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Survey on Customer Relationship Management Analytics

Varun Vijayanand M.[1*], Deepamala N.[2]

[1,2]Dept. of Computer Science and Engineering, R.V College of Engineering, Bangalore, India

[*]*Corresponding Author: vvijayanand16@gmail.com, Tel.: +91-86186-37824*

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***Abstract*—** With a rapidly growing customer base, it has become increasingly difficult for companies to manage and understand customer data, even with the assistance of Customer Relationship Management (CRM) platforms. The vast progress achieved in the field of Data Analytics has made it possible to extract meaningful information from raw customer data efficiently, using which well-informed decisions can be made to enhance customer relationships. This paper discusses the power of Data Analytics and CRM platforms working in unison, known as CRM Analytics. It covers the various applications of CRM Analytics and the key data mining techniques used by business organizations. A comparison between top CRM platforms is carried out and a case study on the latest cloud-based Salesforce CRM platform is presented.

***Keywords*—** CRM, Data Science, Data Analytics, CRM Analytics, Data Mining, Predictive Modeling, Salesforce

I. INTRODUCTION

Data science can be defined as a field of study which incorporates coding skills, knowledge of mathematics and statistics, and domain expertise to extract meaningful insights from data. This is very similar to extracting knowledge from large datasets of different types. In the past few years, the data analytics stream has been growing, attracting a large load of journals and papers. Across the various domains of data science available, this paper will be discussing data analytics and how it can be applied in Customer Relationship Management [1].

Customer Relationship Management can be defined as a platform that assists businesses to cultivate strong client relationships and improve product sales and customer retention by having quality conversations with prospects and customers [2]. This paper will be discussing the development of CRM Analytics and the different Data Analytic techniques/tools that can be used so overall services for businesses can be improved.

In the second section, the different domains of Data Science have been discussed along with a few features about them. In the next section, the paper talks about the different types of analytics that can be performed and their importance. In section IV, the paper explains Customer Relationship Management in brief along with its history and scope, followed by the link between data analytics and CRM. In section V, the paper explains the different Data Mining techniques used in Data Analytics. In section VI, the different applications of Data Mining tools in CRM are discussed. In section VII, a comparison between popular CRM platforms is conducted. In the following section, a case study on the Salesforce CRM platform has been carried out. The last two sections cover the conclusion of the study and the references used.

II. DOMAINS OF DATA SCIENCE

Data science covers almost all industries and fields, specifically, health-care, forensics, customer segmentation, managing the customer relationship, offering customer-centric products, fraud detection, predicting equipment failures, mitigating risks, optimizing resource utilization, managing stocks, identifying and removing performance bottlenecks and identifying the causes of a problem during real-time. Being a very large discipline, it can be further narrowed down to a few domain expertise which has a major overlap with Data Science [3]:

A. Data Mining and Statistical Analysis

This field mainly deals with the decoding of large chunks of data and enables the user to see patterns where none existed to the plain eye. It is needed in order to make sense of the data in front of us and derive actionable insights from the same [4].

B. Predictive Modelling

This is a project that usually takes place in all industries which may range from determining the propensity of the industry to win an opportunity to predict the churn rate of their customers. It mainly uses data and statistics to predict the outcomes with data models [5].

C. Data Engineering and Warehousing

The process of applying transformations onto the data to convert it into a useful format for analysis is known as Data Engineering. When all the different available data is combined and stored in a format that can be used by data

analysts is knows as Data Warehousing. Both domains play a very important role in Business Intelligence.

D. Data Analytics

This is a field that is a narrower perspective of Data Science. Data Analysis is a process of analyzing the data, cleaning it, reconstructing, and modeling data to gain meaningful information, deriving insights, and supporting recommendations.

E. Business Intelligence and Strategy

This is a field where key responsibilities include improving decision support systems for increased accuracy and simplicity, constructing tailored analytics solutions, handling dashboards, identifying leads that are likely to convert, and recognizing best practices in visualization.

III. UNDERSTANDING DATA ANALYTICS

Data Analytics is said to be a field of Data Mining, defined as the science of examining raw data to conclude that information. It involves applying an algorithmic process to derive insights, running through several data sets to determine associations between them. Being a very broad field, it can be classified into four primary types [6][7]:

A. Descriptive Analytics

This type helps answer questions about what happened. Large datasets are made simple and summarized to customers using these techniques. In order to track the performance in specific industries custom metrics (Return on Investment) are developed using which successes and failures of strategies can be determined. The entirety of the process provides actionable insights into historical performance.

B. Diagnostic Analytics

This type helps answer questions about why things happened. These techniques serve as a supplement for the results obtained from descriptive analytics. They take the results from the previous step and perform a root-cause analysis to determine the key factors that are affecting the results.

C. Predictive Analytics

This type helps answer questions about what will happen in the future. Using the historical data that is present these techniques try to identify trends and determine what could happen in the foreseeable future. This is one of the most used types in the analytics domain today, these techniques include a variety of cutting-edge machine learning tools like random forests and neural networks.

D. Prescriptive Analytics

This type helps to answer questions about what should be done. Once the predictions from the analysis have been obtained, recommendations can be generated and displayed to the customers. This would allow the customers to make informed choices of whether to accept or reject when faced with uncertainty.

IV. CUSTOMER RELATIONSHIP MANAGEMENT

Customer Relationship Management (CRM) is a platform which assists businesses by maintaining all the customer information in a single location, develop customer relationships, improve customer loyalty, and gain potential customers. They help make the entire sales process from campaigning to services more streamlined and cost-effective [8].

A CRM helps in connecting all the units of business and unify them to work together, through the means of making data of customer interactions with one entity available to another, therefore avoiding the duplication of work. They help in simplifying the process of acquiring data from externals sources through support with third-party applications and have also been incorporated with the feature of running analytics on the data present [9]. The elements of CRM are stated in Figure 1[10].

Figure 1. The elements of a CRM

A. History of CRM

The first-ever software programs were very simple and followed traditional approaches of taking down customer details on cards and then filing them into folders. Today, with the technological advancements taking place, these software's have developed. But the basic purpose of the software to use customer details to create sales remains the same [10].

It began with stand-alone mainframe systems in the 1970s, which were used for automating sales and storing customer information. Moving into the mid-1980s, there was a shift to database marketing where marketers established communication with customers personally for order with a higher conversion rate. Coming to the late 1980s, marketing professionals started integrating different external platforms like analytics, salesforce, and customer data into the software, this was the age of contact management software. This period saw the emergence of cold calls between marketers and clients to upsell their products. It was during the early 1990s when database marketing transformed into sales force automation. The first CRM framework consisted of account, campaign, lead, and opportunity management in

one CRM system. After which in the mid-to-late 2000s online cloud-based CRMs became popular like Microsoft Dynamics, SugarCRM, EC2/S3, and Salesforce [11]. Shown in Figure 2.

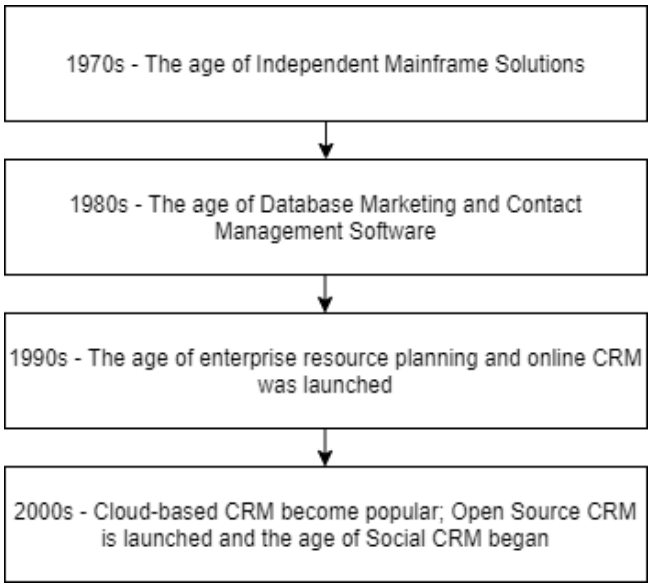

Figure 2. History of CRM

B. Types of CRM

The primary goals, for any CRM application, would be to provide better quality service to organizations and enable them to understand customer needs and behavior. It helps in developing long term relationships with customers and improve the loyalty of customers through recommendations. There exist three types of CRM applications that exist [12]:

Operational CRM:

This type of CRM mainly focuses on streamlining the process of Marketing, Sales, and Services. It serves the purpose of generating campaigns, leads, opportunities, orders, quotes, contacts, accounts, and service requests, and encompasses everything that takes place in the customer lifecycle.

Analytical CRM:

This type of CRM as the name itself suggests provides analytical solutions to the problems faced by top management, marketing, and sales personnel. It takes the data that exists on various customer and applies a few data mining techniques to obtain actionable insights to build sustainable relationships with customers and enhance the quality of support.

Collaborative CRM:

This type of CRM serves the purpose of sharing the customers' information among the different business units that exist. This can be explained with an example of when customer survey feedback on products is given back to the sales team, this information can be shared with the marketing team in order to improve their pitch. This CRM brings together all the different business units and improve the overall quality of customer service and gain the loyalty of customers.

C. Scope of CRM

CRM is mainly concerned with the means of attracting potential customers, developing mutually beneficial relationships between customers and the business, and generate long term profit for the same. The scope of a CRM can be defined based on its components [13][14][15]:

1) Sales Management:

A good CRM would support mobile applications and reps to manage their leads, contacts, and events from wherever they are without the need of any external administration. CRM is enabled with the dashboard widgets, which provide visualizations of data and help the sales reps gain a more profound understanding of data in a much shorter time.

2) Marketing:

Marketing is the process of campaigning for products through the process of generating leads, converting leads to opportunities, and converting contacts to accounts. This process enables transparency and helps improve the relationship with customers and gain their loyalty.

3) Customer Service:

Customer service is a process where employees of the business need to be readily available to the customers to assist the case requests, to take phone calls and troubleshooting. With the help of CRM which provides a 360-degree overview of the customer lifecycle and the business process, all the information from schedules to events is readily available and issues can be solved anywhere through the platform.

4) Business Intelligence:

CRMs provide businesses with the capability to build dashboards that provide a snapshot of the performance of the business through key performance indicators, trend charts, and other fully functional widgets. This assists the business in getting a visualized representation of the data and make informed decisions.

D. Steps to Maximise Effectiveness of CRMs

CRM strategy is a key factor in determining the effectiveness of that software, it can be defined as a unified plan of action that aligns people, processes, and technology to achieve customer-centric goals. Defining a strategy according to the IDIC model there are a few basic steps to maximize effectiveness [16][17]:

a) Customer Identification

The entire process of customer identification revolves around understanding the business process from the company's perspective and then determining the customer base that would be interested.

b) Customer Differentiation

After the customer base has been identified, it is time to now take the business process a level deeper that is to

segment the customer base into sectors each which would belong to the product category.

c) Customer Interaction

The next step of the process would be to come up with a strategy to interact with customers which ensures a long-term relationship and is mutually beneficial to both parties. Every customer is unique in their demands, so it is very important to have a flexible interaction strategy.

d) Customization

This step can be defined as giving benefits to the customers the business feels, which would bring a large profit. It is also a method of personalization or improving the loyalty of the customer.

E. Link Between Analytics and CRM

When Data Analytics and CRM are roughly put together the product is known as CRM Analytics. Within large organizations, where they must deal with many customers daily and with each client interacting with more than one business unit, it is very hard to keep track of where each client is in the sales funnel. This is where the catchy term of CRM Analytics fits in, with the help of this technology the organizations can have all the data in a single location, analyze it and then present the insights obtained in an aesthetic manner [16].

Then there occurs the problem of personalization, sometimes even the customers who belong to the same stage in the sales funnel might require vastly different actions. The CRM Analytics software takes care of this by allowing the user to access information specific to the customer under consideration and then personalize the sales process according to their needs [18].

With the help of CRM analytics at this stage, it is possible to use the existing customer base data and predict the type of clients that could become potential customers. This software ensures that all its customers do not feel like they are just a source of revenue and allows the business to modify their strategy to fit the client base accordingly. With that being said, the ability to personalize the customer journey of each client is just one of the many benefits CRM Analytics provides; few other mentions [19]:

Profitability Analysis

With the help of the CRM Analytics software, it is possible to segment the customer according to the organization's needs, they can be segmented based on the return on investment or the type of product with the highest demand, etc. This galvanizes the business with supporting information to make informed decisions in the advertising or marketing campaigns, generating higher profits.

Flexibility with Third-Party Customisation

With every version of the CRM Analytics software, there will always be some disadvantages and limitations that surface. But, with the help of CRMs being enabled with the power to integrate with custom third-party applications this problem can be overcome. The main purpose of these applications is to provide the features that do not exist within the CRM. For example, dataloader.io is a third-party application that assists Salesforce in importing bulk data from external sources.

V. DATA MINING TECHNIQUES USED IN ANALYTICS

Data mining can be defined as the process of identifying patterns in data from which useful and actionable insights are gained. There are many data mining techniques that organizations can use, that involve everything from the basics of data preparation to cutting-edge artificial intelligence. To mention a few key techniques [20][21]:

a) Tracking Patterns

It involves the methodology of noticing trends in the data and monitoring them to make some intelligent inferences. Once a trend in sales data has been identified, a basis has been established on which actionable insights can be taken [22].

b) Outlier Detection

It is used to determine aberrations in the data. The anomalies once found by the organization, it can be used to their advantages as it helps them understand why these outliers exist and occur. It would also help them prepare and be aware while working on future business outcomes [23].

c) Association

The data mining technique association is also like the notion of correlation. What this means is that there is a relationship between the two data events: this could be the simple example of where when someone purchases a cycle it is frequently accompanied by a purchase of a safety helmet.

d) Classification

Classification is the process of analyzing all the different attributes associated with the kinds of data types that exist. After which a set of attributes are assigned to each data type and then new data can be easily classified into one of the data types based on its attributes [24].

e) Regression

This process can be simply defined as a method of identifying the type of relationship that exists between an output field and every other attribute. It belongs to the category of white-box techniques, there are different types the most popular being linear and logistic regression.

f) Decision Trees

Decision trees have an extremely forward nature of learning, they too belong to the category of white-box techniques. They are used to determine how a set of input attributes affect the result or output field. When many decision trees are combined a random forest is created which is a predictive analytics model [25].

g) Clustering

This data mining technique as the name suggests is used to group similar objects or data into a single entity called a cluster. Every cluster in independent of every other cluster that is created and this technique is highly used in performing exploratory analysis [26].

VI. APPLICATIONS OF DATA MINING TOOLS IN CRM

Some of the applications of data mining tools in CRM are as follows [27][28][29]:

a) Marketing

Marketing for service contract renewals, selling new sockets, loyalty cards, targeted promotions, product replacement, etc., needs to have exhaustive correct information. When this happens and the complete profile of a customer is available, every action can be focused, drastically improving conversion rates and reducing advertising costs.

b) Telecommunication

In the telecommunication industry, data mining techniques are widely used to determine the key success factors that allow a new product to stay at the top of its game and how it can be further improved.

c) Risk Management

Using the data given by customers to banks, such as income, job status, etc. The banks can recognize what their customers' intentions are and how they can improve their overall services. Shopping centers can also determine who is more inclined towards a specific product.

d) Fraud Detection

Data mining techniques are now being used in supermarkets as well in order to keep track of the billing history of customers and make sure all the money is returned to the company, therefore trying to minimize the number of dishonest cashiers [30].

e) Propensity Models

With the help of data mining tools that can perform linear and logistic regression the models are capable of analyzing historical win-loss data of customers and give prediction scores as well as recommendations on how to win an opportunity in future cases.

VII. COMPARISON OF CRM PLATFORMS

In today's world a CRM System is the most used platform for modern business development. Therefore, every business has begun implementing such software to increase the number of potential customers and make the entire process cost-effective. A comparison between a few popular CRMs is done as shown in Table 1 based solely on key features that businesses are looking for [31][32][33][34]:

Table 1. Comparative Study on CRM Platforms

Characteristics/CRM Platform	*Salesforce*	*Oracle CRM*	*MS Dynamics*	*Sugar CRM*	*NetHunt CRM*	*Nimble*
Free Trial	Yes	No	Yes	Yes	Yes	Yes
Mobile App	Yes	Yes	Yes	Yes	Yes	Yes
API Access	Yes	No	Yes	No	Yes	Yes
Contact Management	Yes	Yes	Yes	Yes	Yes	Yes
Contract Management	Yes	Yes	Yes	Yes	No	No
Database Management	Yes	Yes	Yes	Yes	Yes	Yes
Funnel Reporting	Yes	Yes	Yes	Yes	Yes	Yes
Integration Capabilities	Yes	Yes	Yes	No	Yes	Yes
Performance Reporting	Yes	Yes	Yes	Yes	Yes	No
Product and Price Control	No	No	Yes	No	No	No
Quotation Handling	Yes	Yes	Yes	Yes	No	No
CPQ	No	Yes	No	Yes	No	No
Flexible Customer Size	Yes	No	Yes	Yes	Yes	Yes
Cloud Hosting	Yes	Yes	Yes	Yes	Yes	Yes
Pricing	$25 per user/month	$75 per user/month	$210 per user/month	$40 per user/month	$25 per user/month	Starts from $5 per user/month
Rating on 10 (excluding pricing)	8.5	7.1	9.2	7.9	7.1	6.4

From the comparison and analysis conducted above, we can see that Microsoft Dynamics and Salesforce are on the top of the list in terms of rating. But, when this is combined with the Pricing at which these two platforms are available, we see that the price of a Microsoft Dynamics license is at least 8 times more than that of a Salesforce License. Therefore, we can conclude that in terms of features and capabilities Microsoft Dynamics wins the battle, but when an all-rounder perspective is considered Salesforce takes the top position.

VIII. CASE STUDY ON SALESFORCE CRM

Salesforce is the #1 intelligent CRM platform for businesses of all sizes (claimed by the firm). This CRM has been recognized by professional data specialists and top businesses as a leader in the market for CRM technology. Salesforce provides novel solutions that let developing

industries implement cutting-edge technology without any difficulty and connect all the solutions that are required by them [35].

A. What makes Salesforce the best CRM platform in the world?

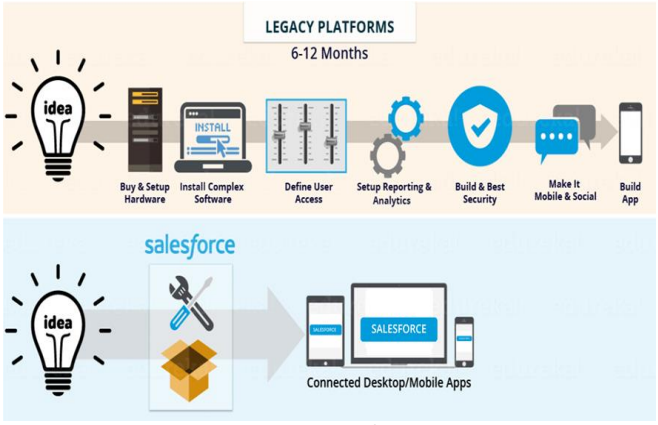

Figure 3. Pathway Salesforce provides

- As seen above in Figure 3, Salesforce sets you on the quickest path from a 'light bulb moment' to an application. With Salesforce you need not spend time on building the infrastructure and tools, but rather focus on building your application using the built-in Salesforce tools. This can save you time and make the entire process cost-effective.
- Salesforce is generally said to stand out for three major reasons [36]:
    1) Speed – Salesforce CRM software takes a few weeks to a month to deploy when compared to traditional CRM which takes more than a year.
    2) Easy to Use– Salesforce wins in this category without even having to lift a finger. With the well-crafted UI and documentation time can be spent effectively by putting the software to use rather than figuring it out.
    3) Efficacious – Because it can be customized to meet business needs and is very simple to use, clients find Salesforce very effective.
- Salesforce is in the cloud-based platform, so your team just needs access to the internet to be able to use it.
- Salesforce effortlessly allows integration with 3rd party applications. If there is a need to integrate with Gmail it can be done, it can also be integrated with your accounting software. On the other hand, traditional CRMs are not so flexible.
- Salesforce is cost-effective, especially when you consider the vast variety of capabilities it offers.

B. Salesforce Analytics – Einstein Analytics

Salesforce Einstein Analytics provides complete analytics to every one of its clients. Einstein Analytics combines real-time, interactive data visualization with the power of Artificial Intelligence to deliver actionable insights and data-driven models for every business user. Fig. 4 shows a representation of the process [37].

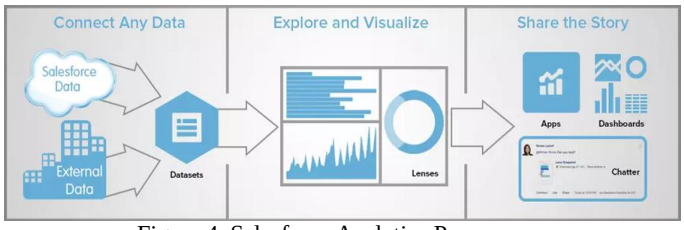

Figure 4. Salesforce Analytics Process

Einstein Analytics provides cutting- edge augmented analytics where intelligent experiences can be created, with features like:

- Data management tools that establish connections and cleanse all kinds of data. The data need not be in Salesforce and it also provides dataloader.io which allows the importing of bulk data.
- Provides predictions, recommendations, insights to the data, and much more without any coding required.
- Allows us to build AI-powered apps from scratch and provides pre-built templates for the same.
- It not only provides insights but also allows the user to engage, collaborate, and act on insights with intelligent analytics.

To complete the entire analytics process from cleaning the data to creating stories to propose to clients a followed by dynamic recommendations, Einstein analytics has a few tools:

1) Analytics Studio

Analytics Studio is an application that provides the fastest path from data to actionability. With seamless integration to Salesforce data is easily accessible from which beautiful data visualizations and actionable insights can be generated right where they work.

2) Einstein Discovery

It is an alternative to complex data models that provides AI-enabled analytics to discover associations between fields on data provided by the various clients. With seamless integration with Salesforce and Analytics studio, it automatically examines millions of data combinations in minutes and gives us unbiased answers and explanation of trends.

3) Einstein Next Best Action

This is a tool in Salesforce which surfaces recommendations to the users. In combination with data flows, process flows and the strategy builder it is possible to not only display these recommendations but also provide actionable buttons that allow the user to act dynamically.

IX. CONCLUSION

Since the advent of the concept of CRM in the early 1970's the entire functioning of businesses has been revolutionized and continually improved. With the large amounts of data

being generated by the world today, there was a need for a one shop stop where everything could be handled from the collection to processing. This was the CRM, which not only attracted customers from different sectors but also made jobs simpler and efficacious. To process this large amount of data being generated the latest advancements in data science and analytics needed to be incorporated.

This paper covers the integration of data analytics with CRM, the birth of CRM Analytics. With the help of CRM Analytics, there was no need to shift between applications; everything from data cleaning to the creation of stories can be done in a matter of minutes. Through this paper, the different applications of CRM analytics have been discussed and the key data mining techniques used by business organizations. From the comparison done between the top CRM platforms, the Salesforce CRM platform is considered due to its high-end features and cost-effective nature. A case study has been further carried out on the same. In conclusion, to manage large amounts of customer data and gain a deeper understanding of customers from every front, CRM Analytics is a must.

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Authors Profile

Mr. Varun Vijayanand is an undergraduate student pusrusing his bachelors degree in computer science and engineering at R.V. College of Engineering. He has worked on multiple projects in the field of computer science, in campus and through internships. He has publihsed a paper in the IEEE journal. His main research interests would lie in the doamins of Machine Learning and Data Science.

Dr. Deepamala.N, Associate professor in Computer Science Department in R.V.College of Engineering, Bangalore. Born in Bangalore on 14th August 1980. Has completed Bachelor of Engineering in Computer Science and Engineering from VTU Belagavi, India in 2002, M.Tech in Networking and Internet Engineering from VTU, Belagavi in 2004 and has completed PhD on Natural Language processing from Visvesveraya Technological University, Belagavi, Karnataka, India in 2016. Has worked in MNC companies like D-Link India Ltd, Nortel Networks and Radware for five years from 2004 to 2009. From 2009 onwards has been in teaching field till date. Has taught various subjects in Networking, Programming and Language Processing. Has one patent published and has five Research projects various companies like Citrix and SCII to her credit. She has published ten journal papers and ten Conference papers.

