An open source CRM software with data informatics

Poonam Aher,Pratibha Charoskar,Abhishek Deshmukh,Tanmayee Deshpande

Dept. of ComputerEngineering, K.K.Wagh Institute of Engineering Education and Research,Nashik ,Maharashtra , India.

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Abstract - *Customer Relationship Management (CRM) has become one of central base point for many industries and organization such as Telecommunication, Banking, Retail, Insurance and IT industries. CRM is basically a business strategy which aims to help companies to maximize customer profitability through streamlined, integrated customer-facing processes. The motivation for companies to manage their customer relationships is to increase sales profit from concentrating on the economically valuable and profitable customers to increase revenue. Our system mainly provides the separate customer panel for easy interactions between customer and organization along with the data informatics about the customers using data mining. Data Mining is a process that uses a various data analysis and data modeling techniques to discover patterns and relationships amongst data which is used to make predictions and to take right decision. Data mining is one of the data analysis methodology through which all the information about customer is collected and processed .We are using clustering technique to form the location and source cluster of the customers It helps to select the right perspective on whom to focus, provide the right additional offers and products to existing customers and identify leads. The result is improved customer relationship and revenue because of improved ability for each individual to contact in the best and sophisticated way.*

Key Words: **CRM,Database,Data mining ,Clustering,pattern finding.**

1.INTRODUCTION

CRM is a combination of processes, people, and technology that seeks to provide understanding of customer needs, to support a business strategy and to build long term relationship with customers. It involves using technology to synchronize, organize and automate business processes and sales activities, but also those for marketing, customer service, and technical support. Our CRM is complete Customer Relationship Management software that is a great fit for almost any company, freelancer or any individual looking to manage contact interactions. This CRM system can help companies look more professional to their customers and help improve business performance at the same time. And it is cloud based so one can access it from anywhere, anytime. Our CRM system is mainly focused to solve the problem of missing customer's area and data informatics of

customers using data mining techniques .Admin can manage the data and assign roles to multiple department to provide information related to customers and even customers are having their dedicated area to track the communication and status. The objective is to track all the communication between customer and business, and based on the collected information, create sales opportunity and forecast reports. Our goal is on customer retention techniques to enhance our customer relationships via Data Mining. Data Mining would fasten up the process of searching large databases so as to extract customer buying patterns, to classify customers into groups which also make databases to be handled efficiently. Clustering can help marketers to discover distinct groups in their customer base And they can characterize their customer groups based on the purchasing patterns .

Data mining will play an important role in CRM as the data mining techniques like clustering and classification techniques will help in CRM fields like customer retention and customer services, marketing and hence increasing the sales by finding optimal leads.

1.1 Problem Defination

Sales profitability and robust customer relationship is an activity that involves selling of products and providing services to customers and finding optimal leads. All the existing
CRM is potent in delivering strategies but does not meet the customers demand of transparency. The traditional system fails to provide the dedicated area for customers to track all the communication between customer and business. This paper produces an effective mechanism in designing integrated version of CRM along with customer panel. By the use of data mining techniques each module are scheduled. By considering location and source parameters, similar customers are identified and mainly occasional customers that mean leads are converted to regular or valuable customers. In order to retain the current customers some attractive programs are developed.

1.2 Literature Survey

CRM comprises a set of processes, people and enabling systems supporting a business strategy to build long term, profitable relationships with customers [Ling and Yen (2001)].It is an important technology in every business

because all the businesses are customer centric. According to Ngai et al. , CRM can be partitioned into four dimensions, that are customer identification, customer attraction, customer retention and customer development. Customer identification comprise targeting the profitable crowd who are most likely to become customers, or the group of existing customers that will bring additional profit to the organisation . Customer attraction is the second phase where the investment of efforts and resources are done by organization In order to attract the target customers. Customer retention requires effort in meeting customers' expectation and increasing customer satisfaction based on a customized marketing approach, which is a critical step in building long term relationships with customers . The last phase is customer development which is the consistent expansion of transaction intensity, value, and customer profitability. To manage the customer relationship effectively, efforts have been made to develop company websites or apps to promote and sell products through the Internet, over the last decade. To tackle the problem of the large amount of data volume, high complexity data forms and high speed result generation, cloud computing services have been introduced as an emerging direction for efficient data storage and analysis.

2. METHODOLOGY

Leads: Leads are created when new client arrives and modified by the admin or business developers. Leads are those client who are satisfied with the quotation and shows interest in assigning the project. If once leads converted into project it will close. If one organization is having more than one project then there is seperate leads for each project. A sales lead is a prospective consumer of a product or service, created when an individual or business shows interest and provides contact information. Businesses gain access to sales leads through advertising, trade shows, direct mailings and other marketing efforts. Leads are found out by doing data analysis of customer interactions with the system services.

Business Developer: Business developers can create the client and can modify their details when request arrives. He can also block or delete the user contact if he wanted .And he can only see the details of his contact. Business development is usually understood to mean sales. Actively finding new prospects and driving them through the sales lifecycle, usually more in Business to Business rather than Business to Customer.

Customer/Client: Each client will be having unique username and password. Client can manage and change his profile details. He will also be able to schedule the meeting with the business developer with all records. He will be updated with a details of his project and its status only, but he cannot make any modification in it.

Project Developer: Every software system production needs an owner on the technical team which is called as Developer Lead. Being responsible for a lion's share of the programming and delegating tasks to others, they are the mouthpiece of the entire production team and will be responsible for direct communications with the client specifications, requirements , schedules, and build notes.

Project Development: In Project development section there will be the display area for the workers which are working on a particular project in a company. Here will be the log files of milestones of the project will be created.

Customer Area: In our CRM there is dedicated customer area which is not present in traditional CRMs. It helps the customer to track all communication between organization and customer .
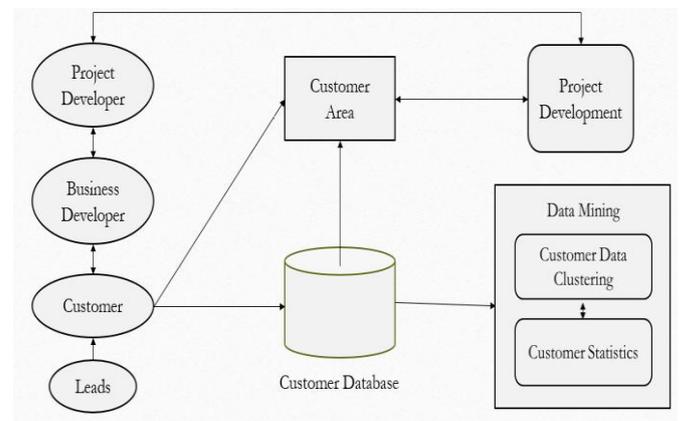

Fig: Block Diagram Of CRM System

Customer Database: Customer Database is the main part of this system . It is the main pool where all the customers' details as well as customers' interactions with the system services are stored . This pool is very important in order to do data mining.

Data Mining: In this aspect of the CRM system data mining techniques are applied on the customer and lead database. Clustering is the data mining technique to form the groups of similar kind of data. In our system customers are classified into two categories ,location cluster and media cluster. This cluster helps the organization to find out the profitable area from where they get the more sales and also helps to find out the maximum respondable media of contact through which the get the more response and to develop the new strategy for the publicity in order to increase revenue.

Location cluster & media cluster : This type of cluster will be formed by analyzing the customer and lead profile details, which contains many fields like name, email-id ,phone no, city(location),contact source(media),state...customers will be grouped according to the response area and the media of response. Clustering will be shown in the visual graphics format like reports, pie charts which will be beneficial Businesses.

Algorithm

Agglomerative clustering:

```
Workset ws = new Set(points);

KDTree kdtree = new KDTree(points);

while (true) {

 foreach (Element p in ws) {

 if (p.hasCluster()) continue;

Point q = kdtree.findNearest(p);

 if (q == null) break; // stop if p is last element

Point r = kdtree.findNearest(q);

if (p == r) { // create new cluster e that contains a and b

 Element e = cluster(p, q);

 newWork.add(e);

} else

 { // can't cluster yet, try again later

 newWork.add(p); // add back to worklist

  }

 }

 if (newWork.size() == 1) // we have a single cluster

  break;

ws.addAll(newWork); //add new nodes to worklist

 kdtree.clear();

 kdtree.addAll(newWork);

 newWork.clear();

}
```

Explanation:

We implement a cautious variant of Agglomerative Clustering algorithm first described by Walter et al., which is based on the following observation: if at any time two points

agree that they are one another's nearest neighbor, they will be clustered together in the final dendrogram (subject to certain conditions on the distance metric). Pseudo code for this algorithm is provided above

Initially, all data points are placed onto a work list (line 1). We then build a kd-tree, an acceleration structure that allows the quick determination of a point's nearest neighbor (line 2). The algorithm proceeds as follows. For each point p in the worklist, find its nearest neighbor q (line 5) and determine if q's nearest neighbor is p (lines 6-8). If so, cluster p and q and insert a new point into the new nodes list representing the new clusters. Otherwise, place p back onto the new nodes list to be processed in the next iteration of the outer loop. The new clusters are then copied back to the worklist after rebuilding a new Kd-Tree. The algorithm terminates when there is only one point left in the worklist.

Data Structures

There are two key data structures used in Agglomerative Clustering:

Unordered Set

The points left to be clustered can be processed in any order, so the worklist holding those points is represented as an unordered set.

KD-Tree

The kd-tree represents a hierarchical decomposition of the point space in a manner similar to an octree. It is built prior to performing clustering as a means of accelerating nearest-neighbor queries. Rather than requiring O(n) time to find a point's nearest neighbor, the kd-tree allows the search to occur in O(log n) time. It is kept up-to-date throughout execution by removing clustered points and adding newly created clusters.

3. CONCLUSIONS

This paper provides a comprehensive review of clustering techniques in data mining and added customer panel which provides better customer services.
This paper simplifies the sales and marketing process. Also provide better customer services by giving transparency to customer in operating the system. The data in database will be mined, and will be used for location and media clustering and this clusters are represented in form of pie-charts ,reports which are

helpful for organization to increase revenue as well as taking appropriate decision.

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