

# APPLICATION OF CRM TECHNIQUE WITH THE AID OF ARM AND AI

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## ABSTRACT

*The main purpose of this paper is to maintain an effective customer relationship between the customers and the company. To accomplish this, we need to maintain a historical database. The historical database will contain customer information and the corresponding company revenue for each individual customer. And also the database will contain the information about the purpose for which the customer approached the company i.e., the customer has visited to procure some product or some service etc. Based on the information, the company needs to provide a price offer to the customer. To extract the required information from the database, we will use an ARM algorithm. Using the mining technique, we will get to know the customers who provide profitable business to the company and those customers will get a discount from the company and the discount rate has to be estimated such that it would not affect the current company's revenue and customers' satisfaction*

**Keywords :** Data mining, Customer Relation Management, AI, OLAP, ARM

## I. INTRODUCTION

A data stream is a massive unbounded sequence of data elements continuously generated at a rapid rate. The continuous characteristic of streaming data necessitates the use of algorithms that require only one scan over the stream for knowledge discovery. Data mining over data streams should support the flexible trade-off between processing time and mining accuracy [1]. Data mining is defined as extracting or mining of knowledge from large amount of data [2] [16]. There are several data mining tasks, for example classification, regression, clustering, dependence modeling, etc. [4]. Besides the other processes, clustering plays a vital role in data mining. It is the process of partitioning data objects, records, documents, etc., into meaningful groups or clusters so that objects within a cluster have similar characteristics but are dissimilar to objects in other clusters [5] [14].

Recently, a number of data mining applications and prototypes have been developed for a variety of domains, including marketing, banking, finance, manufacturing, health care and other types of scientific data [3] [15]. Data mining approaches found to be useful in other complicated areas such as customer relationship management (CRM) can be used to find parameters that cause defects in manufacturing processes [6]. Acquiring new customers can cost five times more than it costs to retain current customers [17]. In addition, repeat customers can generate more than twice as much gross income as new customers.

Companies have realized that instead of treating all customers equally, it is more effective to invest in customers who are valuable or potentially valuable, while limiting their investments in non-valuable customers. As a result of these types of findings as well as the fact that customers want to be served according to their individual and unique needs, companies need to develop and manage their relationships with their customers such that the relationships are long-term and profitable. Therefore, companies are turning to Customer Relationship Management (CRM) techniques and CRM-supported technologies [8]. CRM can be defined as a strategy that utilizes organizational knowledge and technology to enable proactive and profitable long-term relationships with customers [8] because company effectiveness relies on the effect of customer relationship management [7].

Customer Relationship Management includes a wide range of topics, which focus on all customer-oriented processes in a company [9]. The information and communication technology components of a comprehensive CRM strategy are integrated into CRM systems that enable the automation of business processes in the areas of marketing, sales and service in order to build and maintain profitable long-term customer relations. The effective management of customer information has become more and more crucial in CRM [10]. CRM can be seen as a link between front-office and back-office and focuses on the preparation, simulation, analysis and optimization of customer-related decision-making processes based on

customer data [11]. These data are gathered in marketing, sales or service processes [18]. The information about customers, products and markets are often systematically stored in data warehouses for the later use of analytical tools (e.g. OLAP, Data Mining) to analyze these data (e.g. simulations, forecasts, segmentation of customers) [12]. These analyses can form the background for further CRM activities as the results deliver valuable findings about the market or customer behavior [13]. Nowadays, customer relationship management (CRM) helps to increase the business profit of enterprises. Enterprises usually utilize CRM to know the customers and provide personalized products and services in order to increase customer satisfaction for stable and long term relationship [19].

## II. RECENT RELATED RESEARCHES: A BRIEF REVIEW

Ching-Hsue Cheng *et al.* [20] have discussed that data mining has been a powerful technique that helps companies to mine the patterns and trends in their customer's data, then to drive improved customer relationships, and it has been one of the well-known tools given to customer relationship management (CRM). However, data mining tool has some drawbacks, such as long training times of neural networks and brute computing method of genetic algorithm. Their study has proposed a procedure, joining quantitative value of RFM attributes and K-means algorithm into rough set theory (RS theory), to extract meaning rules, which can effectively improve these drawbacks. Their study has involved the following three purposes: (1) discretize continuous attributes to enhance the rough sets algorithm; (2) cluster customer value as output (customer loyalty) that is partitioned into 3, 5 and 7 classes based on subjective view, then see which class is the best in accuracy rate and (3) find out the characteristic of customer in order to strengthen CRM. The proposed method has firstly utilized RFM model to yield quantitative value as input attributes; next, K-means algorithm has been used to cluster customer value; and finally, rough set (the LEM2 algorithm) has been employed to mine classification rules that help enterprises driving an excellent CRM. Analyzed empirical result has shown that the proposed procedure outperforms the methods listed in terms of accuracy rate regardless of 3, 5 and 7 classes on output, and generates understandable decision rules.

Abdullah *et al.* [21] have presented the best integration of ERP with Customer Relationship Management (CRM). Data mining has been overwhelming the integration in their model by giving support for applying best algorithm to make the successful result. Their model has three major parts, outer view-CRM, inner view-ERP and knowledge

discovery view. The CRM has been to collect the customer's queries, ERP to analyze and integrate the data and the knowledge discovery to give predictions and advises for the betterment of an organization. For the practical implementation of presented model, they have used MADAR data and implemented Apriori Algorithm on it. Then the rules and patterns have been suggested for the organization which helps the organization for solving the problem of customers in future correspondence.

Yu-Teng Chang [22] has discussed that in Taiwan the wireless telecommunication market has been opened to the private enterprises since 1997. The competition in wireless telecommunication industry has been getting severe with the deregulation and great advance of new technologies. Accordingly, churn prediction and management have become a great concern to the mobile operators. Mobile operators have wished to retain their subscribers and satisfy their needs. Hence, they have needed to predict the possible churners and then utilize the limited resources to retain those customers. In response to the difficulty of churning prediction, their study has applied data mining techniques to build a model for churning prediction. Their study has been referring to develop similar approach to support telecom churn management. Through an analysis result from telecom provider, the results have indicated that the proposed approach has pretty good prediction accuracy by using customer demography, billing information, call detail records, and service changed log to build churn prediction model.

Abdullah *et al.* [23] have presented a model which integrates the database, customer queries, transactions, and all other specifications used in ERP systems, then uses data mining techniques to integrate decision making and forecast flows. By using ERP's characteristics and background they have gathered the data from central database in cluster format which has been based on the action taken against the queries generated by the customers. Furthermore, the clustered data has been used by Apriori Algorithm to extract new rules and patterns for the enhancement of an organization. It has been a complete implementation of data mining applications on ERP framework to predict the solution of upcoming queries. It has been anticipated to make the best association between the customers and organization, and satisfy customer always with company's policies.

Alok Mishra *et al.* [24] have discussed that Customer relationship management (CRM) could help organizations manage customer interactions more effectively to maintain competitiveness in the present economy. More and more organizations CRM have adopted a core business strategy and invested heavily,

as they realized the significance of becoming customer-centric in today's competitive era. CRM, an integration of information technology and relationship marketing, has provided the infrastructure that facilitates long-term relationship building with customers at an enterprise-wide level. Successful CRM implementation has been a complex, expensive and rarely technical project. Their paper has presented the successful implementation of CRM from process perspective in a trans-national organization with operations in different segments. Their study has been anticipated to aid in understanding transition, constraints and the implementation process of CRM in such organizations.

### III. MOTIVATION FOR THE RESEARCH

Lots of traditional methods are used to determine and maintain customer relationships. In the business world, customer relationship management is important to all companies of various fields. The most commonly used methods, which intends to maintain the customer relationship, are based on the frequency of customers i.e., the company provides some attractive offers to the customers who remain as regular customers for a long period. But they are asserted here as ineffective, because those customers may not provide fruitful revenue despite their more frequent arrivals. This in turn, directly affects the economic growth of the company. On the other hand, certain customers who obtain very few services may offer huge revenue to the company. The frequency based methods for offering discounts may fail to satisfy the customers who are profitable to the business, and so they make the customer relationship management ineffective. Moreover, the slab reduction in the business profit should not affect the current revenue of that company. So, new methods have to be developed in such a way that it would take care of all the aforesaid issues. Then only effective customer relationship management can be achieved without affecting the regular revenue of the company. However, methodologies with such provisions are not available in the literature and so they have to be proposed for customer relationship management.

### IV. PROPOSED METHODOLOGY

The main purpose of this research is to maintain an effective customer relationship between the customers and the company. To accomplish this, we need to maintain a historical database. The historical database will contain customer information and the corresponding company revenue for each individual customer. And also the database will contain the information about the purpose for which the customer approached the company i.e., the customer has visited to procure some product or some service etc. Based on the information, the company needs to provide a price offer to the

customer. The primary intention of my research work is to propose an effective method of offering discount to customers that exploits the data mining and artificial intelligence methods. As mentioned earlier, we will maintain a historical database of customer information for our approach. To extract the required information from the database, we will use an ARM algorithm. Using the mining technique, we will get to know the customers who provide profitable business to the company and those customers will get a discount from the company and the discount rate has to be estimated such that it would not affect the current company's revenue and customers' satisfaction. This can be determined using an artificial intelligence method. The proposed technique will be put into practice in the working platform of MATLAB and its performance will be evaluated with test datasets.

### V. CONCLUSION

In this paper we have proposed new CRM technique with that exploits the data mining and artificial intelligence methods. Using the mining technique, we will get to know the customers who provide profitable business to the company and those customers will get a discount from the company and the discount rate has to be estimated such that it would not affect the current company's revenue and customers' satisfaction. The proposed technique will be put into practice in the working platform of MATLAB and its performance will be evaluated with test datasets.

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