A Survey on Factors Impacting Churn in Telecommunication using Datamininig Techniques

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Abstract— **Customer churn is the central concern of most companies which are active in industries with low switching cost. Telecommunication industry can be considered to be top, among the industries which suffer from this issue. Mobile Service Providers have implemented CRM (Customer Relationship Management) with intention to reduce the number of Customer Churn. However, Still the Telecom Industry facing with high churn rate.**

The objectives of this research study are to identify the high impact factors that cause customer churn in Mobile Service Provider Industry. Questionnaire survey from the sample of 750 was conducted under the category of Students, Professionals (Salaried) and Business Persons. The collected data was analyzed using Decision Tree (ID3 Algorithm) in WEKA in order to predict the high impact factors that cause customer churn.

Based on the study Network Quality, Call Facilities , Internet Facilitie and Booster Facilities were the high impact factors that cause customer churn in telecommunication.

Keywords— *Customer Relationship Management, Mobile Service Provider, Customer Churn, WEKA.*

I. INTRODUCTION

A. Background of the Study

Nowadays, Telecommunication companies have to compete with each other and survive in changing environment and deregulation (Geppert, 2002). Customer churn, the movement of customers from one provider to another provider in search of better and cheaper products and services is the constant challenge for both cost and revenue sides (Geppert, 2002).

As markets become saturated and competition oriented, customers have more choices with the concern of their purchasing power (Geppert, 2002). Competitors in the telecommunication market is constantly tempting customers with more incentives to make churn over the service providers. That brings churn management, the process of retaining customers, a major challenge for the carriers to turn unreliable subscribers into customers (Whiting, 2001). It is easier to retain the existing customer than to acquire new customer.

Customer churn also generates loss in brand value. To meet these challenges, communication companies are employing sophisticated customer relationship management (CRM) and churn management techniques (Geppert, 2002).

B. Research Question

The question of the focused research is "What are the most important factors that cause Customer Churn in Telecommunication industry?"

C. Objective of Study

The Mobile Service Providers implemented CRM program in order to satisfy what customer needs and wants. However, that is not well enough because there are so many factors that cause customer churn. This study is able to understand weakness of the Mobile Service Provider in this present time. The objectives of this study are:

- To identify the high impact factors that cause customer churn of Mobile Service Provider over the current market situation.
- To conduct the survey regarding customer needs from the end of mobile service providers
- To identify the area in which service providers need to be improved for serving customers.

II. METHODOLOGY

A. Population

Three Categories (**Students, Professionals (Salaried) and Business Persons**) of Customers of various service providers situated in kanchipuram of tamilnadu were treated as the population of this study. Survey was targeted on the customers of Mobile Service Providers such as Airtel, BSNL, IDEA, and Vodofone.

B. Procedure

It was decided to collect at least 600 questionnaires to arrive at reasonable conclusion. The questionnaires were circulated to 762 mobile phone users of various mobile phone service providers. The sample size was 762, in which 750 were validated and remaining 12 were not included due to incompleteness. Out of 750 respondents, Students were 250, Professionals (Salaried) were 250 and Business Persons were

250. The collected data was analyzed using Decision Tree (ID3 Algorithm) in WEKA in order to predict the high impact factors that cause customer churn.

C. Measure

Questionnaire was used as an instrument for this study. It contains brief description about purpose of the study and various factors under the following six categories like Network Quality, Customer Service, Call Facilities, Internet Facilities, Booster Facilities and Alerts. Here all this six categories are considered to be the **Independent variable** and Customer Churn is the **Dependent variable**.

III. DATA ANALYSIS

A. Using WEKA

- **ID3 BASIC**

Iterative Dichotomise 3 or ID3 is an algorithm which is used to generate decision tree.

The idea of ID3 algorithm is to define the decision tree in a top-down fashion through the given data to test each attribute at every node. To select the attribute useful for classifying a given sets, an information gain metric is used.

To find an optimal way to classify a learning set, we have to minimize the questions asked (i.e. minimizing the depth of the tree). Thus, we need some metric that, measure which questions provide the most balanced splitting. Such metric is the Information gain metric.

- **ID3 Metrics**

To avoid overtraining, decision trees should be preferred in small ones. This algorithm defines small trees, but it not always defines the smallest possible tree.

The optimization step makes use of information entropy:

Entropy

$$E(S) = -\sum_{j=1}^{n} f_S(j) \log_2 f_S(j)$$

Gain

Gain information is the estimation of the gain produced by a split over an attribute:

$$G(S, A) = E(S) - \sum_{i=1}^{m} f_S(A_i) E(S_{A_i})$$

B. Results and Discussion

Student:
Calculated Gain Information for Network Quality Category Attributes:

Info (NQC) = - 138/250 log2 (138/250) – 112/250 log2 (112/250) = 0.992 Bits

Now, It needs to look at the distribution of Strongly agree, Agree, Neutral, Not agree, Strongly not agree tuples for every attribute of Network Quality category.

Attribute "Network Coverage":

Info $_{NQC.}$(NC) = 138 / 250[(- 64/138 log2 (64/138) - 46/138 log2(46/138) –12/138 log2 (12/138) – 9/138 log2 (9/138) – 7/138 log2 (7/138))] + 112 / 250[(- 48/112 log2 (48/112) – 31/112 log2 (31/112) – 14/112 log2 (14/112) – 11/112 log2 (11/112) – 8/112 log2 (8/112))]

= 1.007 + 0.902

Info $_{NQC.}$ (NC)	= 1.909
Gain $_{NQC.}$ (NC)	= 0.917
Gain $_{NQC.}$ (NA)	= 0.843

Total Gain (Network Quality)
= 0.917 + 0.842 = 1.759

Table 1 : Ranked Gain information of factors in various categories among Students.

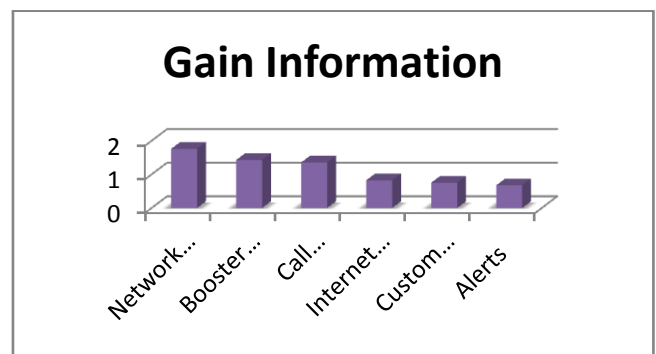| Category	Gain Information
Network Quality	1.759
Booster Facilities	1.528
Call Facilities	1.156
Internet Facilities	0.824
Customer Service	0.752
Alerts	0.675

Fig 1: Chart Representation of Table -1

Based on the Gain Value calculated using ID3 algorithm, it has been identified that Network Quality and Booster Facilities were the two high impact factors that cause churn among students. The same was proved by the table and the bar chart diagram.

Professional (Salaried):

Table 2: Ranked Gain information of factors of various Categories among Professional (Salaried).

Category	Gain Information
Network Quality	1.687
Internet Facilities	1.614
Call Facilities	1.237
Customer Service	0.885
Booster Facilities	0.653
Alerts	0.618

Fig 2: Chart Representation of Table -2
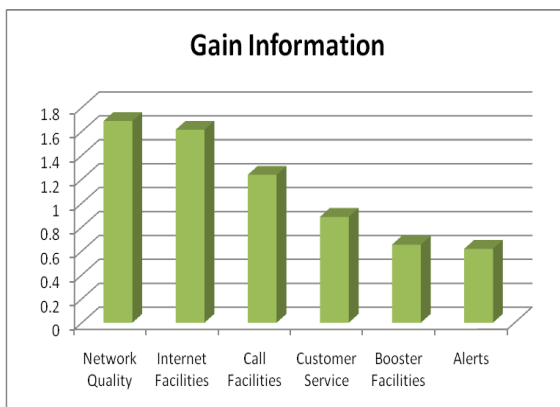
As Network Quality is the major impact factor for all the customers, Professionals also given much importance for the same. From the analysis further, it has been identified that, next to Network Quality, Professionals are giving more preference to the Internet Facilities.

Business Persons:

Table 3 : Ranked Gain information of factors in   various categories among   Business Persons.

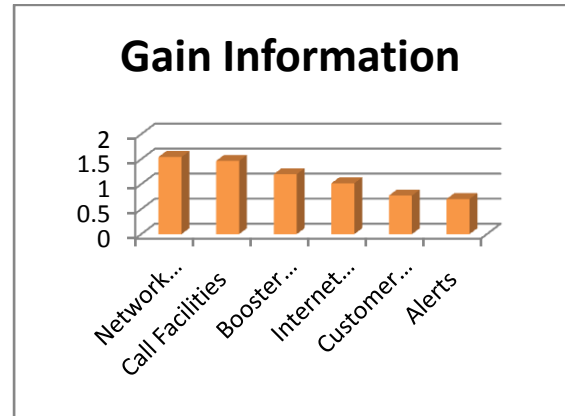| Category	Gain Information
Network Quality	1.543
Call Facilities	1.464
Booster Facilities	1.198
Internet Facilities	1.017
Customer Service	0.771
Alerts	0.701

Fig 3: Chart Representation of Table -3

Based on the analysis, it is also suggested that, apart from Network Quality, Call Facilities and Booster Facilities are the two high impact factors that influence the churn in telecommunication among the Business Persons.

IV.   CONCLUSION

The study has focused to identify the factors that influence customer churn in telecommunication. The factors were considered under the category of Network Quality, Call Facilities, Call Service, Internet Facilities, Booster Facilities and Alerts. Questionnaires were used to collect data from 750 Customers under Students, Professionals (Salaried) and Business Persons in Kanchipuram, of Tamilnadu.   The collected data was analyzed using Decision Tree (ID3 Algorithm) in WEKA.

Network Quality is the one of basic requirement of all the service providers. The same was proved by the study also. From the Study it has been concluded that, Apart from Network Quality, Booster Facilities are the most impact factor that cause customer churn among the students.   By considering the Professionals the study concludes that, the Professionals are giving more importance for Internet and Latest Facilities and these are two important factors that influence the Churn among the Professionals.

From the study, it is further concluded that Call Facilities and the Booster Facilities are the two high impact factors that cause Customer Churn among the Business Persons. The study also recommends that Mobile Service Providers can give more attraction to the above said factors for their customers to flexibly reduce the churn rate.

V.   FUTURE WORK

The research work is focused to identify the most influencing factors for churn in telecommunication. The evaluation of the result will helps to identify the factors that influence churn.

The Study was only limited to the customers of Kanchipuram region only. The same work may be extended to other region also, to get more information about the services required by the Consumers.

The work also extended to analyze the data based on the clustering techniques, to get more information about the influencing factors of churn between various clusters.

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