

THE KEY DETERMINANTS AND A TECHNOLOGY BASED PREDICTIVE MODEL FOR CELLULAR CUSTOMER CHURN IN INDIAN TELECOM SECTOR

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Two major problems faced by all businesses are customer acquisition and retention. The wireless telephony market is a fast growing service segment. Today majority of phone calls all over the world can be made by mobile phone. Now the mode of struggle got changed from attracting new customers to retaining of old customers. There are various factors that influence the customer's churning decision. Some of them are Service cost, Customer Dissatisfaction, service quality, lack of features, Lack of carrier responsiveness, Brand disloyalty, Privacy concerns, New technology or product introduced by competitors, New competitors enter the market, mobile number portability etc. To address this problem the companies must make use of effective forecasting models so that they will be able to identify the churners before they churn. So it is very important for all the companies to develop a model which can recognize customers who are planning for a switch over to the competitors. This study aims at identifying the key determinants of customer switch over and developing a model using data mining by which the service provider will be capable to categorize and target customers who are making their mind to change the service provider. This model will be very effective in churn management and retention management.

Key words: *Data mining, Churn management, Retention management*

INTRODUCTION

In today's competitive world, customer churn is one of the most critical apprehension for all the mobile network operators. In their endeavor to expand their customer base, or at least maintain the number of customers at a constant level, the providers must stay on their toes in a fierce competition for new customers. The companies can take corrective action to minimize this phenomenon if they are able to recognize the major reasons for the dissatisfaction of

clients and to forecast in advance, the clients whom they will lose in near future . It is more expensive for the companies to look for new customer than satisfying an existing customer. Also one bad customer can ruin the likelihood of getting some good customers.

In this industry customers can decide about what quality of service they should receive from their current service provider. If the service provider could not satisfy their clients they can choose any alternate option where they get good quality services. In this highly competitive market, customers will stay with companies who care for them and offers better products and services at lesser prices. Therefore retaining existing subscribers is more important than looking for new ones. Many operators give prime concern for retaining high profitable customers and consider it as the number one business pain. Network service providers make use of effective promotion and customer communication policies to keep their customers happy and force them to stay. For the present scenario retention strategies and churn reduction strategies should be kept as one of major business goal by all the companies. To manage this phenomenon companies should be able to recognize the clients planning for switching and approximate time of their switching .if this is known in advance companies can plan better retention strategies to stop as many customers as possible from switching .

Forecasting models helps the companies to recognize in advance which customers are having high chance to change the service provider , why they are changing and when they will churn, improve the quality of services by identifying the areas where improvements are required, provide incentives to the targeted customers, and thereby avoid the economical wastage for mass marketing approaches. This study is intended to identify the major customer churn determinants and creation of a model based on data mining technology to predict the customer churn in telecom sector.

REVIEW OF LITERATURE

The mobile telephony market being the fastest-growing service segments to support telecommunications companies manage in reducing the degree of churn they need to know in advance the probable customers who are planning for a switch over and what time they will switch. In doing so the companies get the benefit to optimize their marketing policies and resources so that a considerable amount of customer switch over can be prevented

.Companies can also plan their customer communication and treatment programs in a timely efficient manner.

With a subscriber base of more than 650 million, the Mobile telecommunications system in India is the second largest in the world and it was thrown open to private players in the 1990s.

Arthur, Y. D., Ahenkrah, K., & Asamoah, D. (2012). In their study “Determinants Analysis of Customer switching Behavior in Ghanaian Telecommunication Industry” has discussed the major factors that affect the customer’s churn probability in Ghanaian telecom sector.

Boohene, R., & Agyapong, G. K. Q. (2011) in their study “ Analysis of the antecedents of customer loyalty of telecommunication industry in Ghana” identified the antecedents of customer loyalty of telecom industry . Adeleke, A. & Aminu, S. A. (2012), has discussed The Determinants of Customer Loyalty in Nigeria GSM Market in their study. In (2002) Wei & Chiu developed a model for subscriber churn prediction in telecommunications industry.

According to Neslin, Gupta, Kamakura, Lu, & Mason, (2006) and Coussement & Van den Poel,(2008), the systems can be very wasteful if churn predictions are inaccurate, because then companies are wasting incentive money on customers who would have stayed anyway.

According to Coussement & Van den Poel, (2009), researches in this field have been made with one of the following aims: finding the key determinants of customer switch over , or model building for customer switch over forecasting which is still of high importance .

OBJECTIVE

The important aim and objective of this research is to recognize the key factors which contribute to customer’s switching behavior and to develop a proficient and effective model which can spot in advance the probable customers who have made their decision to change the present operator and join a new operator of their choice, in Pre-paid mobile telephony market. This is very much useful for the present carrier to recognize the customers who are thinking about changing their present service provider.

The churn prediction solution uses information about the historical behavior of your customers, revenue, operations, social behavior and other current measures, and applies predictive models to determine the likelihood for churn and build target campaigns towards customer retention. Companies can know what are the important factors contributing the customer’s switching decision.

CHURN IN TELECOMMUNICATION INDUSTRY

There are three types of churn:-

1. Active / deliberate – here the customer is the decision maker. Because of various reasons the customer decides to stop availing the services of the present operator and to join another one of his choice. decides to quit his contract and to switch to another provider.
2. Rotational / incidental – Without planning a switch over here the customer discards the present service provider. Some of the reasons for this are financial problems, or change of the geographical location etc
3. Passive / non-voluntary - Here service provider terminates the contract. The major reason can be payment fraud.

To stop voluntary churn the companies have to identify and target those customer who have made their mind for choosing another operator and what factors forced them to discard the services offered to them.

So it is a process of recognizing most probable clients who will leave in the near future. For this historical data of past churners is compared with present customers. Based on the behavioral similarity the probable churners are identified.

MAJOR CAUSES OF CHURN

Today's highly competitive environment, subscribers receive high amount of incentives to switch and come across many disincentives to stay. Some of them are as follows :-

- *Price*: The pricing promotions offered by service providers in the wireless telecom markets can influence the customers change their service providers .
- *Service quality*: Inability to keep quality in service can force the customers to shift to another with good service , network connectivity etc.
- *Fraud*: After generating high usage volumes customers may attempt to switch constantly to the next competitor without making the payment.
- *Lack of carrier receptiveness*: Ignorance to customer complaints will definitely lead to customer dissatisfaction. Not responding even after repeated complaints or long waiting time

to solve customer queries , failures in fulfilling promises, etc are sure to lead to customer attrition.

- *Brand treachery* : Even if the customers are loyal a service provider in the market with strong brand image can influence the loyal customers also. Disloyal customers are very easily attracted by the incentives offered by the competitors.
- *Privacy concerns*: To get a service connection, lots of personal information are to be revealed to the service provider. The mode of storage of this data by maintaining high confidentiality is always expected by the customer. The service provider will be held responsible for the leakage of the same.
- *Deficiency of features*: Customers aims for added features at a lower cost. If the service providers fail to provide features existing as on date, customers will surely switch to service providers who provides features which are latest and up to date.
- *Latest technology or invention introduced by competitors*: Latest technologies employed by competitors are strategies by which they can attract the customers to switch on to them.
- *Entry of new competitors in the market*: Disloyal customers are influenced by new competitors entering the by making offers of short- or long-term benefits and thereby make market share.

Mobile number portability: This facility provides the customer to enjoy different service providers with efficient and competitive service features without getting his/her mobile number changed. This also enables the customer to make out the service provider which can give him the maximum satisfaction. Due to increase of competition in this field more features at lower cost is what the customer prefers.

- *Erroneous Billing or disputes in service*: Regularly interrupted services and errors in preparing bills and additionally applied charges can cause customers to switch operator.

RESEARCH METHODOLOGY:

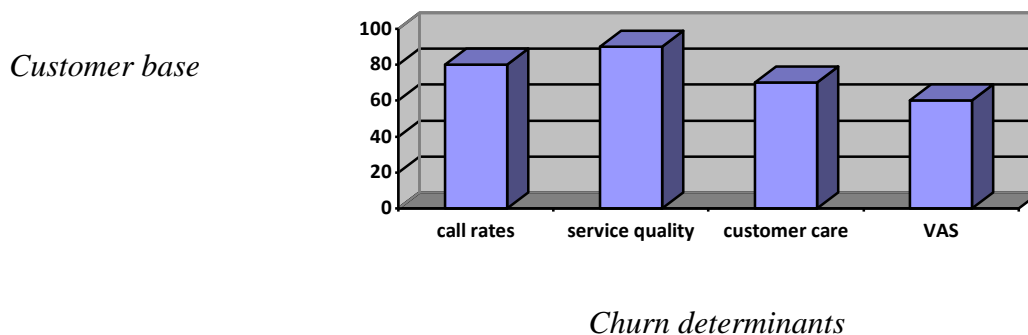
This study is intended to find the key determinants for customer churn in telecom sector and to device a model to deal with it. The data of this research will be primary data from the customers and the call records of customers collected from a particular service provider. Both primary data from the respondents and secondary data from the service provider data base is used in the study. For model creation, firstly, based on their usage behavioral feature the

customer base was clustered. In the next phase classification technique was used to build the model. This is a process by which we can predict the class of instances whose class labels are not known.

ANALYSIS & INTERPRETATION

The primary data was collected from 120 respondents with a questionnaire consisting of 25 factors. Out of the 120 respondents 80% agreed that high call rates have a positive impact on the subscriber's churn decision. 90% of the subscribers say that service quality is the most important factor based on which a subscriber decides to continue or terminate the service of the particular service provider. The next important factor identified is customer care support offered to the subscribers. 70% say that poor customer support is also a reason for the subscriber churn. 60% customers say that lack of value added services/support also contribute to the customer switch over.

Figure1: Major churn determinants



MODEL CREATION

The customer base is segmented based on the calling behavior of customers and accordingly four clusters are created. The following 8 features are used for model creation by considering two sub periods of 15 days for each cluster.

1. *IMOU initial* : A subscriber's minutes of usage of incoming calls in the first sub-period.
2. *IFOU initial* : A subscriber's incoming frequency of usage in the first sub-period
3. *OMOU initial*: A subscriber's minutes of usage of outgoing calls in the first sub-period.

4. *OFOUinitial*. : A subscriber’s outgoing frequency of usage in the first sub-period
5. $\Delta IMOU2$: The change in Incoming Minutes of usage of a subscriber between the sub-period 1 and 2 and is measured by $\Delta IMOU2 = (IMOU2 - IMOU1 + 0.01) / IMOU1 + 0.01$ where, $IMOU1 = MOU_{initial}$.
6. $\Delta IFOU2$: The change in Incoming FOU of a subscriber between the sub- period 1 and 2 and is calculated as $\Delta IFOU2 = (IFOU2 - IFOU1 + 0.01) / IFOU1 + 0.01$ where $IFOU1 = FOU_{initial}$.
7. $\Delta OMOU2$: The change in Outgoing MOU of a subscriber between the sub- period 1 and 2 and is measured by $\Delta OMOU2 = (OMOU2 - OMOU1 + 0.01) / OMOU1 + 0.01$ where $OMOU1 = OMOU_{initial}$.
8. $\Delta OFOU2$: The change in Outgoing FOU of a subscriber between the sub- period 1 and 2 and is calculated as $\Delta OFOU2 = (OFOU2 - OFOU1 + 0.01) / OFOU1 + 0.01$ where $OFOU1 = OFOU_{initial}$.
9. *Churn*: binary churn labels for each client according to their churn status in prediction period.

A Decision tree multi-algorithm model is applied on the four selected clusters and the gain factor for each cluster is calculated for the top 10% and 20% of customers and the results are recorded in the following table.

Table1. Gain Measure values of Multi-algorithm Model on Clusters

<i>Cluster No</i>	<i>% Gain for percentile=10</i>	<i>% Gain for percentile=20</i>
1	78.2	80.4
2	54	67.1
3	15	30.6
4	40	80

The above table

shows that a gain factor of 80.4% and 78.2% is obtained by the model constructed, for the top 20% and 10% respectively of the customers in cluster1.

Here the constructed model gets a gain measure of %67.1, and %54 respectively for top %20 and top %10 of the customers in cluster 2. For cluster 3 gain factor of 30.6%, and 15% respectively is scored for the for top 20% and 10 % of the customers . In cluster 4 gain factor for the top 20% of the customers is 80% and 40% for the top 10% of the customers .

That is selecting a sample size of 20% from customer base of each cluster , the multi algorithm model is able to spot 80.4%,67.1%,30.6% and 80% of the total number of customers respectively from each cluster who are about to switch their service provider.

CONCLUSION.

The major crisis that the carriers are facing is to identify the future churners and to focus them with incentives so that they are convinced to stay back. Due to the absence of a precise model to monitor the customer behavior the most companies are not capable to distinguish the churners from non-churners. In this study first the major determinants are identified from the primary data collected from respondents and identified that high call rates, service quality, poor customer care and lack of value added services as the major factors for customers to change their service provider. Next the predictive model is constructed by the secondary data collected from a particular service provider and applied decision tree algorithms. The model performance is recorded based on gain measure.

LIMITATION AND FUTURE SCOPE

Due to the confidential nature of billing and credit data of customers, I was unable to utilize these data in this study which is observed as a major limitation. So these features could not be included in the model building phase. Another limitation which was observed is absence of customer demographics. This also could not be included in this study. These factors could have improved the precision and analyzing capability of clusters. In this study for the purpose of clustering and classification I used two step clustering and decision tree classification for developing the model. Further work can be done to compare the performance of various classification and clustering algorithms for the creation of such forecasting models.

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