EDA Capstone Project

Telecom Churn Analysis

Team members

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Introduction

- Customer churn is the percentage of customers that stopped using company's product or service during a certain time frame.
- Customer churn is a big problem in any industry and one of the most important concerns for the Telecom industry as this effects the revenues of the companies.
- It costs 5-10 times more to acquire a new customer than to retain an existing one, that's why customer retention has now become an important aspect than customer acquisition.
- Therefore, finding those factors that increase customer churn is important to take necessary actions to reduce this churn which in turn will maximize the company's profit by retaining customer.

Objective

1.Finding the factors which are affecting the customers and resulting in customers churn.

2.To provide appropriate steps for retaining churned customers which in turn increases the companies profits.

3.Providing effective offers to retain most valuable customers and to minimizes the customer churn.

Data Summary

- **Decision Variable**
  - Churn

- **Categorical Data**
  - State
  - International Plan
  - Voicemail Plan

- **Nominal Data**
  - Area code

- **Numeric Data**
  - Account length
  - Number vmail messages
  - Total day minutes
  - Total day calls
  - Total day charge
  - Total eve minutes
  - Total eve calls
  - Total eve charge
  - Total night minutes
  - Total night calls
  - Total night charge
  - Total intl minutes
  - Total intl calls
  - Total intl charge
  - Customer service calls

This is the Orange Telecom Churn Dataset provided to us and below given is the analyzed Head and tail of the data set

```
#Data included in the top 5 rows
telecom_df.head(5)
```

	State	Account length	Area code	International plan	Voice mail plan	Number vmail messages	Total day minutes	Total day calls	Total day charge	Total eve minutes	Total eve calls	Total eve charge	Total night minutes	Total night calls	Total night charge	Total intl minutes	Total intl calls	Total intl charge	Customer service calls	Churn
0	KS	128	415	No	Yes	25	265.1	110	45.07	197.4	99	16.78	244.7	91	11.01	10.0	3	2.70	1	False
1	OH	107	415	No	Yes	26	161.6	123	27.47	195.5	103	16.62	254.4	103	11.45	13.7	3	3.70	1	False
2	NJ	137	415	No	No	0	243.4	114	41.38	121.2	110	10.30	162.6	104	7.32	12.2	5	3.29	0	False
3	OH	84	408	Yes	No	0	299.4	71	50.90	61.9	88	5.26	196.9	89	8.86	6.6	7	1.78	2	False
4	OK	75	415	Yes	No	0	166.7	113	28.34	148.3	122	12.61	186.9	121	8.41	10.1	3	2.73	3	False

```
#Data included in bottom 5 rows
telecom_df.tail(5)
```

	State	Account length	Area code	International plan	Voice mail plan	Number vmail messages	Total day minutes	Total day calls	Total day charge	Total eve minutes	Total eve calls	Total eve charge	Total night minutes	Total night calls	Total night charge	Total intl minutes	Total intl calls	Total intl charge	Customer service calls	Churn
3328	AZ	192	415	No	Yes	36	156.2	77	26.55	215.5	126	18.32	279.1	83	12.56	9.9	6	2.67	2	False
3329	WV	68	415	No	No	0	231.1	57	39.29	153.4	55	13.04	191.3	123	8.61	9.6	4	2.59	3	False
3330	RI	28	510	No	No	0	180.8	109	30.74	288.8	58	24.55	191.9	91	8.64	14.1	6	3.81	2	False
3331	CT	184	510	Yes	No	0	213.8	105	36.35	159.6	84	13.57	139.2	137	6.26	5.0	10	1.35	2	False
3332	TN	74	415	No	Yes	25	234.4	113	39.85	265.9	82	22.60	241.4	77	10.86	13.7	4	3.70	0	False

Features description

State: There are 51 unique states present in the given dataset.

Account length: It is the length for which a particular customer used the account.

Area code: Code number of area having some states.There are 3 unique area codes

International Plan: Yes indicates that customer has an International Plan & No indicates that the customer doesn't have any subscription for International Plan.

Voicemail Plan: Yes indicates that customer has a Voicemail Plan & No indicates that the customer doesn't have any subscription for Voicemail Plan

Number vmail messages: Number of Voice Mail Messages ranging from 0 to 50

Total(Day/Evening/Night/International)(Minutes,Calls,Charges)

These are a total of 12 attributes with numerical data types. All these attributes contain the data of calls, minutes, charges, of a customer with respect to the time of a day and plan.

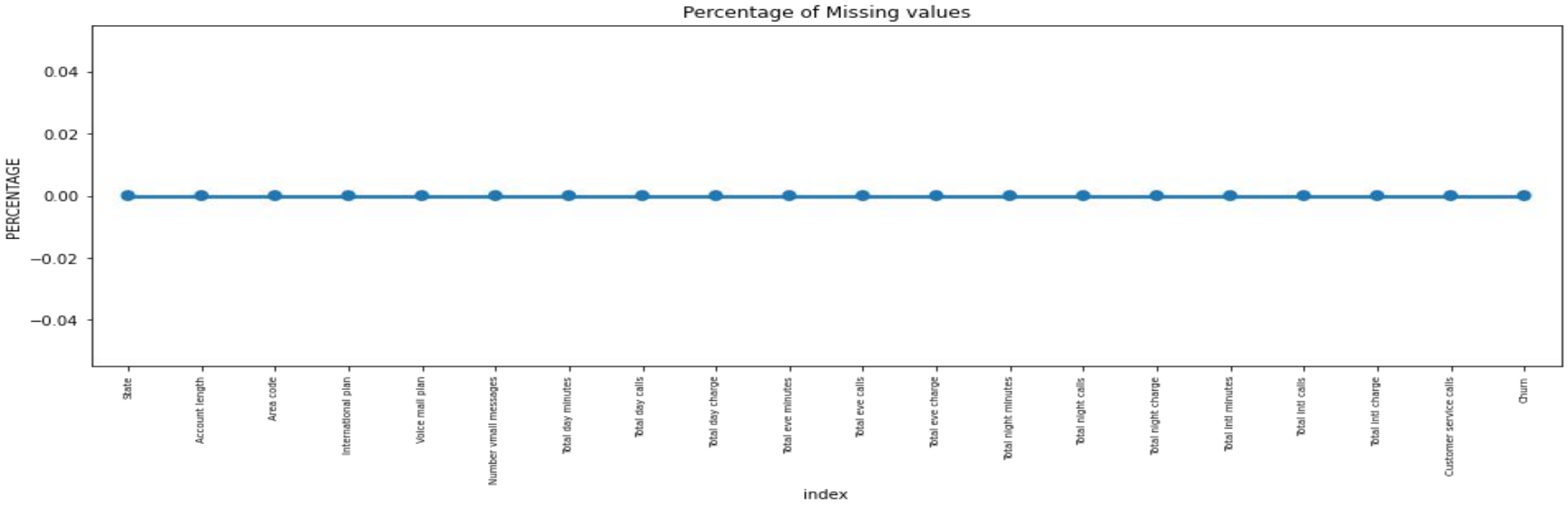
Customer service calls: Number of customer service calls made by customer to the service centre of an operator.

Churn: Indicates the customer churn, True means customer is churned, False means customer is retained or not churned

Exploring for duplicate/missing values

We tried to explore for any duplicate/missing values in the data set and we found there are no duplicate/missing values present in the data set.

Below given plot explains that there are no missing values in the data set.

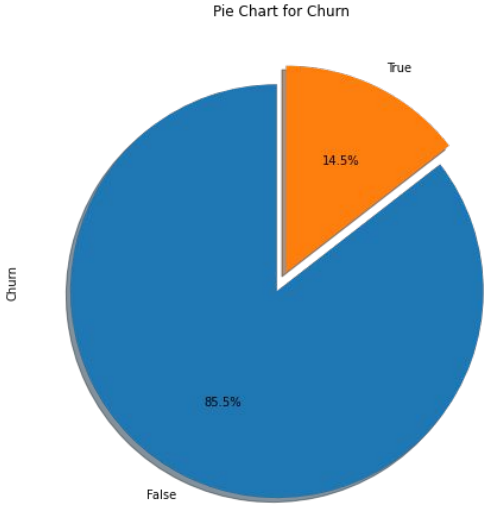


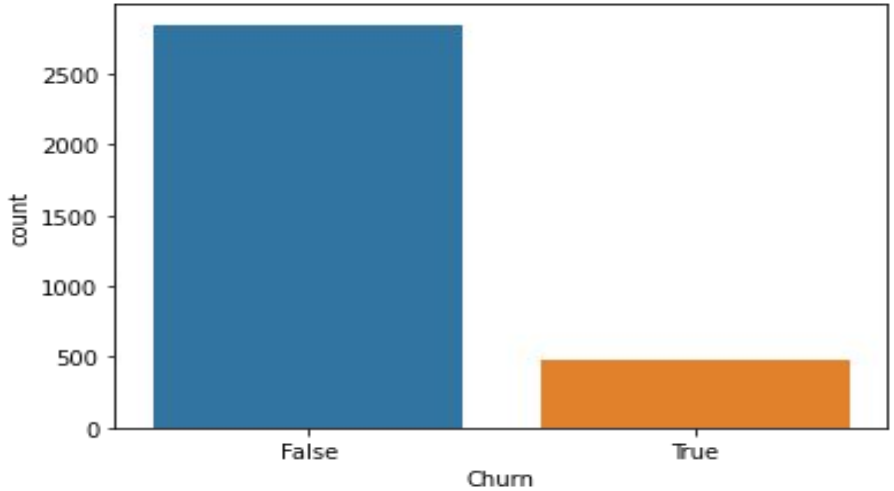
Analyzing the dependent variable ‘Churn’

After analyzing the churn attribute, we understood that 14.5 percent of customers have churned and 85.5 percent of customers are not churned.

The pie chart given below explains the percentage of customers churned to the percentage of customers not churned.

The count plot below explains the number of customers churned(483) to the number of customers not churned(2850).





Analyzing the dependent variable ‘Churn’

After analyzing the churn attribute, we understood that

1.There are **3333 users** in the given data set

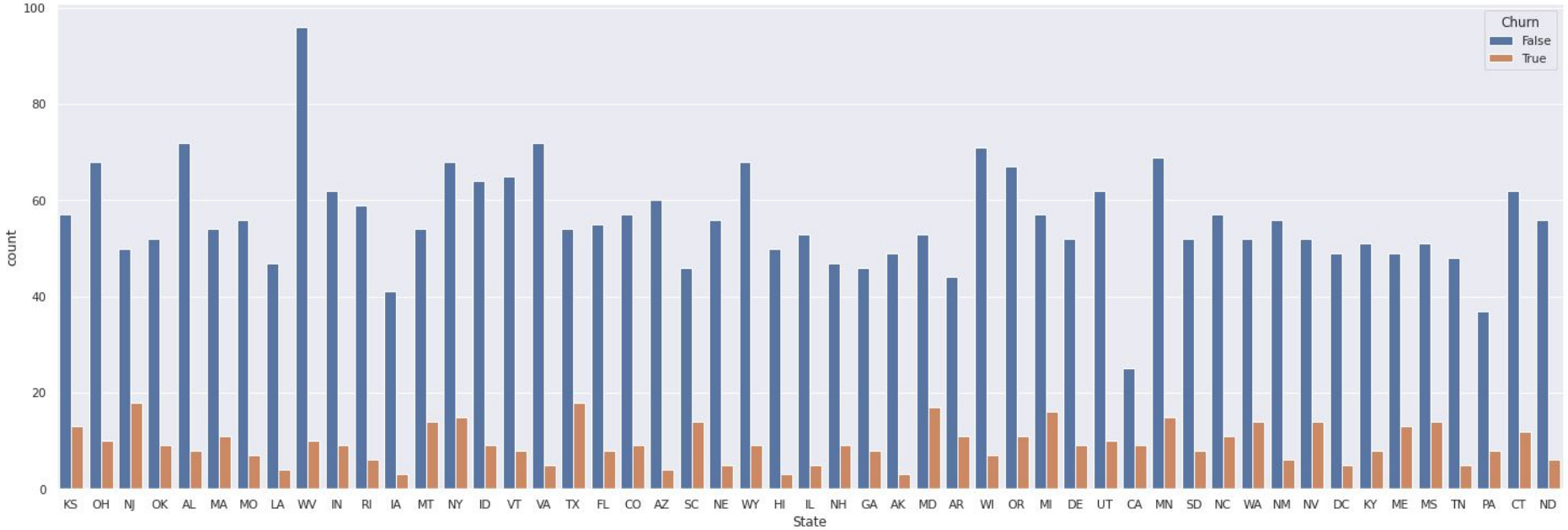
2.**Not churned customers**= 2850 *(85.5%)*

3.**Churned customers**= 483 (14.5%).

From the analysis we found that 14.5% customers are churned and we need to explore the factors that are causing the churn of customers.

Analysis on ‘State’ vs ‘Churn’

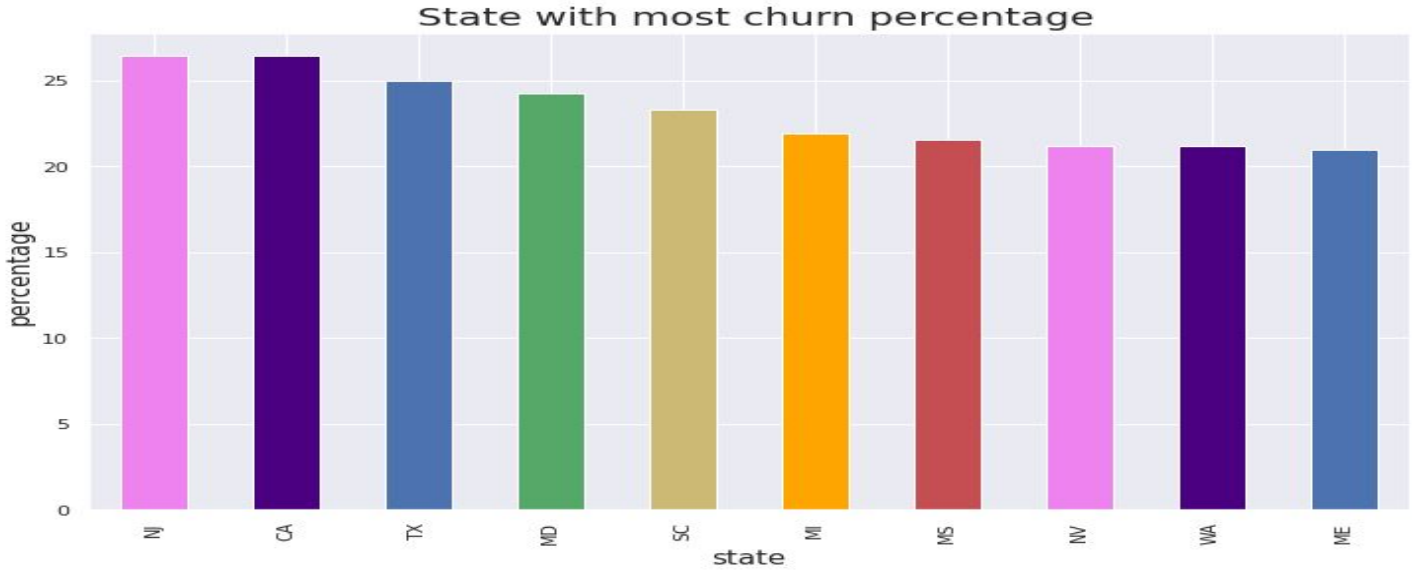
During the analysis we found that there are 51 unique states with different churn rates. The plot below shows the different states with respective churn rate.



States with Highest churn rate

From the analysis, we can say that there are 51 unique states with different churn rate and the states **NJ,CA,TX,MD,SC,MI,MS,NV,WA,ME** are the states with high churn rate which is above 20%.

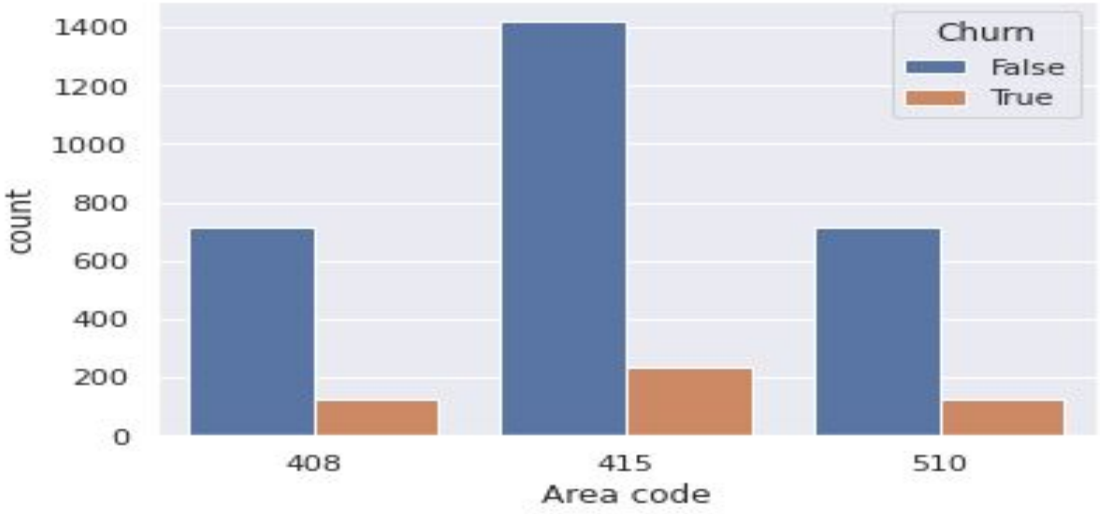
The reason for this churn might be low network coverage or poor signal supply at the respective states.



Analysis on ‘Area code’ vs ‘Churn’

From the analysis, we can say that there are 3 unique Area codes i.e, 408, 415, 510 and the churn rate of these area codes are almost the same(14%).

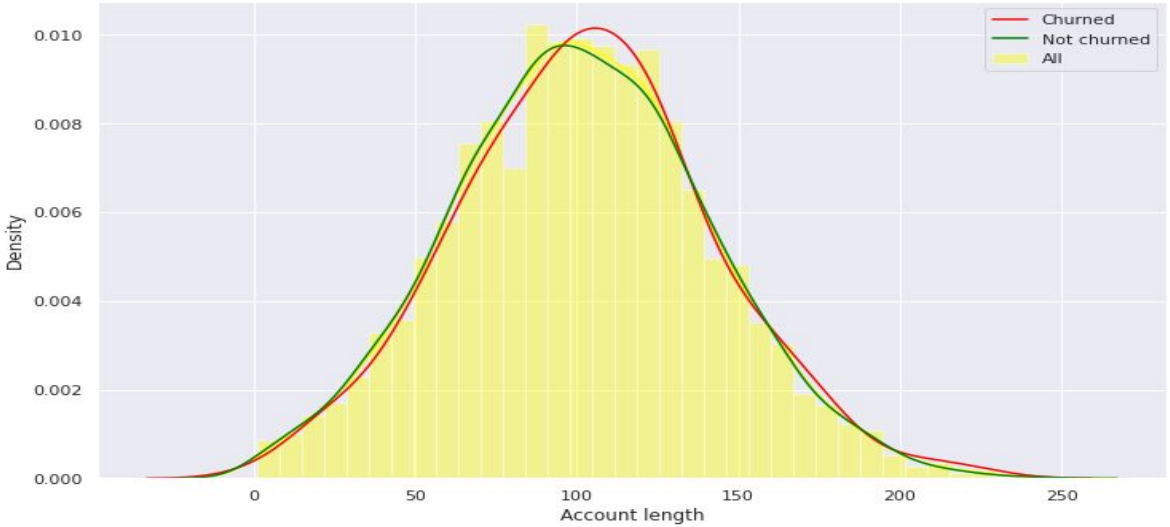
So we can assume that there is no proper relation between the "area code" and"churn" due to which the customer leaves the operator.



Analysis on ‘Account length’ vs ‘Churn’

From the analysis on Account length attribute, we understood that Account length is not implying much effect for the churn of customers.

The plot below explains the effect of Account length on churn, from which we can say that there is no sign of churn because of length of account usage.



Analysis on ‘Voicemail Plan’ vs ‘Churn’

From the above analysis we can say that

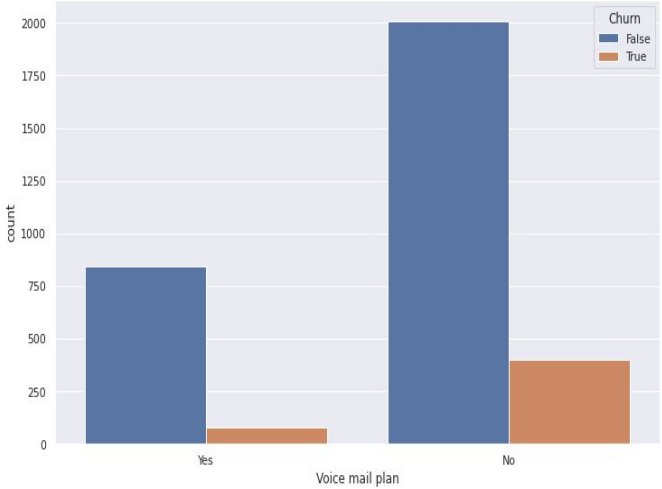
2008 i.e, 72.3% customers do not have a Voicemail plan, of which

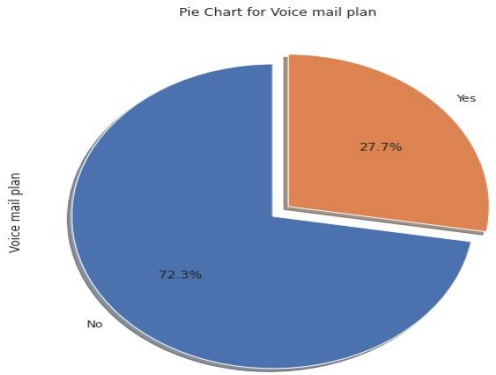
403 i.e, 16.7% customers are churned

842 i.e, 27.7% customers have a Voicemail plan, of which

80 i.e, 8.6% customers are churned

As there is no proper correlation between churn and Voicemail plan, we cannot conclude that this attribute is a reason for the customer churn

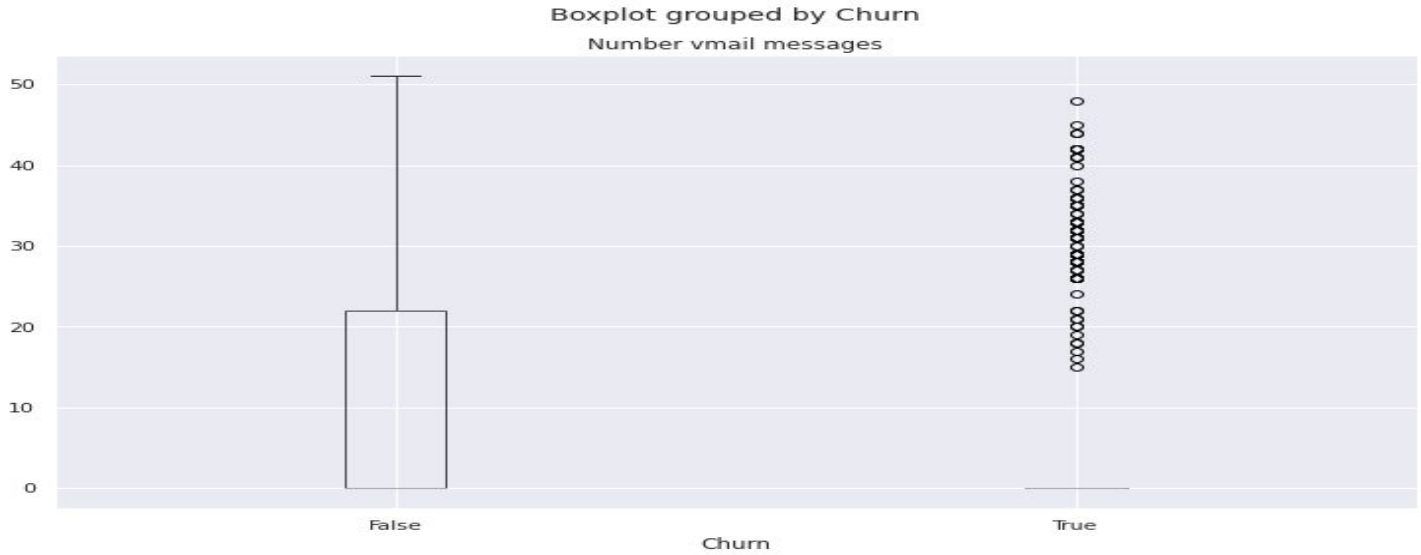




Analysis on ‘Number vmail messages’ vs ‘Churn’

From the analysis on voicemail attribute we can say that when there are more than 20 voice-mail messages there is a churn in customers which is represented in the boxplot below.

Reason for this churn might be low voicemail quality.



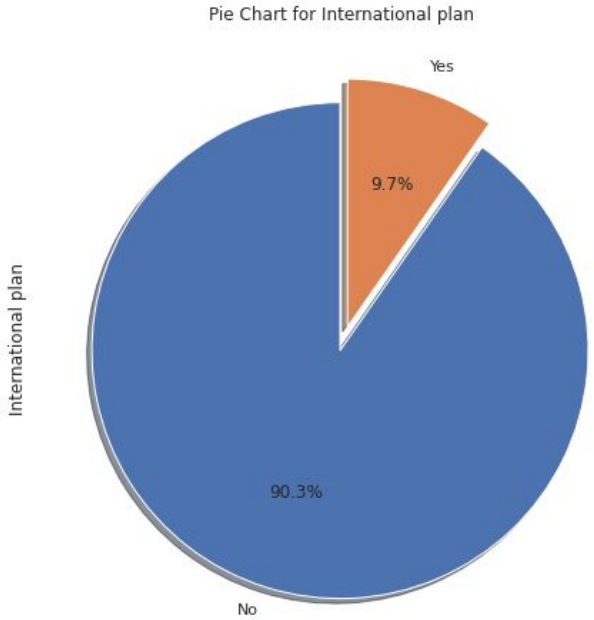
Analysis on ‘International Plan’ vs ‘Churn’

From the analysis on International plan attribute we understood that

1. There are 3010 customers(90.3%) without an international plan &

2. There are 323 customers(9.7%) with an international plan.

The pie chart explains the percentage of customers with an international plan(9.7%) and the percentage of customers without an international plan(90.3%).



Analysis on ‘International Plan’ vs ‘Churn’

On further analysis we understood that

42.4% (137)customers with an International plan are churned &

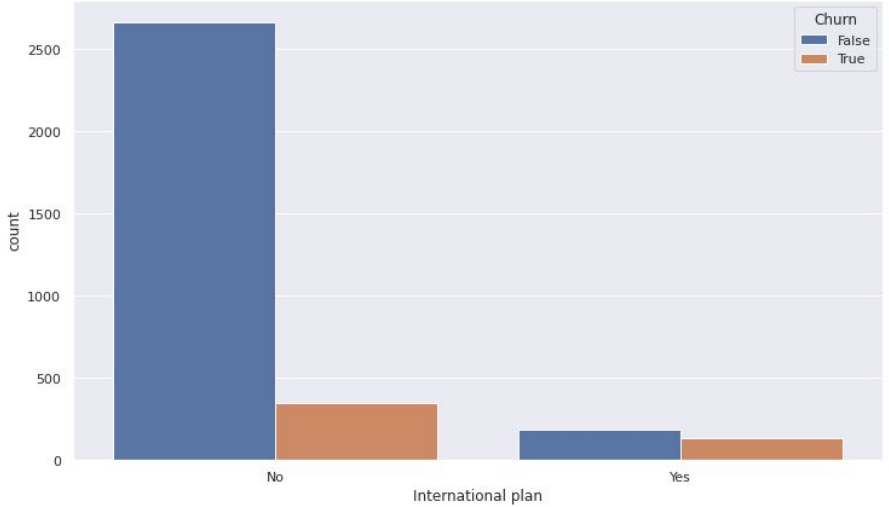
11.4 % (346) customers with no International plan are churned.

Hence we can say that customers with an International plan are highly tend to be churned.

This might be because of the connectivity issues or high call charges.

The following count plot explains the customer churn with/without an International plan.

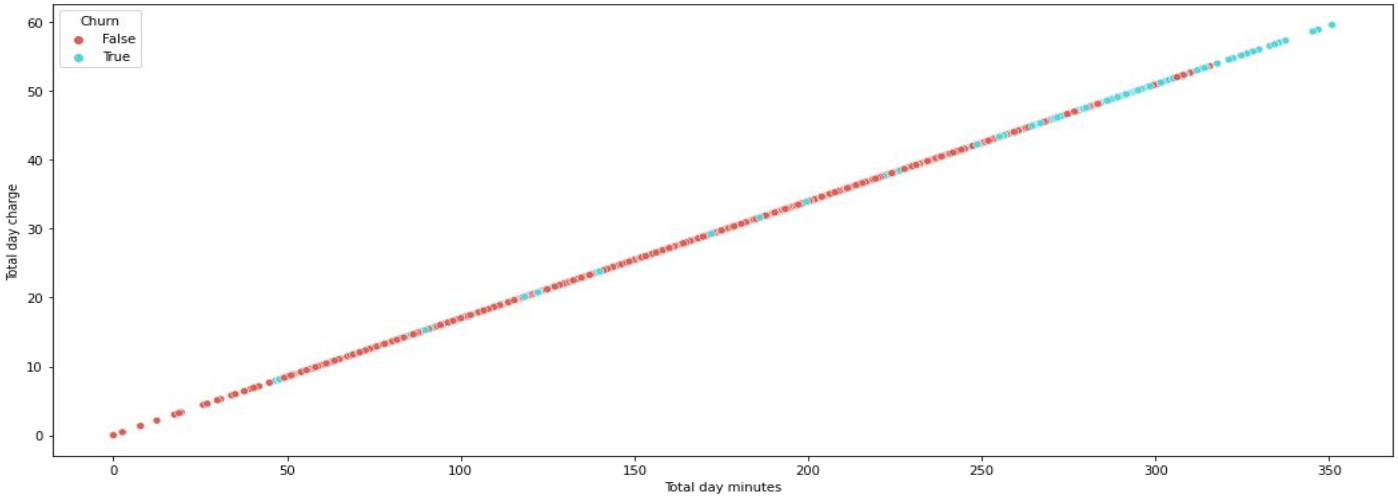
Churn International plan	False	True	Percentage Churn
No	2664	346	11.495017
Yes	186	137	42.414861



Analysis on All the calls/call minutes/calls charges vs 'Churn'

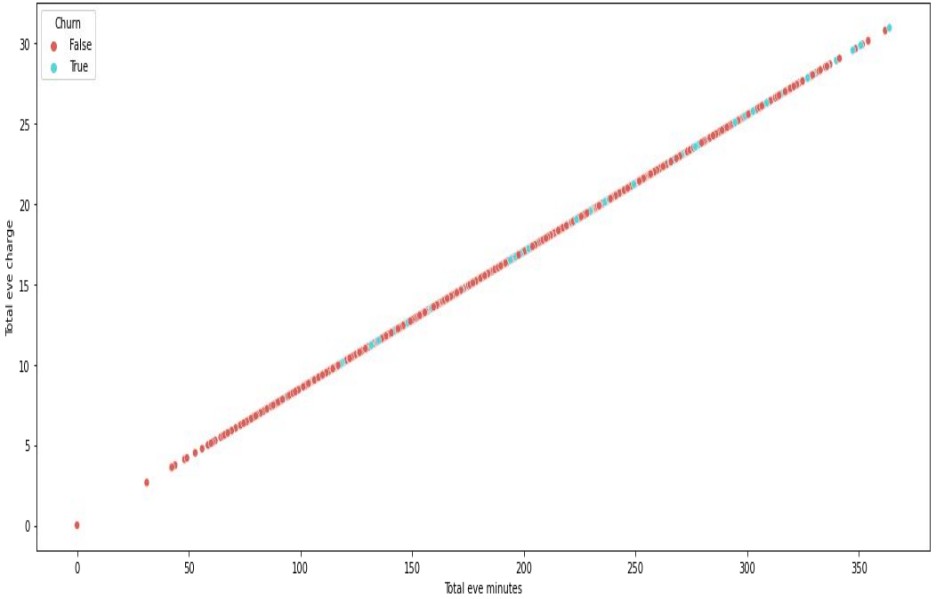
- From the analysis on day call minutes and day call charges, we observed that customers spending more than 250 minutes are tend to churn.

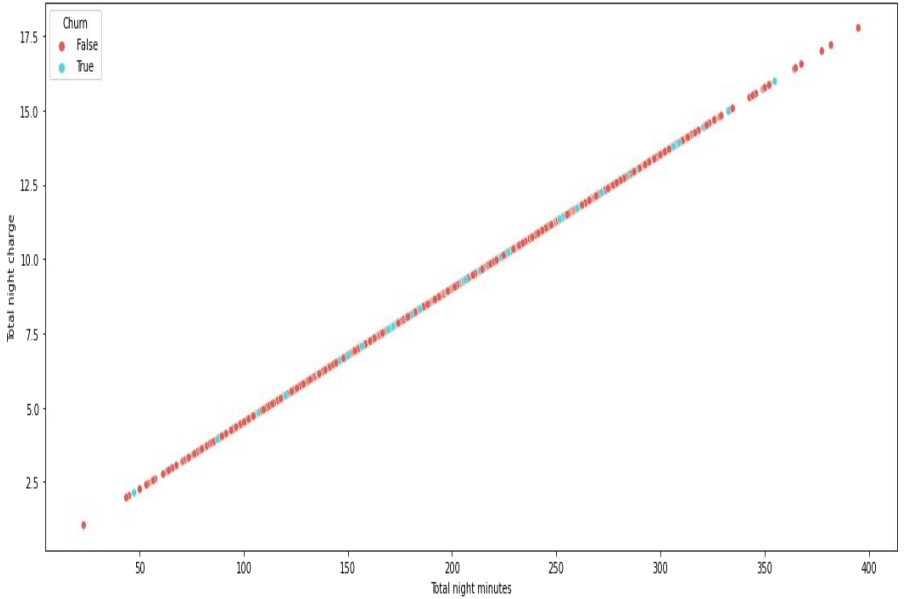
- Customers with high call minutes will have high call charges which can be assumed to be the reason for churn.



Analysis on All the calls/call minutes/calls charges vs ‘Churn’

From the analysis we observed that total night, total evening minutes/calls/charges are not much of a reason for customer churn as there is no proper relation with Churn attribute.

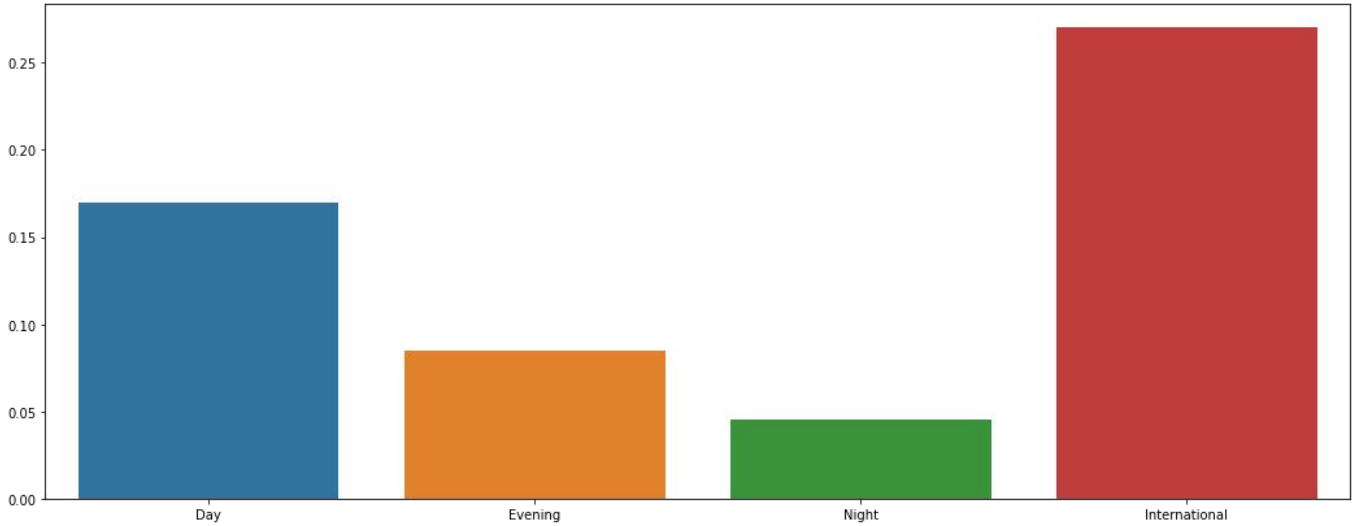




Analysis on All the calls/call minutes/calls charges vs ‘Churn’

- From the International calls/minutes/charges/ it is observed that International call charges are high when compared to others. From this we can assume that this might have been a cause for International plan customers to churn out.

- The barplot plotted below explains the variations of all call charges per minutes

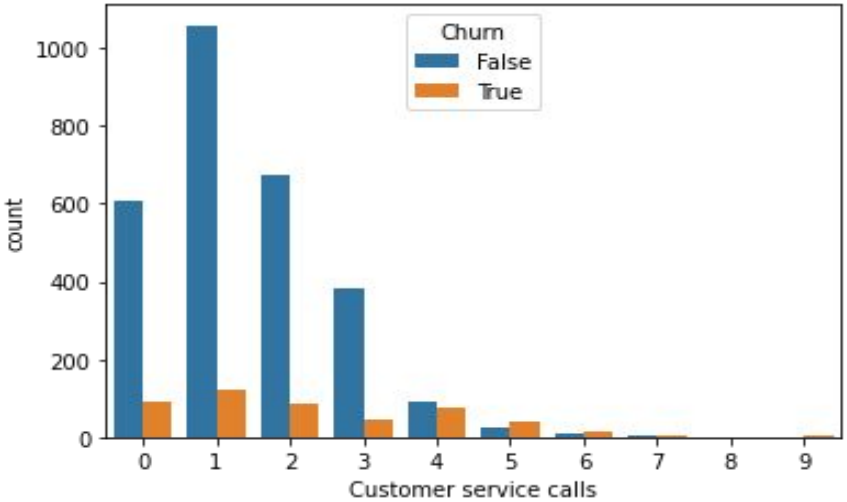


Analysis on ‘Customer service calls’ vs ‘Churn’

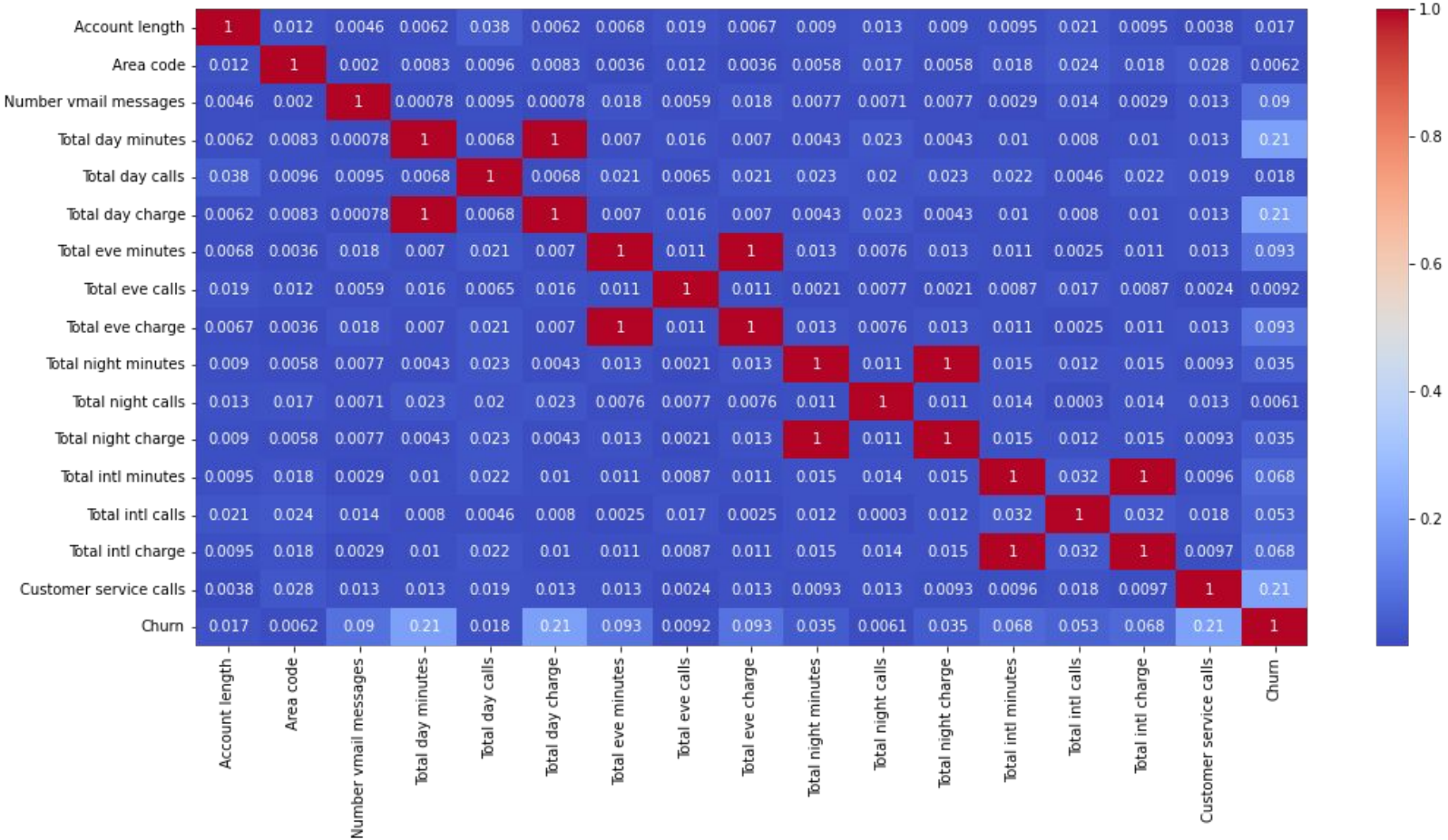
- From the analysis on Customer service calls attribute we can say that Customers who called the service center 5 times or more are churned more, with a churn rate higher than 60%. The countplot below explains the churn of customers with respect to the customer calls.

- Customers churn gradually increased with the number of calls, indicating their issue was not solved in the first attempt.

Churn	False	True	Percentage_Churn
Customer service calls			
0	605	92	13.199426
1	1059	122	10.330229
2	672	87	11.462451
3	385	44	10.256410
4	90	76	45.783133
5	26	40	60.606061
6	8	14	63.636364
7	4	5	55.555556
8	1	1	50.000000
9	0	2	100.000000



Correlation matrix



Conclusion

1.There are some states with high churn rate when compared to others, this might be due to the low network coverage over the respective states.

2. Area code and Account length are not affecting the customers and are not any kind of reason for the customer churn.

3. Customers with an International plan are tend to be churned more than the customers without an International plan. We also observed that International call charges are high and this reason is also implicting the customers to get churned as they are unsatisfied with the network issue and high call charges

4. When there are more than 20 voice-mail messages, we observed a churn in customers, From this we can say that the quality of voice mail is not good.

Conclusion

5.Total day call minutes, Total day calls, Total day charge, Total eve minutes, Total eve calls, Total eve charge, Total night minutes, Total night calls, Total night charge, are not playing much of a role for the customer churn.

6.International calls data shows that the customers with an International plan have high churn rate, which means that, International call charges are high and also there might be a call drop or network issue regularly.

7.From the analysis on Customer service calls attribute, we observed that whenever an unsatisfied customer called the service center, there is a churn and this customers churn gradually increased with the number of calls, which indicates that their issue was not solved in the first attempt.

Recommendations:

1.Improve the Network coverage and Signal strength in the states with customer churn.

2.Modify the existing International plan with optimal discounts and improve the network supply, reducing the call drops or signal fluctuations.

3.Improve the voicemail quality and take feedback from the customer regularly.

4.Improve the service provided by the call centers and take frequent feedback from the customers regarding their issue.

Try to resolve the issue as soon as possible with good customer satisfaction.

THANK YOU