Customer Relationship Management through Web Mining

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Abstract: *Today, the most popular and interactive medium to disseminate information is World Wide Web. Web is very huge, diverse and dynamic and thus raises scalability, multimedia data and temporal issues respectively. It is a fertile area for data mining research. Mining is meant for extracting something useful or valuable from a baser substance such as mining gold from earth. Significant researches in Web Mining aim to develop new innovative technique for effective extraction and mine useful knowledge and information from web pages. It is a challenging task. Now, the time has come to explore the new areas that will be advanced by the use of Web mining and CRM is such an area that can benefit from and contribute to further advancements of Web mining research. CRM is an underexplored filed that has many open and interesting problems in the industry. Web mining, in customer relationship management (CRM), is the integration of information gathered by traditional data mining methodologies and techniques with information gathered over the World Wide Web. This paper reviews some of the key aspects of CRM, describes certain problems and promising research directions in the field, and discusses how Web mining can contribute to solve these problems.*
Keywords: *CRM, Web Mining, Research, Customer Loyalty.*

I. INTRODUCTION

In the present era of technological advancement, there is a significant transformation in web mining from an emerging technology to a well-established discipline having a well-defined and established body of knowledge. It can contribute a lot towards different fields. CRM is amongst one of them. CRM is about acquiring and retaining customers, improving customer loyalty, gaining customer insight, and implementing customer-focused strategies. A true customer-centric enterprise helps your company drive new growth, maintain competitive agility, and attain operational excellence.

To manage the relationship with the customer a business needs to collect the right information about its customers and organize that information for proper analysis and action. Web mining community should have a closer look at CRM and examine how it can contribute to this important field that is entering a significant growth period.

While celebrating all this progress, it is a good time to reflect on the next growth area in Web mining and identify either a big application domain or a novel set of methods that can significantly advance the field over the next decade. In this paper, we will argue that the Customer Relationship Management (CRM) is such an area which is gaining advantage from web mining and will present the various emerging web mining techniques that are effectively efficient in managing the different CRM issues.

II. OBJECTIVES

- To understand the concept of CRM and web mining.
- Major problem faced by CRM.
- Application of web mining in the CRM process.
- Promising Research directions in the future scenario.

Customer Relationship Management

Customer Relationship Management (CRM) is a business philosophy involving identifying, understanding and better providing for your customers while building a relationship with each customer to improve customer satisfaction and maximize profits. It's about understanding, anticipating and responding to customers' needs.

Customer relationship management (CRM) is a term that refers to practices, strategies and technologies that companies use to manage and analyze customer interactions and data throughout the customer lifecycle, with the goal of improving business relationships with customers, assisting in customer retention and driving sales growth. CRM systems are designed to compile information on customers across different channels -- or points of contact between the customer and the company -- which could include the company's website, telephone, live chat, direct mail, marketing materials and social media. CRM systems can also give customer-facing staff detailed information on customers' personal information, purchase history, buying preferences and concerns.

The secret to an effective CRM package is not only   effective data collection but also   the best organization and interpretation of that data. Computers can't, of course, transform the relationship you have with your customer. That does take a cross-department, top to bottom, corporate desire to build better relationships. But computers and a good computer based CRM solution can increase sales by as much as 40-50% – as some studies have shown.

Web Mining

Web mining is the use of data mining techniques to automatically discover and extract information from web documents and services. Web mining, which is moving the World Wide Web toward a more useful environment in which users can quickly and easily find information, can be regarded as the integration of techniques gathered by means of traditional data mining methodologies and its unique techniques. It aims to present a full picture of the state-of-the-art research and development of actionable knowledge discovery (AKD) in real-world businesses and applications. It can be broadly divided into three distinct categories, according to the kinds of data to be mined:

- Web Content Mining
- Web Structure Mining
- Web Usage Mining

Web Content Mining - It is the mining, extraction and integration of useful data, information and knowledge from Web page content. It describes the automatic search of information resource available online and involves particularly mining Web content data. It mainly relates to the text and multimedia documents and combination of novel methods from a wide range of fields including data mining, machine learning, natural language processing, statistics, databases, information retrieval and so on.

Web Structure Mining - Web structure mining, is a tool used to identify the relationship between Web pages linked by information or direct link connection. This structure data is discoverable by the provision of web structure schema through database techniques for Web pages. This connection allows a search engine to pull data relating to a search query directly to the linking Web page from the Web site the content rests upon. The main purpose for structure mining is to extract previously unknown relationships between Web pages.

Web Usage Mining - Web Usage Mining is the application of data mining techniques to discover interesting usage patterns from Web data in order to understand and better serve the needs their browsing behavior at a Web site.

Data Mining

To understand the concept of Web mining, first of all we should be clear about the meaning of data mining. It is a branch of computer science It is the process of extracting patterns from large data sets by combining methods from statistics and artificial intelligence with database management Only data collection is just nothing unless some meaningful information is drawn from that raw data. Earlier, doing that work manually was a tedious task for people. As the time passed, this theoretical knowledge from the statisticians was converted into programming languages and lead to the development of data mining applications. Data mining is seen as an increasingly important tool by modern business. It is currently used in a wide range of profiling practices, such as marketing, surveillance, fraud detection, and scientific discovery.

Earlier Bayes 'theorem and regression analysis methods were used for identifying pattern in data. As data sets have grown in size and complexity, direct hands-on data analysis has increasingly been augmented with indirect, automatic data processing. Data mining is the process of applying different methods to data with the intention of uncovering hidden patterns. A primary reason for using data mining is to assist in the analysis of collections of observations of behavior.

Data mining generally involves four classes of tasks named as: Clustering, classification, regression and associate rule learning. As the technology is advancing day by day, Data mining has been considered to be added into CRM applications.

Major Problems Faced by CRM

In this competitive age, proper management of customer interactions is a major challenge for modern companies. Now-a-days businesses are faced with the challenge of retaining existing customers and sourcing new ones in their path to success. Quality, reliability and efficient service have become major keys for brand building. Poor customer relationship management will result in disastrous outcomes including customer loss, company misdirection and eventual liquidation. The main reasons for failure and suitable suggestions to overcome these failures are listed as below:

- Wrong CRM assumption: CRM is a strategic focus that is aimed at long-term success and establishment in the marketplace by attaining maximum shares in terms of loyalty. One of the assumptions made is that CRM should be left to the sales and marketing team alone but this traditional thought is no longer applicable as research revealed that customer support practices involving the contribution of all members rather than only one department produces better results. But this wrong assumption is the result of technological advancements which have misled businesses to view CRM as software.

- Unclear goals/objectives: Clear objectives need to be set at every level to gain optimum participation from everyone. In many occasions, companies fail to set clear measurable objectives which limit their chances of accessing CRM's ROI. For this, harmonization of individual goals with departmental goals and overall objectives of firm should be done. These objectives should include short term goals which will be evaluated and measured through the CRM.
- Defining CRM processes: Businesses often find problems in defining key processes such as management changes, re-evaluations and security measures. All the processes that will be undertaken in achieving the set goals should be clearly defined and relayed to everyone. This is different from setting goals. The best practice involves establishing a central repository system that can be accessed by everyone. This system should contain all the process definitions as well as a section for documentation to act as a referencing resource.
- SECURITY ISSUES: The very nature of CRM software poses the potential for mistreatment of data. Such large databases, holding thousands of personal details, are stored online and accessed by teams around the globe. But these risks can be mitigated by introducing regular and thorough testing of CRM package. Make sure employees are fully trained in handling of sensitive information and ensure internal security systems are robust enough to inhibit external hacks. As with all online services, storing sensitive data is never 100% risk-free, but there are important measures which can drastically minimize these risks.
- OUT DATED INFORMATION: Customer's tastes go on change constantly therefore data relating to customers changes frequently and it is crucial that marketers lag behind by using old information. An easy and effective way to ensure that available data stays relevant is regular auditing of your data and asking customers to verify their details regularly.

Application of Data Mining in CRM

As the technology is advancing, Data mining has been considered to be included into CRM applications. A company can concentrate its efforts on prospects that are predicted to have a high likelihood of responding to an offer, rather than randomly contacting a prospect through a call center or sending mail. More sophisticated methods may be used to optimize resources across campaigns, to predict which channel and which offer an individual is most likely to respond to — across all potential offers. Once the results from data mining (potential prospect/customer and channel/offer) are determined, applications can be programmed either automatically to send an e-mail or regular mail. Of course, the issues of bulk mail and spamming should be given due consideration. Uplift modeling and Data clustering can also be used.

An example of a CRM application would be in a car manufacturing business (assuming they sell directly to end users). If they maintained a database of which customers buy what type of product, and when, how often they make that purchase, what type of options they choose with their typical purchase, their color preferences, whether the purchase needed financing etc., the manufacturer knows what marketing material to send out, what new products to promote to each customer, what preferences/options may swing the sale, whether a finance package should be included in the marketing material and when would be a good time to target each customer. They could use the information to build a relationship with the customer by reminding customers of service dates, product recalls, and maybe even to send the customer a birthday card.

Effective application of Web-mining in CRM can be understood by following steps:-

- Define Business Problem
- Build Marketing Database
- Explore Data
- Prepare Data For Modeling
- Build Model
- Evaluate Model
- Deploy Model and Results

Promising Research Direction in Future Scenario

As the usage of the internet in the present day is growing in faster rate, the personalization process of the web mining provides us a great opportunity of maximizing the efficient usage of the internet. The users of WWW need to use intelligent tools to find, sort, and filter the available data. The Web mining goals is to find and retrieve the information on the Web. By using important for future development web usage mining should handle integration of offline information with ecommerce tools. Relational Database Management, provides products catalogs and services with other applications, few new variables are required for finding natural and meaningful and useful patterns. Through the analysis of patterns, we will be able to develop the and design the efficient and powerful analysis tool.

Cloud mining is a new approach to apply data mining to CRM by using web mining process. By a cloud, we mean an infrastructure that provides resources and/or services over the Internet. In fact among all the

potential use of web mining in future, the growing online shopping activities, e-services industry and e-commerce are important domains.

With the increased penetration of CRM philosophies in organizations and the concomitant rise in spending on people and products to implement them, it is clear we will see improvements in how companies work to establish long term relationships with their customers. However, there is a big difference between spending money on these people and products and making it all work: implementation of CRM practices is still far short of ideal. Everyone has his or her own stories about poor customer service and emails sent to companies without hearing a response. We can expect that the technologies and methodologies employed to implement the steps will improve as they usually do. More companies are recognizing the importance of creating databases and getting creative at capturing customer information. Real-time analyses of customer behavior on the Web for better customer selection and targeting is already here which permits companies to anticipate what customers are likely to buy. Companies will learn how to develop better communities around their brands giving customers more incentives to identify themselves with those brands and exhibit higher levels of loyalty.

III. CONCLUSION

The past few years have seen the emergence of Web mining as a rapidly growing area, due to the efforts of the research community as well as various organizations that are practicing it. CRM is essential to compete effectively in today's world. The more effectively you can use the information about your customers to meet their needs the more profitable you will be. But operational CRM needs analytical CRM with predictive data mining models. The route to a successful business requires a marketing manager that understands its customers and their requirements and implements data mining with a good different model. If you are looking to grow your business in leaps and bounds, and you know the way to it is to grow your customer base, to improve your relationship with your customer, to actually be able to get insights on your customer buying behavior and pattern, then you need a CRM application.

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