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ISSN (P) 2319 - 8346 **TOWARDS MOBILE USERS SATISFACTION IN TELECOMMUNICATION NETWORKS USING DATA** MINING CLASSIFIERS

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ABSTRACT

Customer satisfaction with a company's products or services is often seen as the key to a company's success and long-term competitiveness. In the context of relationship marketing, customer satisfaction is often viewed as a central determinant of customer retention. If a customer perceives that an outcome is less than expected, customer will be dissatisfied, if outcome meets an expectation of the customer that will be satisfied, and if an outcome exceeds expectation of the customer will be highly fulfilled. One of the most satisfaction surveys asks questions about their performance without relevance to the customer's requirement or expectations. To rate the company's performance must have to be survey the customers that would be meaningful to ask questions relating to how the customer priorities, their needs and expectations The aim is to statistically analyze data and complement this with Text mining, in order to have an holistic way of drawing inferences from both structured and unstructured data for the purpose of decision making.

Keywords : Customer satisfaction, Data Mining, service quality, Customer Expectation

I. INTRODUCTION

Customer satisfaction is a marketing term that deals with how products or services supplied by a company meet or surpass a customer's expectation. Customer satisfaction is important factor because it provide marketers and business owners with a metric that they can use to handle and improve their businesses. Telephony In 1880, two telephone companies, namely The Oriental Telephone Company Ltd., and The Anglo-Indian Telephone Company Ltd., move toward the Government of India to establish telephone exchanges in India. The permission was refused on the grounds that the organization of telephones was a Government monopoly and that the Government itself would assume the work.

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In 1881, the Government later reversed its earlier decision and a license was granted to the Oriental Telephone Company Limited of England for opening telephone exchanges at Calcutta, Bombay, Madras and Ahmadabad and the first formal telephone service was established in the country. On the 28th January 1882, Major E. Baring, Member of the Governor General of India's Council declared open the Telephone Exchanges in Calcutta, Bombay and Madras. The exchange in Calcutta named the "Central Exchange" was opened on the third floor of the building at 7, Council House Street, with a total of 93 subscribers. Later that year, Bombay also witnessed the opening of a telephone exchange. While all the major cities and towns in the country were connected with telephones during the British period, the total number of telephones in 1948 numbered only around 80,000. Post independence, growth remained slow because the telephone was seen more as a standing symbol rather than being an instrument of utility. The number of telephones grew unhurried to 980,000 in 1971, 2.15 million in 1981 and 5.07 million in 1991; the year economic reforms were initiated in the country. In 1975, the Department of Telecom(DoT) was divided from Indian Post & Telecommunication Accounts and Finance Service. DoT was answerable for telecom services in the entire country until 1985 when Mahanagar Telephone Nigam Limited (MTNL) was fixed out of DoT to run the telecom services of Delhi and Mumbai. In the 1990s the telecom sector was opened up by the Government for private investment as a part of the Liberalization-Privatization-Globalization policy. Therefore, it became necessary to split the Government's policy wing from its operations wing. The Government of India corporatized the operations wing of DoT on 1st October 2000 and named it as Bharat Sanchar Nigam Limited (BSNL). Many private operators, such as Reliance Communications, Tata Indicom, Vodafone, Loop Mobile, Airtel, Idea etc., successfully entered the high potential Indian telecom market. Today, the Indian telecommunication industry is the world's fastest growing industry with 951.34 million total phone subscribers as of 31st March 2012 according to the Telecom Regulatory Authority of India (TRAI).

The total number of telephones in the country stands at 1035.18 million, while the overall teledensity has increased to 81.82% as of 30 November 2015 and the total numbers of mobile phone subscribers have reached 1009.46 million as of May 2015. The mobile tele-density had increased to 79.78% in November 2015. In the wireless segment, 6 million subscribers were added in November 2015. The wire line segment subscriber base stood at 25.72 million. Telecommunication is one of the greatest-growing industries in India and as the second largest market in the world. As such, the penetration of mobile phones is almost twice as high as that of personal computers. While only 49.2% of the world's population owned PCs in 2015, 79.8% possessed cell-phones.

User satisfaction is very important in today's business world and it makes phone users loyal to one telecommunication service provider and the Fig.1. shows the conceptual model of the customer satisfaction model.



Fig. 1. Research Conceptual Model

II. LITERATURE REVIEW

During the past few decades service quality has become a major area of academic investigation. There are many researchers and analysis that defined the term of "Service Quality". Gronroos (1982) described the total service quality as customer's perception of difference between the expected the service and the perceived service. Asubanteng ,Mccleary and Swan (1996) [.] defined service quality as the difference between customer's expectations for service performance prior to the service encounter and their perceptions of the service received. Gefan (2002) defined that service quality as the subjectives comparison that customers make between the quality of the service that they want to receive and what they actually get. Kalpana and Chinnadurai (2006) [25] in their study titled "Promotional Strategies of Cellular Services: A Customer Perspective" analyzed that the increasing competition and changing experience and preferences of the customer's all over the world are forcing companies to change their targeting strategies. The study revealed the customer attitude and their satisfaction towards the cellular services in Coimbatore city. It was found that advertisement play a leading role in influencing the customers but most of the customers are of opinion that promotional strategies of cellular companies are more sale oriented rather than customer oriented. According to Oyeniyi, Omotaya and Abiodun Abolaji Joachim (2008), Customer service has

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received considerable attention in marketing literature. This paper attempts to find the relationship between customer services on customer retention in telecommunication industry. If retention is not managed, customer's loyalty may be lost. This study examined the potential constructs in customer retention by investigating the chain of effects of retention from customer service, satisfaction, value and behavioral intention. The hypotheses are supported except that a higher level of customer satisfaction does not lead to customer loyalty[5]

Chris (2003) has analyzed 'Telecom advertising in print media'. This research attempted to consider why Telecom themes are used in advertisement, and the motives that lead companies and advertisers to use sport celebrities and sport concept in advertisements. From study it has been exposed that the appearance of sport celebrities in advertising endorsement occurred more often in Telecom magazines than in other magazines, because their target group is more acquainted with athletes. The sport celebrities that dominated each printed media are related with their target group characteristics.

III. RESEARCH METHODOLOGY

The primary goal of customer satisfaction surveys is **obtaining meaningful data** that can be used to enhance the operations of a business. Survey usually fall into a small set of data points that can be calculated, including:

- Customer demographics (age, gender, ethnicity, income status, etc)
- > Opinion about products purchased or service received
- > Overall satisfaction with a location, product or service
- Recognition of the brand and its marketing efforts

Survey has helped the researcher to come up with important factors, which important to customer, since user perception differs from person to person and perceptions are relative to expectation. Further user expectations are dynamic & changes over time with respect to age, occupation, gender. The need is to understand the user perception with reference to their expectation point of view. So researcher has done a survey through questionnaire by taking a sample of 575 customers.

Factor analysis is done to get the critical factors, which are affecting the customer satisfaction. The outcome of factor analysis give five major factors from customer perception and expectation point of view, which are: Network coverage, Billing service, Customer Care, Call Drop & Value Added Service. For the study in hand, both the primary and secondary data is collected. The primary data for the study is collected directly from target respondents through structured questionnaire and personal interviews. The secondary data for the study is collected from different sources such as technical and trade journals, articles, newspapers, magazines, internet, periodicals, books, reports, publications of associations related to mobile phone service providers.

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IV. DATA MINING

Data mining refers to extract implicit knowledge from huge amount of database. The data may be spatial data, multimedia data, Geographical data, time series data, text data and web data. Data mining is the process of extraction of interesting, nontrivial, implicit, before unknown and potentially useful patterns or knowledge from huge amounts of data. It is the set of activities used to find new, hidden or unexpected patterns in data or unusual patterns in data. Using information contained within data warehouse, data mining can often provide answers to questions about an organization that a decision maker has previously not thought to ask [1].

V. DATA MINING ALGORITHM AND TECHNIQUES

There are some data mining techniques and algorithms have been developed and used in data mining like association, classification, clustering, prediction and sequential patterns, Regression, Neural Networks etc. [2]. We will briefly appear at those data mining techniques.

5.1 Classification

Classification is the most commonly applied data mining technique, which employs a set of pre-classified examples to develop a model that can classify the population of records at large [3]. Basically classification is used to classify each item in a set of data into one of predefined set of classes or groups. Classification method makes use of mathematical techniques such as decision trees, linear programming, neural network and statistics. In classification, we make the software that can learn how to classify the data items into groups [4].

Types of classification models:

- Classification by decision tree induction
- Neural Networks
- Support Vector Machines (SVM)
- Classification Based on Associations
- Bayesian Classification

BAYESIAN CLASSIFICATION

Bayesian classification technique is based on Bayes' Theorem with an assumption of independence among predictors. It is a very simple which assumes that the classification attributes are independent and they do not have any connection between them. A lot of researchers have found that this assumption of liberty do not work in the entire cases for which other different methods are proposed to raise the performance. The creative Naïve Bayesian technique is based on the conditional probability and the maximum likelihood incidence. The Naive Bayesian algorithm based on the description provided in^[26]:

$$P(C/A) = P(A/C)P(C)$$

P(A)

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5.2 Clustering

Clustering can be said as identification of similar classes of objects. By using clustering techniques we can further identify dense and sparse regions in object space and can discover overall distribution pattern and correlations among data attributes. Classification approach can also be used for useful means of individual groups or classes of object but it become costly so clustering can be used as preprocessing approach for attribute subset selection and classification. For example, to form group of customers based on purchasing patterns, to categories genes with similar functionality.

Types of clustering methods

- Partitioning Methods
- Hierarchical Agglomerative (divisive) methods
- Density based methods
- Grid-based methods
- Model-based methods

5.3 Association Rule

Association and correlation is usually to find frequent item set findings among huge data sets. This type of finding helps businesses to make certain decisions, such as catalogue design, cross marketing and customer shopping behavior analysis. Association Rule algorithms need to be able to generate rules with confidence values less than one. However the number of possible Association Rules for a given dataset is generally very large and a high proportion of the rules are usually of little (if any) value.

Types of association rule

- Multilevel association rule
- Multidimensional association rule
- Quantitative association rule

5.4 Neural Network

Neural network is a set of connected input/output units and each connection has a weight present with it. During the learning phase, network learns by adjusting weights so as to be able to predict the correct class labels of the input tuples. Neural networks have the remarkable ability to derive meaning from complicated or imprecise data and can be used to extract patterns and detect trends that are too complex to be noticed by either humans or other computer techniques. These are well suited for continuous valued inputs and outputs. For example handwritten character reorganization, for training a computer to pronounce English text and many real world business problems and have already been successfully applied in many industries. Neural networks are best at identifying patterns or trends in data and well suited for prediction or forecasting needs.

Types of neural networks

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