International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 11 | Nov -2016 www.irjet.net p-ISSN: 2395-0072

Modeling and Analysis of Customer-Product Relationship for Revenue Growth of Online Telecom Industry

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Abstract

Today, it has become very difficult for the telecom industries to generate revenue at the speed they thought it would be. Customer-Product relationship has always been the most important relationship for growth of business. The better this relationship better is revenue generation and better is the growth of company. This paper will focuses on different data mining techniques applied to provide better understanding of customer and product relationship hence help e-commerce business to grow. The three main phases of Customer Relationship management are as follows:

- *Customer Identification*
- *Customer Attraction*
- *Customer Retention*

As there is better understanding of the customers and products, there is more probability of transactions. If transaction count increases, proportionally even the revenue increases which in turn increases the profit.

In designing the solution, data mining methods and algorithms play vital role. Concepts such as classification, clustering, prediction techniques, association rule mining and network based learning are used. With all these concepts put together, the solution becomes one of many ways to generate more revenue and help e-commerce business flourish.

Introduction

We all know that web based nature of business is also referred as e-commerce business it has many advantages but only business ideas using web can survive.

1.1 Problem Statement

Different issues faced by E-commerce industries are as follows:

- Lack of understanding of customer attributes
- Lack of understanding of product attributes
- Lack of understanding of customer – product relationship

This paper work will mainly focus on above mentioned three sub problems and will provide best solutions to overcome with these problems.

1.2 Reasons Why E-commerce Business Fail

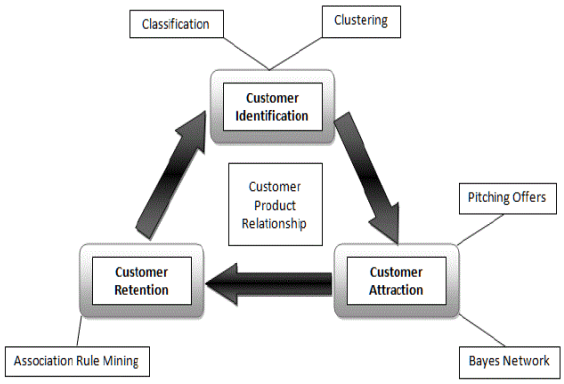
- The main problem with e-commerce is that sometimes it aims at selling wrong and unintended product to the customer. This makes customers unhappy. So this must be avoided.
- If one wants to earn higher revenue then he/she has to make sure that the business website is catering to needy customers at time of their need with the products they need.
- The e-commerce has its presence only on web. Thus one should make optimum use of this platform for marketing.
- This all can be handled by using CRM methods. These CRM methods internally use data mining techniques.

Customer Relationship Management

CRM is an approach to manage an organizations interaction with its current and future customers. In case of e-commerce, there will not be any physical or real interaction. The interaction with customers will be in form of asking the customers to visit the webpage and choose the products they want to buy.This interaction will involve many stages. All these stages are based on using business data and information to turn it into knowledge base. This conversion of information to knowledge requires data mining techniques. Mostly used techniques are:

- Classification
- nonlinear regression
- Bayesian network
- Clustering
- Apriori algorithm

Diagram 1. CRM Process for Maintaining Customer Product Relationship



 ClassificationClassification is a process where we assign a class label from predefined set of classes to any new object. The assignment of this label is dependent on the properties of the new object and the similarity of the same with other pre classified objects.

 Clustering Clustering is a process where we group multiple objects together. This grouping is based on the similarity measure of objects. K Modes algorithm is used for this.

 Nonlinear regression Regression is a technique which helps to understand the statistical relationship between variables. Once this relationship is established it can be used for prediction also.

 Apriori Algorithm Apriori technique is useful for finding out association rules based on pre-decided support and confidence thresholds.

 Bayesian networkif businessman has to predict with what probability a customer will buy a product, Bayes network comes handy.

Data Mining Applications in Telecommunication

Call detail record analysis: Telecommunication companies accumulate detailed call records. By identifying customer segments with similar use patterns, the companies can develop attractive pricing and feature promotions.

Customer loyalty: Some customers repeatedly switch providers, or "churn", to take advantage of attractive incentives by competing companies. The companies can use DM to identify the characteristics of customers who are likely to remain loyal once they switch, thus enabling the companies to target their spending on customers who will produce the most profit. This paper describes the most valuable CRM data mining applications in telecommunications. Data mining project for effective CRM consists of several phases:

1. **Defining the problem to be solved.** Each CRM application will have its own business objectives and requirements. Data mining model have to be defined according to these objectives.
2. **Preparing List of questions:** It is advisable to make a list of interesting questions. This step can sometimes be skipped, in case a data warehouse is used as the single source of data needed for analysis purposes. This is because the data has to be **cleaned, integrated and transformed** before entering into a data warehouse. Of course, data can be accessed from a relational database, a flat file, a spreadsheet, or from some another sources as well. In this case preparation steps usually take a lot of time and effort, especially when the data needed resides in multiple data repositories. Selecting the summary variables on which the model will be built is a critical step within the data mining process.
3. **Modeling:** In this phase the data is presented to a data mining software program. Sometimes the variables chosen are not the appropriate ones, and in this case the analyst has to go back and make some changes to the data he is using.
4. **Interpreting the results.** The results should be brought together into a coherent presentation and presented to the business people.
5. **Applying the results** –The gathered information should be used to enhance business and customer relationship behaviors.

REASONS FOR APPLYING DATA MINING TECHNIQUES FOR CRM IN TELECOMMUNICATIONS

According to the International Engineering Consortium (2005) telecommunications companies can accept one of the two basic strategies:

- Product strategy
- Customer strategy.

Product Strategy was very popular in the past when companies were marketing their services to the masses. But this strategy involves high marketing costs and also the customer loyalty was very low. So companies now design their product according to customer's needs.

In order to deliver relevant services to their

customers most telecommunications firms accepted the second of these two strategies. Today's companies are customer-centric. To create a better environment for managing customer relationships, companies uses an approach called CRM. CRM is defined as a set of activities a business performs to identify, qualify, and acquire. Data mining software should be used together with campaign management software in order to apply a customer-centric business approach. There are several more reasons for applying data mining techniques for CRM in telecommunications:

• Competitive market. After years of being a monopoly market, the telecommunications market is now highly competitive. Customers are able to switch providers easily, because there are many of them available. For this reason telecommunications companies explore data mining solutions to achieve competitive advantage. By understanding the demographic characteristics and customers' behavior, telecommunications companies can successfully tailor their marketing strategies to reach those most likely to use their services, to increase customer loyalty and improve customer profitability.

• High churn rates. Churn refers to the monthly or the annual turnover of the customer base Competitive climate naturally results in high churn rates. Initially, growth in the telecommunications market was exponential, and since many new customers arrived, eventually, the market matured and the churn rates became high.

• Massive data collection. Telecommunications companies collect massive amounts of data. Since the main product of the company is the call, its customers create hundreds of thousands transactions per day. Call detail records are stored in the database and they are a very large data source. Telecommunications firms also collect customer data, which describes their customers, and network data. All of these can be presented to some data mining tool.

THE DATA TO BE MINED

A huge amount of data generated by telecommunications companies cannot be analyzed in a traditional manner, by using manual data analysis. That is why different data mining techniques ought to be applied. As mentioned before, information about each and every call customers make is stored in the database. These are known as **call detail records.** Call detail records usually include information about originating and terminating phone numbers, the date and time of the call and its duration.But those records are often not suitable for data mining itself, so they have to be **transformed.** This is because the goal of data mining is to discover patterns that concern customers, not calls.

Data mining can build models that can explain customers' behavior and predict it, but it is only a step in a much larger process. The successfulness of data mining is determined by the business process, especially by marketing activities, because marketers are the primary users of CRM tools. Marketers have to understand the results of data mining before they put them into action.

Since data mining extracts hidden patterns of customers' behavior, understanding the results can be a bit complicated. But it is necessary in order to improve campaign management. Data mining software should be used together with campaign management software in order to apply a customer-centric business approach. Data mining can be used for marketing campaign design, response modeling and marketing.

BUILDING DATA MINING APPLICATIONS FOR CRM

The two most valuable data mining applications for CRM in telecommunications are concerning **customer segmentation and churn prediction.** These data mining models utilize the necessary data that exists in a database to build patterns that are relevant to CRM.

Customer segmentation is one of the most important data mining methodologies used in marketing and CRM .It helps telecommunications companies to discover the characteristics of their customers. Customer segmentation is grouping similar customers together, based on many different criteria. In this way it is possible to target each and every group depending on their characteristics. A more appropriate term to use is **clustering.** Clustering is a good way to analyses large and complex set of data. Since each cluster provides a description, the analyst can understand the nature of the problem better. The data to be mined usually includes:

• Behavioral data (call detail data)

• Demographic data (customer data).

Behavioral data helps one to identify groups of customers who have similar calling behaviors. In

this way it is possible to focus on what customers do rather than what they are.

Identifying customers' needs only from their demographic data does not produce much value in the market. Different clustering techniques are used. Telecommunications companies have to make efforts to recruit new customers, but they also have to concentrate on not letting the existing ones go.

Hencethe telecommunication industries Applies data mining techniques in CRM under three main sections:

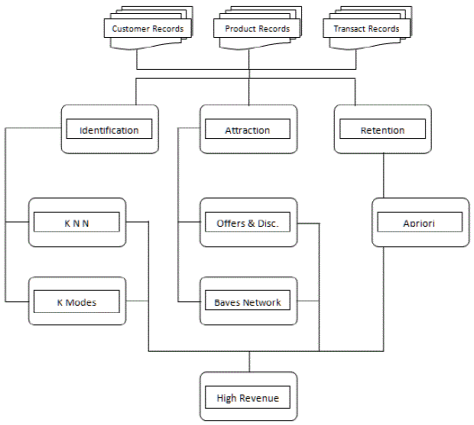
- Customer Identification
- Customer Attraction
- Customer Retention

Customer Identification This phase can also be called as **customer acquisition phase.** In this phase business targets people who are most likely to become customers. To target people who are most likely to become customers, it is must that the customer data should be analyzed. After analysis there comes a step of segmentation of group forming. The analysis is done based on customer attributes and characteristics. Depending on these attributes and characteristics customers are clustered or grouped into multiple clusters or groups. For analysis purpose people use classification algorithm such as K Nearest Neighbor. This algorithm will analyses all the customer records and then will classify a new record on basis of pre classified records. After Analysis comes the segmentation part. Customer segmentation can also be termed as **clustering**. Generally in such scenario people use K Mode algorithm.

Customer Attraction Once the customer is classified and grouped with other customers, the main challenge is to attract them to transact. These transactions would fetch more revenue and the business will grow. One way to accomplish this is by direct marketing. Direct marketing involves knowing when customers buy very often. One can target this period and give away offers those will force the customer to transact. There can also be coupons for the transactions. This can be accomplished by **regression techniques**. If a customer is outlier or showing behavior that is not consistent with the cluster that will be found in this stage. One should use outlier detection techniques for the same.

Customer Retention The customer might visit the e-commerce website and perform some transaction and might come for next transaction too. However what if that does not happen. Thus customer retention is very important stage. This is also considered as most vital phase for customer product relationship. From customers viewpoint this mainly deals with satisfaction of customer by showing the right products for him. From the business point of view, this is a long term profit generator. If the customer is happy and satisfied, he will again and again transact with e-commerce venture. That is why business should give more importance to this. This uses Apriori algorithm to calculate products those are highly associated with already bought products. One more way to accomplish this is to have loyalty program where the customer is given additional offers for being loyal customer. Loyalty program can use decision tree like algorithms.

Diagram2. Flow Chart of model that uses data mining techniques in CRM



TALLY INTEGRATION FOR DATA MINING IN CRM

A major advantage we get as a business when using CRM Software with Tally.ERP 9 is simply that when a customer makes contact either by phone or over the counter CRM Software for Tally.ERP 9 will instantly pop open your customer's record, glean the most relevant information in relation to the customer's preferences and likes and it prepares you to sell at the time of the contact. No other software gives you this remarkable sales advantage. CRM Software with Tally.ERP 9 prepares you to target and shoot (highly personalized sales ready messages) automatically every time your customer makes contact based on

their individual preferences.
CRM Software with Tally.ERP 9 combines data from most operational sources such as customer interaction and transactional data, to sales analytics using existing customer data including personal, demographic and contact data to create a complete view of each customer. For successful customer analytics and response you need to be able to extract relevant customer attributes in real time. CRM Software with integrated Tally.ERP 9 enables this through segmentation,customer insights, interaction details .

Overall, it gives you:

- A single informed view of your customer
- Improved sales effectiveness
- Improved contact effectiveness
- Improved quote-to-order process
- Improved customer acquisition rates
- Improved customer retention rates
- Improved cross-selling rates
- Increased service effectiveness

All information regarding each customer is made easily accessible at the time the customer makes contact. This improves customer service and efficiency and creates a consistent and compliant customer experience. You can record detailed information for customers and suppliers, both at the company-level (Customer and Supplier Accounts) and for individuals (Contacts). You can empower your staff to provide high levels of customer service with a complete record of customer communications. Easily review upcoming activities, sales opportunities.
CRM withTally.ERP 9 includes fully-integrated scheduling and task management to track both internal and customer activities, including multiple participants and resources, with pop-up reminders and Dashboards with proper charts.

Customer contact history
CRM with integrated Tally.ERP 9 captures and stores every customer activity across each point of contact.

Real time decision making
CRM with integrated Tally.ERP 9 is able to work in real time, allowing pricing and application decisions to be made accurately and quickly. It saves unnecessary effort from your staff, this can significantly increase conversion rates.

Ease-of-use
CRM with integrated Tally.ERP 9's intuitive interface enables quick access and assessment of comprehensive information on each customer. Quick workflows and call scripting ensure staff would take the most efficient route to resolving customer enquiries and to progress sales.

SALES AUTOMATION
Manage customer accounts, import leads, distribute them and create automated follow-up reminders. Track detailed opportunity information, including competitor information, and create customized sales stages, based on product or service lines. Use the Product and Customer segmentation features to forecast future revenue, and target the most profitable accounts.

Opportunity Management
After the leads are converted into opportunities these can be easily manged or viewed through customer details available in our tally data.

Easily Track and Manage Inventory

Plan and timely manage accurate stock levels at various locations, store frequent stock transactions, adjustment and analyse stock movement trends effectively.You can also manage threshold quantityof stock and maintain product quality.It provides a robust stock tracking mechanism to help you store and manage stock across multiple branches and godowns.

Exclusive Reports
Get detailed reports on stock movements, branch wise and product wise stock summary, stock valuation, location wise inventory status and threshold stock reports. On top of that analyse supplier product list and customer -wise price list easily.

Create and ManageReceipts Online

You can quickly create & store receipts with its source details like cash, bank, DD, Bank transfer or online

payment. You have all necessary fields to map the transaction's respective ledgers. Moreover, set reminders for receipts coming from various types of vendors and service providers .

Keep track of Payments

Being a distributor or a manufacturer, you need to have accurate processes in place to track all your due payments. Using the payment feature in our software for accounting, you can maintain all details of vendors with associated information of due amount, source of payment, dates of payments etc.

Integrated Reports

Get detailed reports on party ledger, payment registers, bills receivables and payables, stock summary etc. What's more, keep track of vouchers created, approved and paid by every employee.

So by using Tally one can understand the power of adhoc data mining and visualisation that can take your organisation to a next level.Your reporting needs are never-ending, and the need for
adhoc data mining and visualisation is enormous. Your top executives need to monitor summary results and key performance indicators, and sales managers may need information on weekly sales, targets, and receivables which can be easily managed by the integration of Tally.tally integration provides visual data mining (deep diving); drill down, drill through, slice and dice your data in tabular and graphs format.

Conclusion

This paper forms the concept to demonstrate the power of data mining techniques in field of Customer Relationship Management. The verification of different techniques will need integration of this model with actual business scenario. It is hardly possible to integrate the same with working business scenario but I have verified the implementation of different techniques using verification process. I used ninety percent of generated data to train and stabilize the model and remaining ten percent of data is used for verification of results. I found that the various data mining techniques implemented to create and get this model in working condition have given me expected results. I have no other way apart from manual verification to verify the result at this stage.

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