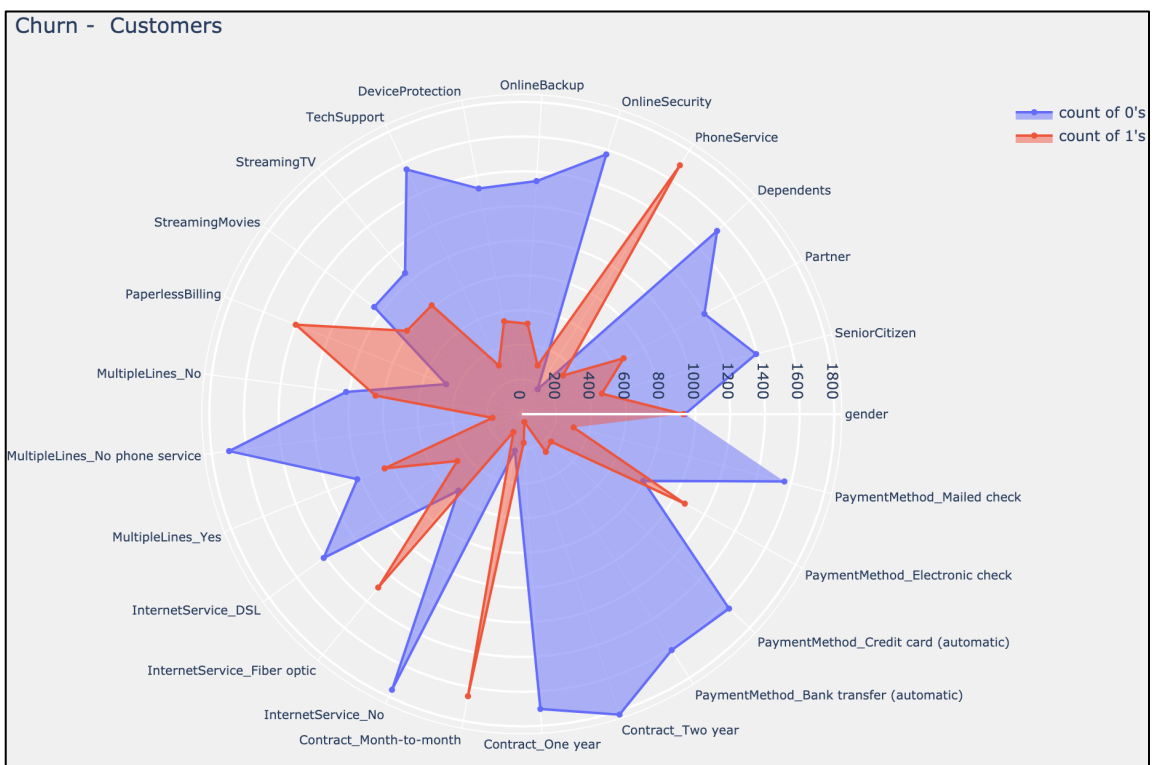


figure 2.9

Noticing patterns in *fig 2.8* and *fig 2.9*, we see spiking towards *Contract_Month-to-Month* among churning customers indicating that customers with annual contracts don't find it easy to churn, we also see that most churning customers opted for Fiber

Optic Internet Service instead of DSL, since they have churned maybe that implies that the quality or the bandwidth of the connection was not that great, maybe the telecom company should work on that, maybe they should compare the speeds and reliability of the internet connection to market competition. If we notice the payment method, among customers who have churned, electronic check is the most popular. This might indicate there is a problem with the payment method, the company should check on the intuitiveness and the ease of use among this payment method, especially for people who are senior citizens, who might not have a strong technical knowledge.

Clustering

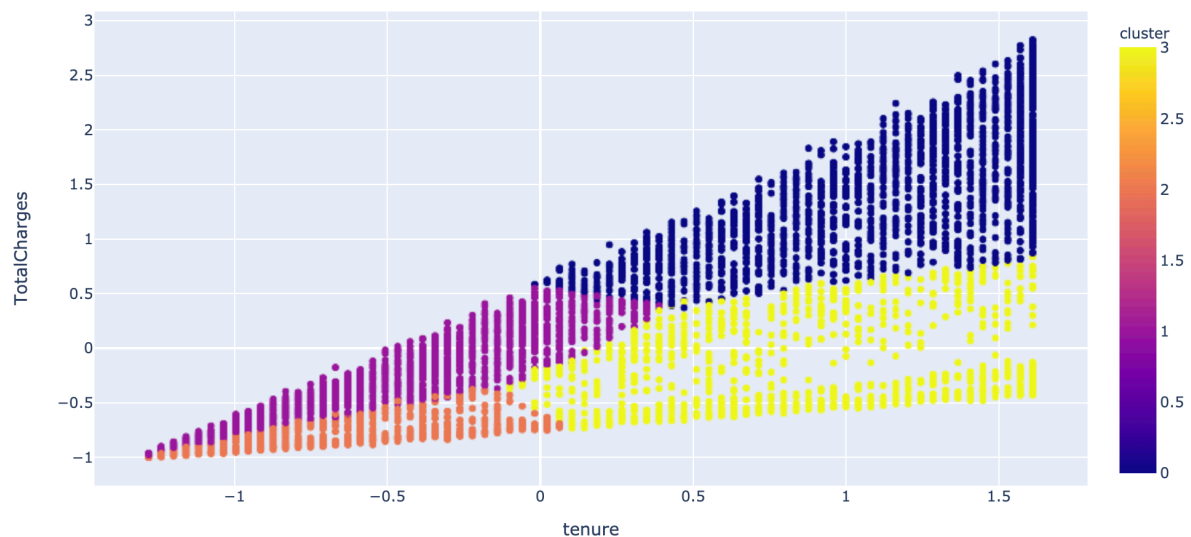


figure 2.10

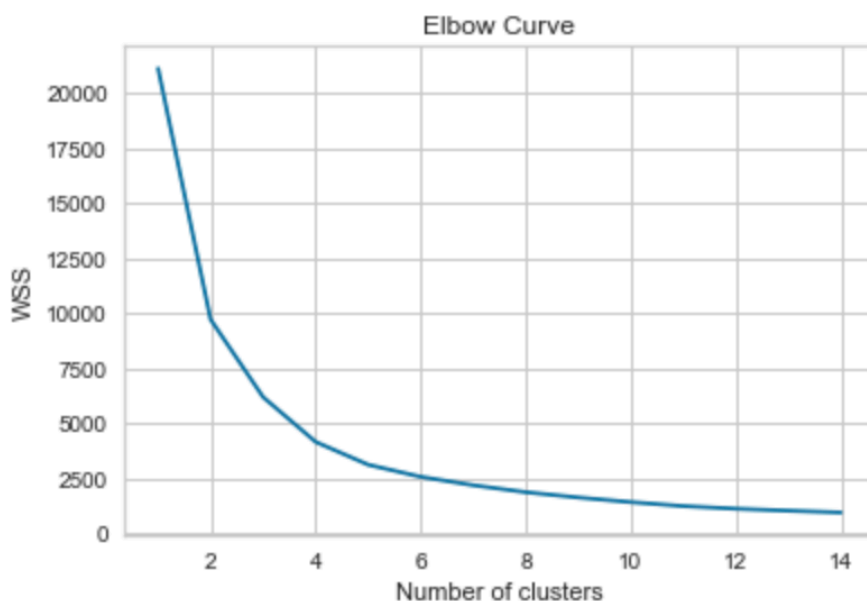


figure 2.11

In *figure 2.10*, we have clustered the data into 4 clusters using the K-Means Algorithm. Using the scree plot in *figure 2.11* we determined that 4 would be the best number of clusters. From *figure 2.10* we have noticed that the most important cluster for us would be Cluster number 0 and the ignorable (stranger cluster) would be cluster 2.

	cluster	tenure_group	SeniorCitizen	tenure_x	MonthlyCharges_x	TotalCharges_x	Churn	InternetService	StreamingTV	StreamingMovies	Contract
0	2	Tenure_0-12	No	10	29.75	301.90	No	DSL	No	No	Month-to-month
1	0	Tenure_48-60	Yes	59	93.85	5574.75	Yes	Fiber optic	Yes	Yes	Month-to-month
2	1	Tenure_12-24	No	16	80.55	1248.90	No	Fiber optic	No	No	Month-to-month
3	3	Tenure_48-60	No	52	35.45	1958.95	No	DSL	No	No	One year

figure 2.12

cluster	tenure	MonthlyCharges	TotalCharges
0	59.530987	93.306224	5548.653887
1	15.445227	80.791201	1252.816564
2	10.277123	31.777771	303.821875
3	53.585850	34.920147	1836.581320

figure 2.13

Looking at the centers of the clusters (*figure 2.12*), and the average charges of the clusters only strengthens the point we made while looking at *figure 2.10*. Cluster number 3 here seems to be of the company's loyal customers, who provide a good value over a period of time. Cluster 1, however, seems to be high value customers who are churning in shorter periods of time. The company has to try and convert these people into loyal, long staying customers.

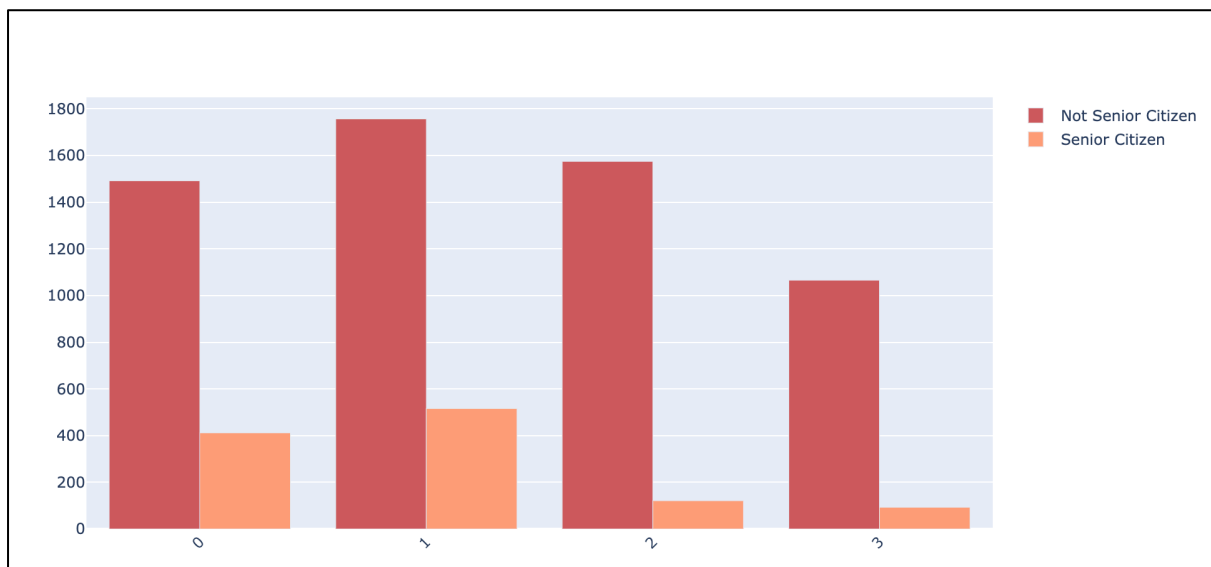


figure 2.14

The churning seems to be the highest in Cluster number 0, which we need to focus on and try and decrease. We should also focus on doing the same for Cluster number 1. Looking at the age distribution among clusters *figure 2.15*, we can see both the high value clusters 0 and 1 have a good share of senior citizens. So, we need to specialize our services to make reduce the attrition among the same.

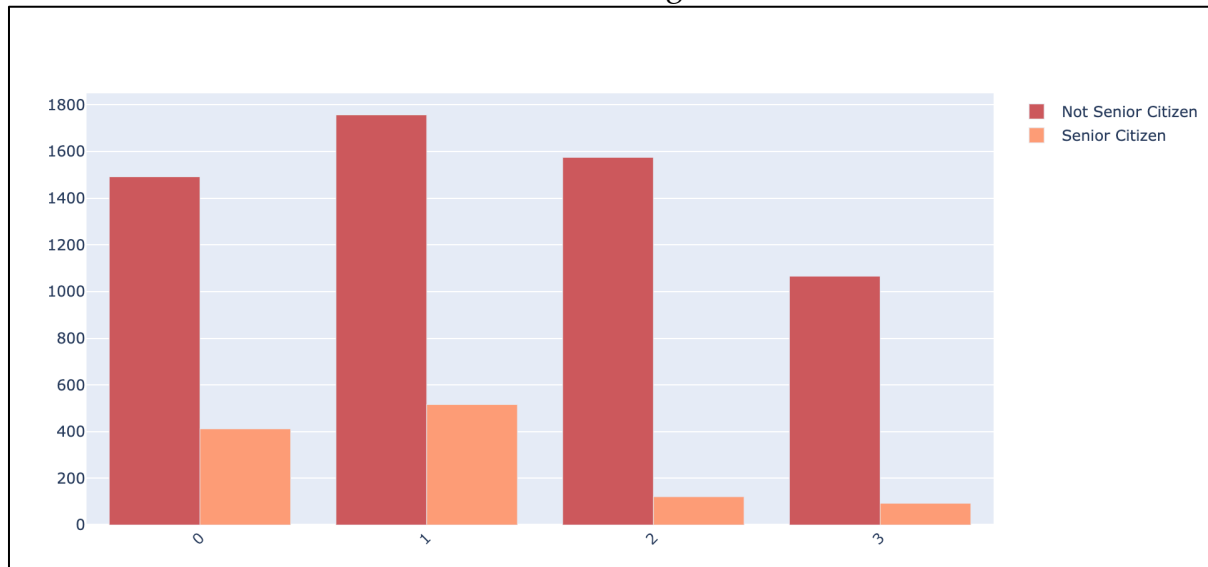


figure 2.15

Model Building

Logistic Regression

```

Classification report :
              precision    recall  f1-score   support

     0       0.88         0.80         0.84         1268
     1       0.59         0.72         0.65          490

   accuracy               0.78         1758
  macro avg       0.73         0.76         0.74         1758
 weighted avg       0.80         0.78         0.79         1758

Accuracy   Score :  0.7798634812286689
Area under curve : 0.7609975535955706

```

figure 2.16

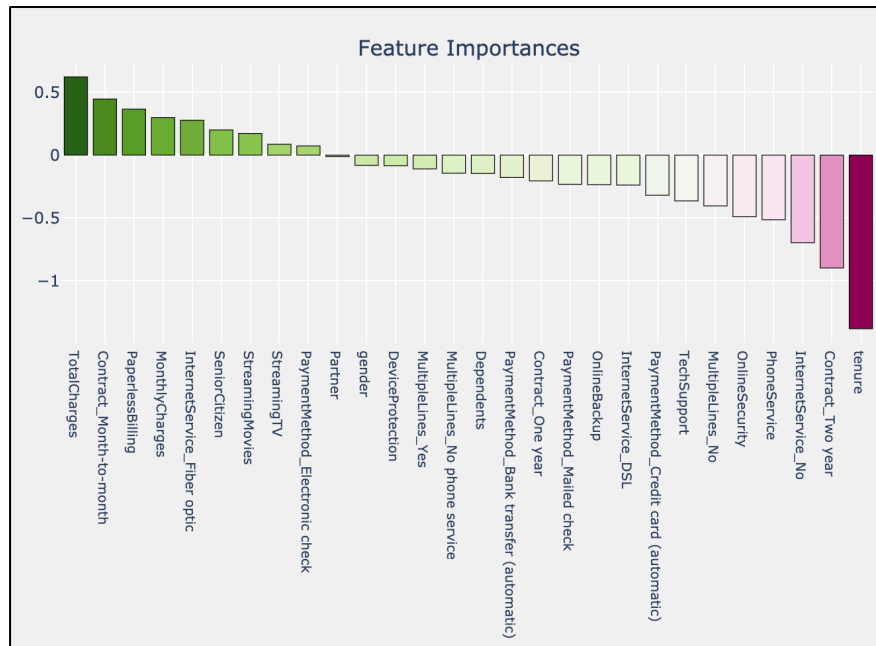


figure 2.17

After performing the logistic regression of the given variables to predict churning of a customer, from the figure 2.17 we see some of the most important features include tenure, two-year contract, total charges, month on month contracts and paperless billing. There are a lot of features here that have been mentioned. We decided to use Recursive Feature Elimination (RFE) to come up with the most important features.

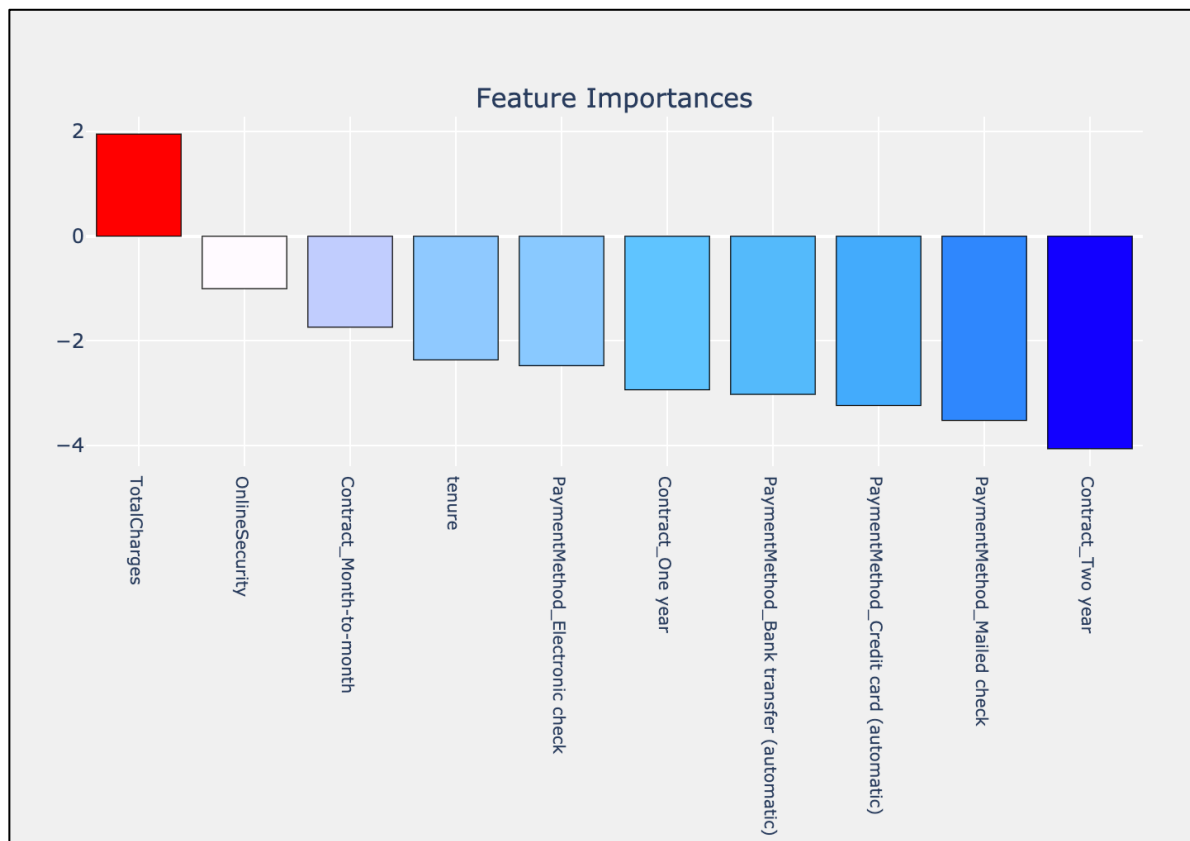


figure 2.18

from the above figure, we see that once we perform the RFE the most important features come up and the among the most significant ones are again two-year contract, total charges and payment method-mailed check, tenure and contract-one year. The contract two year and contract one year support our argument made previously that we need to focus on long customer retention with some kind of benefit with annual plans.

Random Forest Classifier

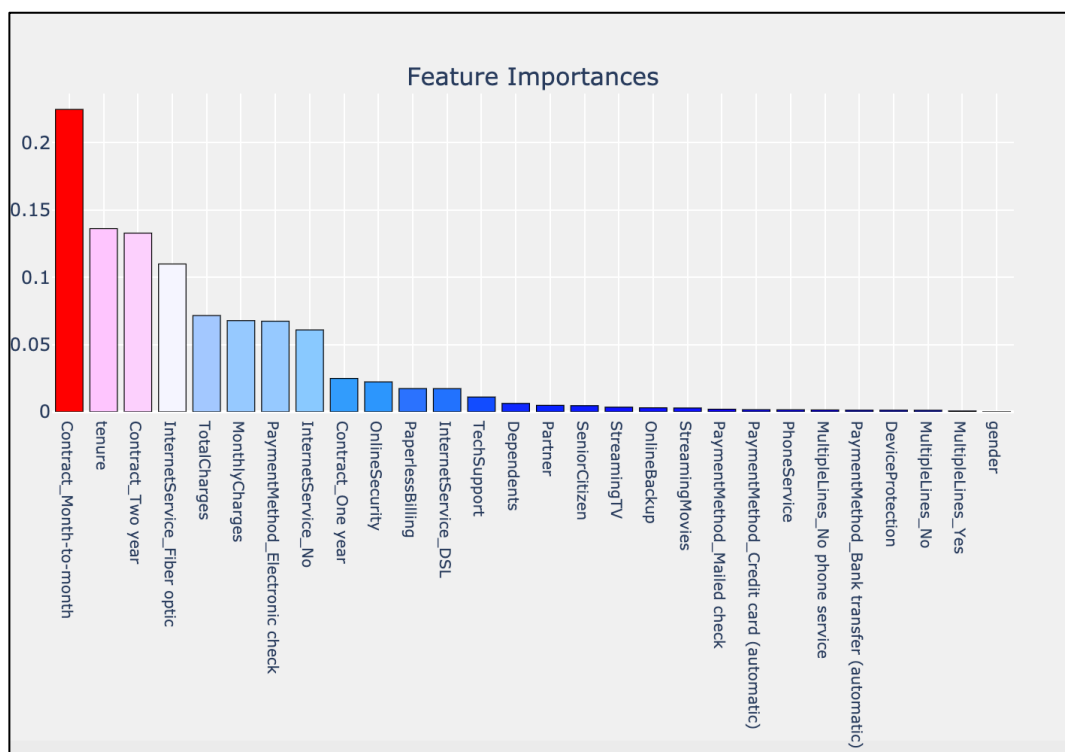


figure 2.19

Upon checking with the random forest algorithm to see whether it gives us any different results. We mostly see the same features being thrown out, except here we even see the internet Optic fiber come up as we mentioned in *figure 2.9*. We got an accuracy of around 76% with 62% AUC with the random forest algorithm using the above features.

XGBoost Classifier

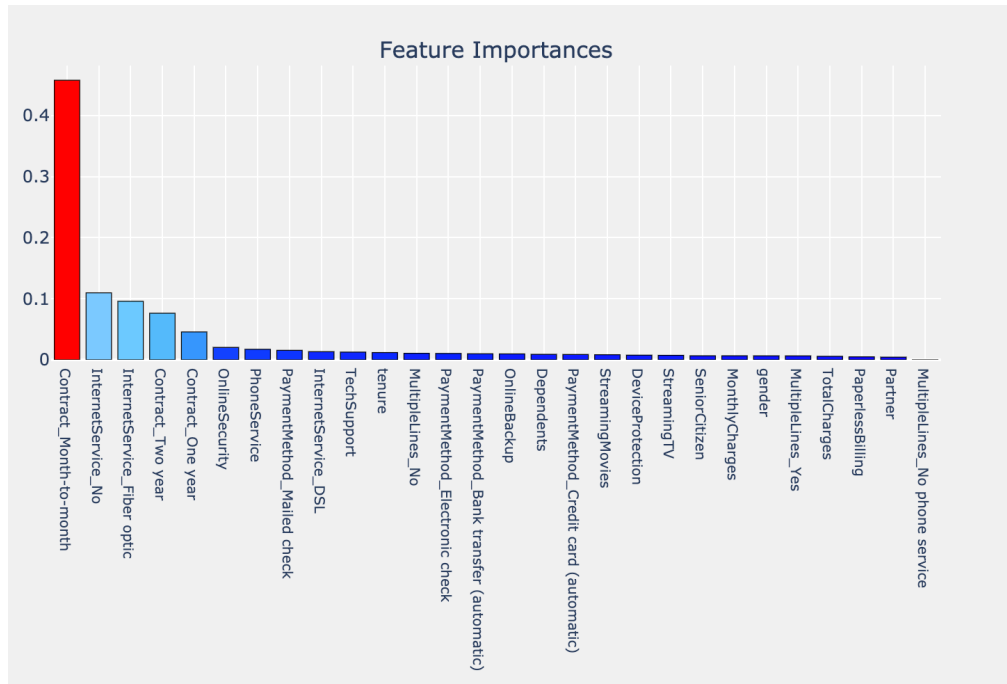


figure 2.20

We checked with XGBoost algorithm to see if we are missing out on any other key features. But from the *figure 2.20*, looks like we have covered all of the important features. Now to use these particular features to make some changes to benefit the company.

Implications and Limitations

Marketing Implications

The company is facing losses because of customer leaving it. In order to retain customers telecom company must make few changes where the customer churn is high and what are the issues related to it. We have identified few issues which are leading to increase in the churn rate.

1. Issues related to Paper Less Transactions where majority of churn rate occurs. Increasing issues related to online transactions lead to inclined customer dissatisfaction especially in the electronic payment check method as we have noticed from *figure 2.9*. Customer Services related to the Payment mode might be very bad for consumer.
2. Optic Fiber is one issues where the customer churn rate is high which needs to be addressed by Organization. Most customers leaving are have opted for optic fiber, this needs to be focused on by comparing the reliability and speeds with market competition at the given price.
3. The monthly service provided by telecom company with higher rates and most consumers who uses these kinds of services are dissatisfied by the way in which the organization is making them to pay heavy charges and getting less services.
4. Month-on-month contracts are the most common features among customers churning, which leads us to believe that we need provide good incentives so that customers prefer annual contracts.
5. Most people churning do not have dependents or partners, so we need to focus on retaining those with the same by providing good family plans for same.
6. We may need to look at the intuitiveness and the ease of use of all the services for senior citizens since they make up a large chunk of our high value customers.
7. A large chunk of customers is leaving after a four years with the company, so the company needs to provide additional benefits to customers who have been with them for so long to increase retention.

Due to these reasons company are losing not only new customers but also the loyal customers who have been with company for 48 months.

Marketing retentions strategies to attenuate churning rate

Need for opting a yearly subscription rather than month on month subscription:

The below mentioned is an example which is required by the Telecom company to use in order to decrease the customer churning rate.

Example of the Indian Telecom Sector

Monthly Plans Offered by BSNL

4.2 GB / Day Combo Unlimited 3G Data Pack

2G-3G Data: 4.2 GB / Day. Unlimited Data Pack. After Rs. **192** (28 days)
 FUP speed reduces to: 40 Kb... [read more](#)

Annual Plans Offered by BSNL

Plan Price	Free Data	Calls	SMS
Rs. 1699	1.5 GB Per Day	Unlimited	100
Rs. 2099	4 GB Per Day	Unlimited	100

These are monthly charges paid by the customer when they opt a monthly plan or an annual plan by BSNL. The above mentioned are services provided by them. So, customers can make a 9% cost reduction when they opt for an Annual Plan. So, the Telecom company must come up with a new strategy of converting large number of customers into an annual plan.

Monthly Plans Offered by Airtel**1.5 GB / Day Combo 3G / 4G Data Pack**

Enjoy TRULY unlimited Local, STD & Roaming calls on Rs. **249** (28 days)
 any network, 1.5 GB data... [read more](#)

Annual Plans Offered by Airtel

ONE TIME CHARGES

Rs. 2398

Free calls / SMS/ data transfer if any (included in one time charges)*

DETAILS	UNIT
Local	FREE
STD	FREE
ISD	NA
SMS	100SMS/day
Data	1.5GB/day

So, when we look at other telecom company Airtel monthly and Annual Plans is another example we conclude after looking at both monthly and annual plans put together there is about 20% cost reduction when annual plan is opted.

Need for Secured Paperless Billing with proper Customer Services:

Majority of customers are using Paperless Billing and the Customer Services are not proper which might result in missing the due dates for bill payment and the outcome might be customer churning in the last month. There also may be security issues while performing the transaction. From the observation we came to conclusion that Fiber Optic is other reason. The effective implementation of Customer Services may lead to decrease in churning.

Conclusions based on the Research Questions

We have identified the research questions and answered the questions:

Is monthly price an influential factor in churning of customers?

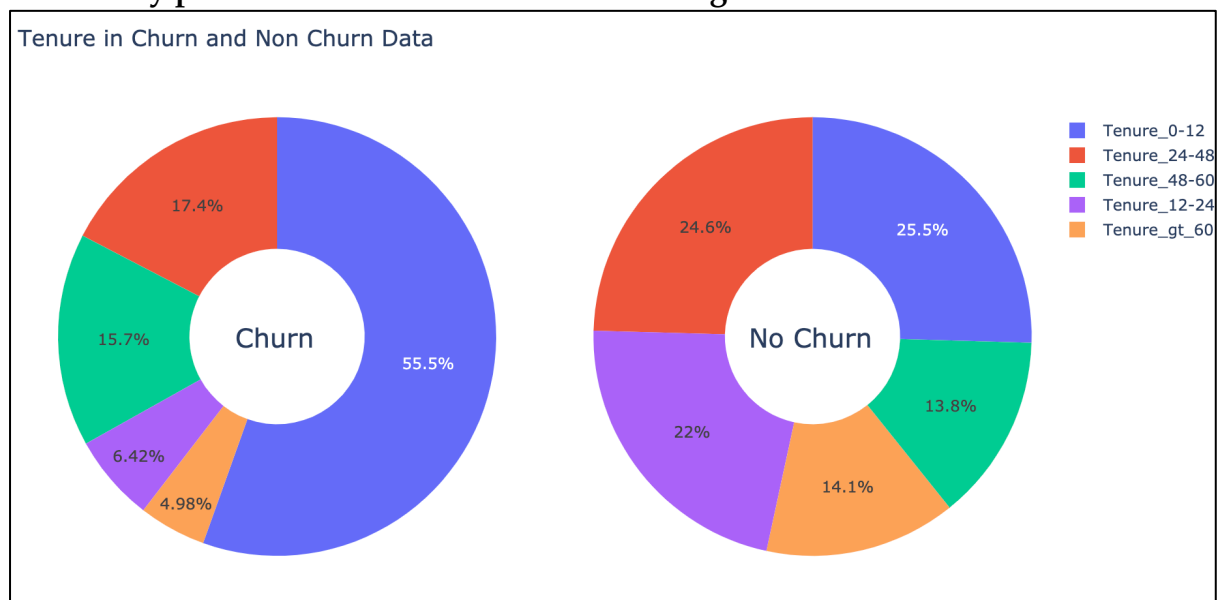


figure 3.1

When we look at the figure above, we can see that there is an 55.5% churn rate for the customers who end up on month on month subscription. Also, from figures 2.17 and 2.19 we see that monthly price is an influential factor due to which customers are leaving as we have noticed in cluster 0(whose monthly charges are high).

Which aspects of service provider services are important while a customer is deciding to leave?

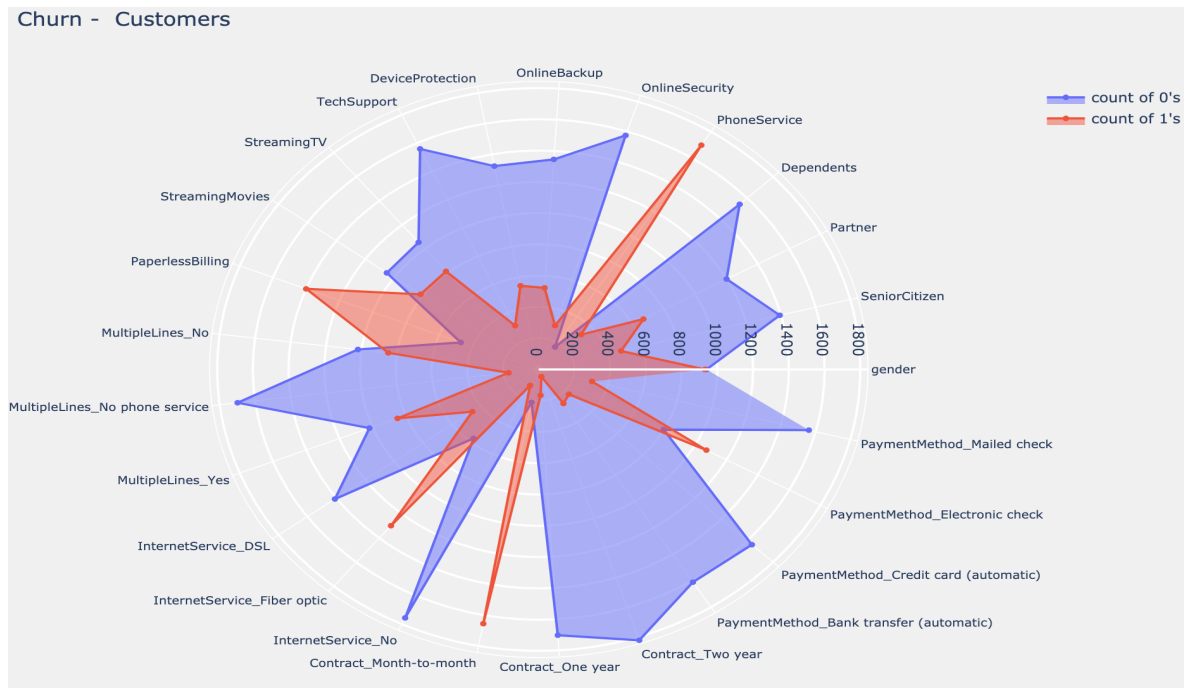


figure 3.2

The figure above shows what are the services which needs to be addressed by the service provider for the customer to not leave the company. The same have been explained in *figure 2.9*.

What are the differences in features used by the customers that churned and those that did not?

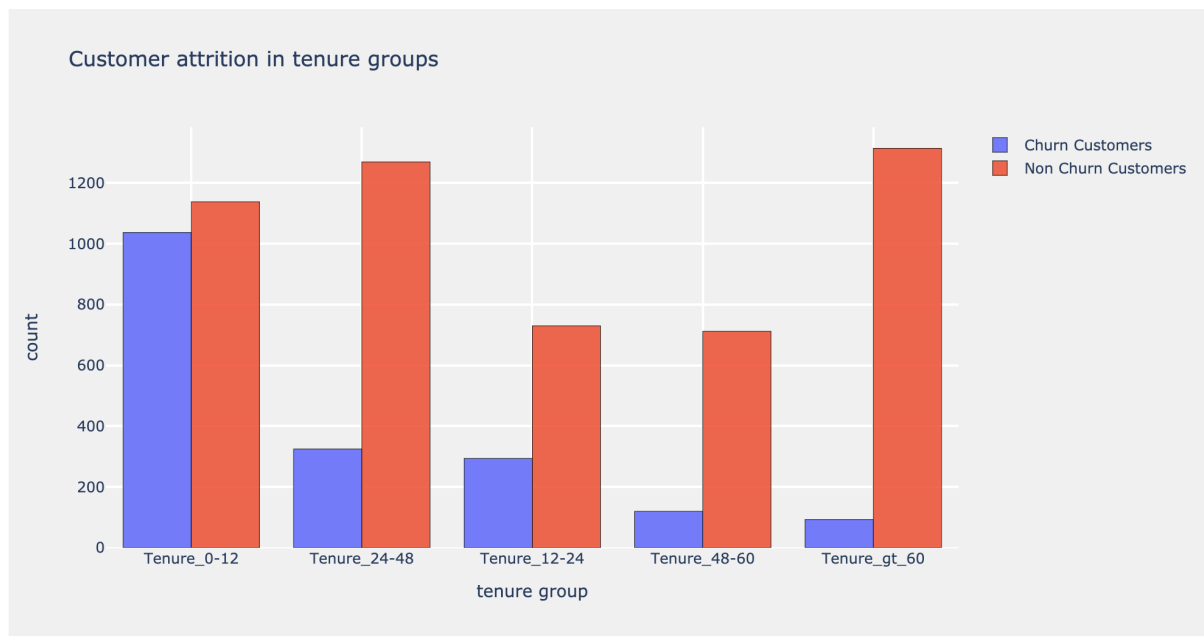


figure 3.3

Customer churning happens higher when the customer stays for a short period. When we look at the above *figure 3.3* we can see that the customers who churned are mostly between 0-12 months.

Limitations

The data set is limited with 21 variables where the age is not mentioned. Age can be one of the important factors which will help in identifying the age group of customers who are leaving and will help in designing a marketing strategy related to age group. As the given data is single month, we cannot identify what are the previous issues related to company which are externally affecting the company.

References

1. <https://www.kaggle.com/blastchar/telco-customer-churn>
2. <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/reducing-churn-in-telecom-through-advanced-analytics>