The Impact of Customer Relationship Management (CRM) in the Banking Sector Using Machine Learning

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ABSTRACT: Technology today is evolving at break-neck speeds offering multiple business opportunities. The creation of Machine Learning (ML) has altered a new dimension in today's business landscape. Machine Learning tools are rapidly changing their activity and give a new pave to the marketing people that are used to make their business more trouble-free and it also makes changes which are so profound for the marketing personnel who are finding it difficult to ignore the importance of investing in and adopting AI which is an integral part of the marketing task. Nowadays the Banking and Financial Sectors are much more mature, and robust and have implemented ML in their Customer Relationship Management (CRM) and marketing fields in a variety of ways. Generally, the most significant impacts on the growth of the above sector depend on in terms of customer loyalty, profitability, and Return on Investment. In recent years it has been noticed the rise of specialized software by the IT firms that have to be dedicated to developing customized solutions with different programs for CRM. It is the liberalization, Privatisation, and globalization(LPG) which make the banking sector so tough and becoming increasingly diverse. For that Customer, the acquisition is vital for a new bank, but retention is much more important and cost-effective for a recognized bank. CRM gives a new dimension to most Indian bankers who could realize the goal of their business and acquire and retain valuable customers to link them in the entire business process. There should be a Highly Integrated effort to innovate, discover, create, and satisfy customer needs differently. However, it is astonishing to mention that most of the banking and financial sector's activities are focused on customer acquisition rather than customer retention. In this study, we have focused on the impact of customer retention and service quality using our proposed Machine Learning Model.

KEYWORDS: Banking Sector, Customer, CRM, ROI, Machine Learning.

INTRODUCTION

It has been seen that the Indian banking sector has rapidly changed its structure through a sequence of fundamental developments. One of the most significant of these is advances in information technology and Communication Technology. It also altered the idea of traditional banking activities and has aided in the propagation of financial information while lowering the cost of much financial behaviour. Nowadays the entire Bank's operations have been transformed by the advancement of information technology along with communication networking systems. Secondly, increasing competition among a wide range of domestic and foreign institutions especially in product marketing has become very commonplace in their operations. Thirdly, to counter the overall economic activity financial organisations have played a big role and adopted different customer-centric services in different areas. For that CRM is a specific tool for automating sales and customer service activity and processes remarkably. CRM is connected to relationship marketing with varied principles. IT and ML both are significantly increasing in today's business world, particularly in the financial sector. It is the ML algorithms, tools, and mechanics that use the new technology to improve the customer experience. Similarly, the job of CRM has been influenced by the intervention of information technology. Particularly ML is now much more important to understand the customer's behaviour in a better manner. Side by side ML enables financial sectors to better understand the intrinsic value of their customers and assess behaviour toward their services. Customers now anticipate more in terms of price (interest rate), financial security, quick service, convenience, Return of Investment, low-cost loan, simple professional service, analysis, easy access, simple procedure with a friendly approach a wide range of products. The entire service sector activity is now transforming to become more customer-centric. The arrival of a new breed of banks especially new private sector banks as well as the opening of the majority of foreign banks in India. It is CRM has emerged as one of the most widely approved solutions in recent years for increasing market value and growth in many industries particularly in the banking

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sector. CRM gives a clear-cut philosophy that places the customer at the centre of a business organization's processes, activities, and culture to improve customer satisfaction. CRM plays a pivotal role in the establishment, development, maintenance, and optimization of a long-run that is mutually beneficial between a customer and an organization. By the way, the Profits are increased by capitalizing on the organization's competitive advantage with a proper scale.

LITERATURE REVIEW

Machine Learning (ML) describes how each of the techniques and principles is used in financial sectors today. It has been summarised in our development under the implications in terms of competition to explain the link between ML developments with the market competition they create. ML has been derived from Artificial Intelligence (AI) allows various software applications to use historical data and predict the most accurate outcome without the need for programming. Burns (2020), confirmed the use of ML in different enterprises which has grown tremendously over the years, and there is almost no area of modern business that has not been touched by ML. He also explains that ML is specifically considered to process enormous amounts of data rapidly by searching for different patterns in the data and predicting future outcomes on these patterns. Frankenfield (2020), explained ML is a practically extensive category. The creation of an interconnected web of Artificial Intelligence(AI) "nodes" has resulted in Artificial Neural Networks (ANN). Mahdavinejad et al., (2018) found that more data entering the ML algorithms improve the model. ML is well suited to putting large amounts of data into an information context for humans to understand. Buttle (2004) clarified in his research, that CRM is a special business tool and has evolved into a global concept of customer relationship management whose primary goal is customer loyalty as well as the improvement of the company's outcome.

Customer Relationship Management machinery solution was primarily made up of three modules: They are sales, marketing, and services which rest on the three traditional pillars of customer global business management. Arsic et al. (2018) found the importance of reinforcing customer loyalty based on the basic principle in today's highly competitive market ecosystem and it gives the ability to reduce the risk of losing the best customer which is a key factor. Fruhling&Siau (2007) described a person or a group of the community may recognize a set of ideas, practices, or objects which is innovative. Chang & Lee (2008) pleasantly explained the ability to innovate an organization's use of technology, to create ground-breaking systems, policies, software, products, processes, devices, and services. These capabilities also comprise a company's ability to incorporate and apply external data to obtain knowledge and marketable information which is relevant to its overall success. Lin et al. (2010) studied the impact of five CRM dimensions on advanced capabilities like product innovation, process innovation, administrative innovation, marketing innovation, and service innovation. It was Optimove (2020) who described CRM as the collection of all marketing strategies and processes used to develop and manage customer relationships. CRM's primary goal is to improve and augment customer relationships so that businesses can achieve customer loyalty, revenue growth, and customer lifetime value through customer retention. Cole (2019) defined CRM adoption in businesses are increasing because it is critical to residing in the current state with the newest trends in a highly competitive market. Syam & Sharma, (2018) stated that one of the most important roles of CRM in decision-making. Over time, technology has aided in the enhancement of business contact and data, but decision-making remains solely in the hands of human beings. However, as technology advances, the procedure of making suitable and dependable decisions is interlinked to the machines.

CUSTOMER RELATIONSHIP MANAGEMENT (CRM)

Customer Relationship Management (CRM) provides faster customer service at lower costs, higher customer satisfaction with better customer retention, and improved sales and profits at a tremendous scale. According to the business mission, the best way to accomplish them and to identify and satisfy the needs and desires of the customers. CRM is a method for identifying, targeting, acquiring, and retaining the best possible outcome for customers. Customer Relationship Management suggests understanding customer needs and building interaction with consumers by supplying the most suitable product services with providing superior consumer service. It incorporates all apparatus to keep track of customer interactions, transactions, and technical assistance among many other things. This database aids the company in understanding the basic customer needs which aim to enhance the quality of the association. The customer is the king. Many organizations do not process customer complaints with dignity. Many business houses like banks, insurance companies, stock markets, and other service providers, recognize the importance of CRM and its potential to help them acquire new and retain existing customers. In the long-term, retention of selected customers exists if there is strong coordination between IT and marketing personnel.

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TYPES OF ML TECHNIQUES

ML is a new field in which software development and maintenance work can generate learning problems that can be solved by learning algorithms. ML is a broad field of computer science, and each branch plays a unique role. To gain a better understanding of various tasks, we have enlightened ML into its subcomponents, which are as follows: Machine Learning (ML): ML branch selection and sub-branch selection. Algorithms are dependent on two factors: first, whether our data has been labeled, and second, the task at hand, such as regression analysis, classification, dimensionality reduction, and so on.

- Supervised Learning
- Unsupervised Learning
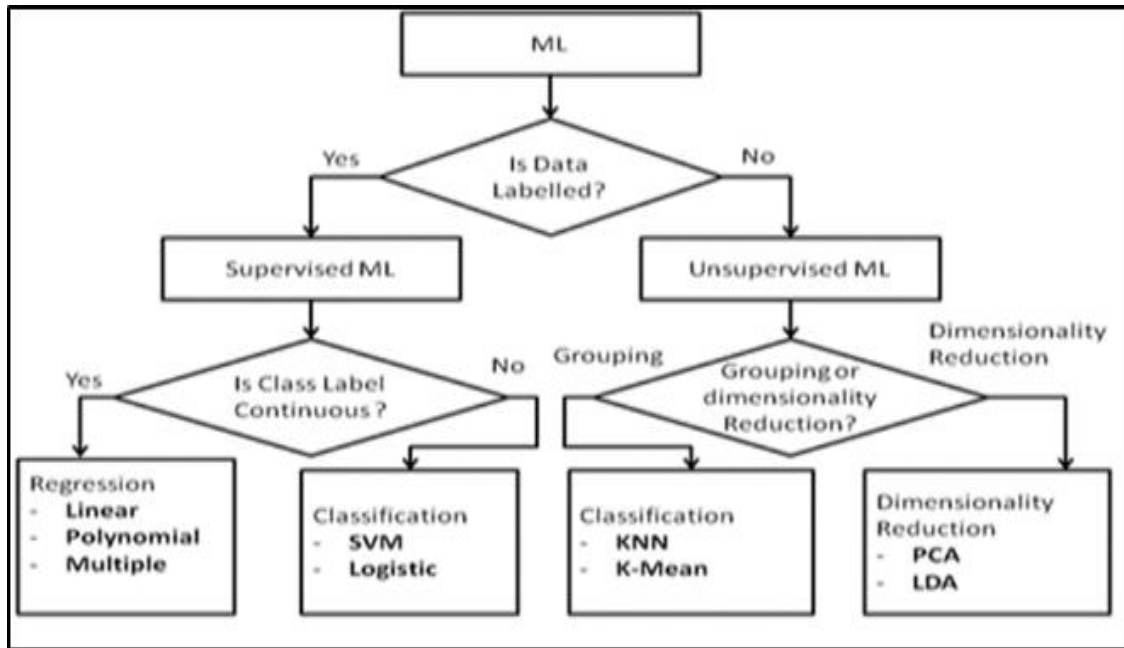- Semi-Supervised Learning

Figure 1. Tree Structure of ML Algorithm Selection

ML IS TRANSFORMING CRM

According to Fatemi (2019), many people believe that with the rise of ML, marketers, and salespeople will lose their jobs however, this is a myth that should be dismissed as a fleeting fad. ML has the potential to enhance rather than restore the human factor of sales. It indicates that future sales professionals will use artificial intelligence to increase their professional talents and various skill sets. Physical data entry is no longer required by sales professionals due to the merger of AI and ML. It also saves numerous hours of extra effort and idle time spent on various activities. Not only that, but ML can help to centralize various customer databases while also saving the whole customer lifecycle information which has been retrieved via email, phone, or chatbots. Dilmengani (2021) illuminated ML integrated CRM system can assist in augmenting the role of decision-making by recognizing probable issues in the system, removing any copied data, coverage any mistakes so that users can correct them, and identifying if there are any partial data in other systems, and giving suggestion on updating any out of date data.

ML has greatly influenced financial sectors to shift from rules-based to forecasting leads. Because ML can examine millions of various historical and instant attributes such as demographic data, geographic data, data activities, web behaviour, etc. It can support salespeople in shaping customer buying readiness. When combined with CRM systems, ML can inspect the percentage of won versus lost to identify various trends which can be used to recommend predictive guide scoring methods. Every time a new accurate model is identified. Because a big proportion of customer interactions take place practically through different methods which do not conceal customers' body language or facial expressions. It is very critical for sales personnel to enlarge trust and built a strong relationship with their customers. Probably, artificial intelligence provides a dominant solution to this issue. AI-powered tools and techniques can analyze conversations process and assess customer's emotional states by using sentiment analysis. Fatemi (2019) suggests the fine example which provides in-call voice analysis to support sales staff and understand their customer's human emotions and react properly to them in the finest way possible.

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OBJECTIVES OF THE STUDY
- To survey customer perceptions of CRM in banks in terms of service quality management.
- To demonstrate customer perceptions of CRM in banks in terms of customer retention management.

METHODOLOGY

The overall study encompasses both primary and secondary data. For that the collection of d primary data on Private and Public Sector banks in Odisha by administering a well-structured questionnaire. The questionnaire is constructed on five points Likert Scale. Very-Strong (1), Strong (2), Don't know (3), Weak (4), Very-Weak (5). The different samples were collected by using random sampling from both public and private sector banks. We have selected all leading banks like 18 public sector banks and 11 private sector banks in 30 districts of Odisha. The public sector banks are State Bank of India, Allahabad Banks, Andhra Banks, Bank of Baroda, Bank of India, Canara Bank, Central Bank of India, Corporation Bank, Dena Bank, Indian Bank, Indian Overseas Bank, Oriental Bank of Commerce, Punjab & Sind Bank, Syndicate Bank, UCO Bank, Union Bank of India, United Bank of India, and Vijaya Bank. The private sector banks are Axis Bank Ltd, Bandhan Bank, City Union Bank, Federal Bank, HDFC Bank, ICICI Bank, IDBI Bank, IndusInd Bank, Karur Vysya Bank, Kotak Mahindra Bank Ltd, and Yes Bank.

Furthermore, we have taken the 7 criteria for customer retention and 4 criteria for service quality. The different criteria for customer retention are i) Market leader in strategies (MLS), ii) Innovative services (IS), iii) Individual customer program (ICP), iv) Customer-Centric approach (CCP), v) Value-added services(VAS), vi) Total employee involvement (TEI) and vii) Low charges (LS). The criteria of service quality are i) Bank's attention (BIA), ii) Convenient operating hours (COH), iii) Employee's specific needs of the customers (ESC), and iv) Customer made to feel important (CMI). After that, we analyzed by using the clustering of the Machine Learning Algorithm to determine the impact of customer retention, and service quality.
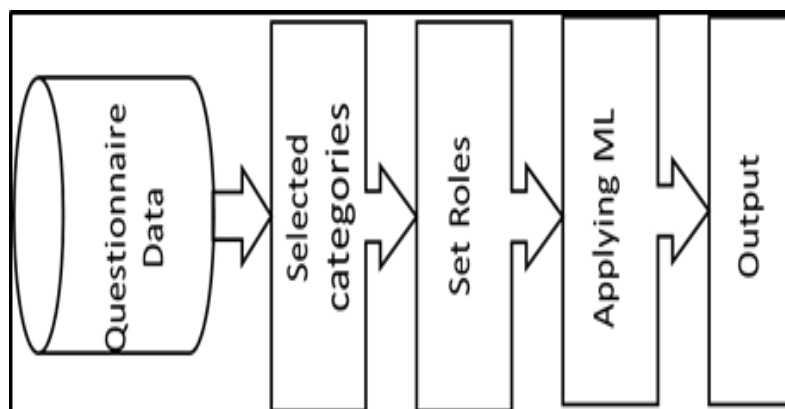
Conceptual Model

Figure 2. Conceptual Model of Customer Retention and Service Quality

As per the above conceptual model (figure 2), we have designed five stages process. First, we collected the data through our questionnaire using a five-point likert scale. After that, we have selected the attributes and set roles for applying ML to analyse and get the outputs.

DATA ANALYSIS AND FINDINGS

As per the above-said methodology, we have collected data from around 1106 responders from both Public & Private Sector Banks in Odisha. According to our proposed criteria for customer retention and service quality, we have designed the following model for Cluster analysis using ML.

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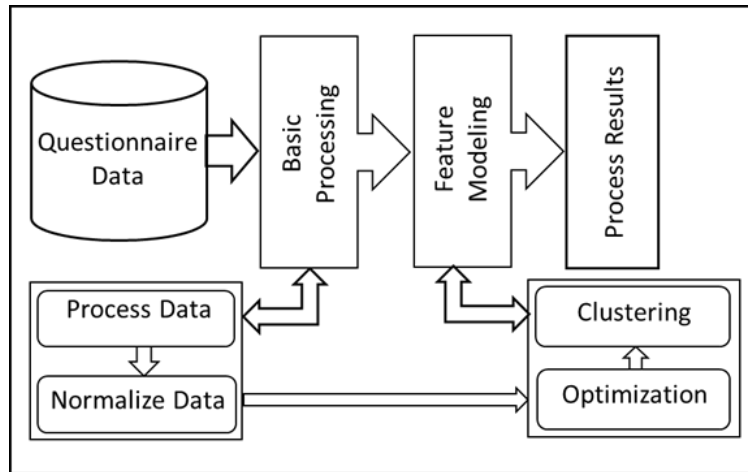
Analysis Model using ML

Figure 3. Cluster Analysis Model

As per our above-proposed model (figure 3), we did three major steps. First, we have taken the collected data set, delivers all labeled data points as well as unlabeled ones for which the model should be applied later on, and then processed it to normalize and optimize the data. After that, we applied the ML algorithm x-Means clustering to the transformed data to determine the impact of customer retention, and service quality.

Findings

The outputs of our analysis are given below. The statistics of customer retention are minimum is 1, maximum is 5, the average is 2.993, and the standard deviation is 1.440. similarly, the statistics of service quality are minimum is 1, maximum is 5, the average is 2.951, and the standard deviation is 1.451.

Statistics of Customer Retention

Name	Value
Minimum	1
Maximum	5
Average	2.993
Standard Deviation	1.440

Statistics of Service Quality

Name	Value
Minimum	1
Maximum	5
Average	2.951
Standard Deviation	1.451

Composed by Authors

Centroid Table

Cluster	CCP	ICP	IS	LC	MLS	TEI	VAS
Cluster 0	2.909	1.515	2.884	3.147	2.916	3.020	2.995
Cluster 1	3.048	3.955	3.042	3.032	2.974	3.116	3.012

Figure 4. Centroid Table of Customer Retention

Cluster	BIA	CCP	CMI	COH	ESC
Cluster 0	2.925	2.918	3.002	2.893	1.508
Cluster 1	2.968	3.042	3.008	3.036	3.952

Figure 5.Centroid Table of Sevice Quality

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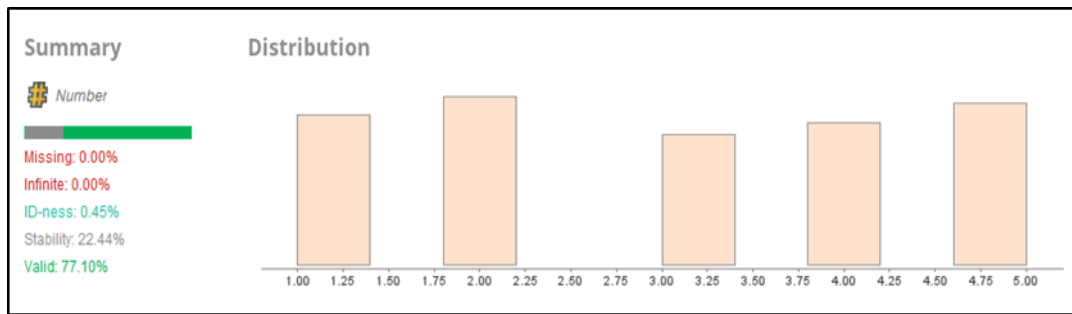
Summary and Distribution

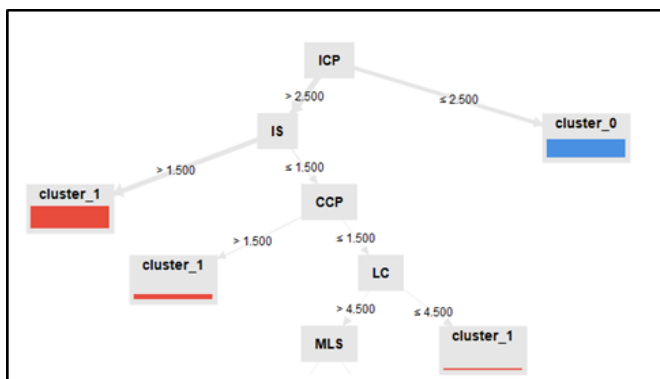Figure 6. Summary and Distribution

x-MeansCluster Tree

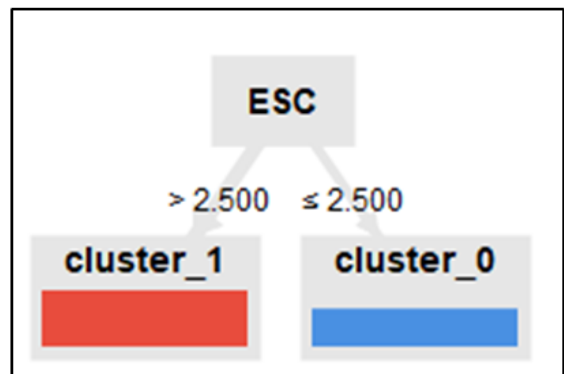Figure 7. x-Means Cluster Tree of Customer Retention
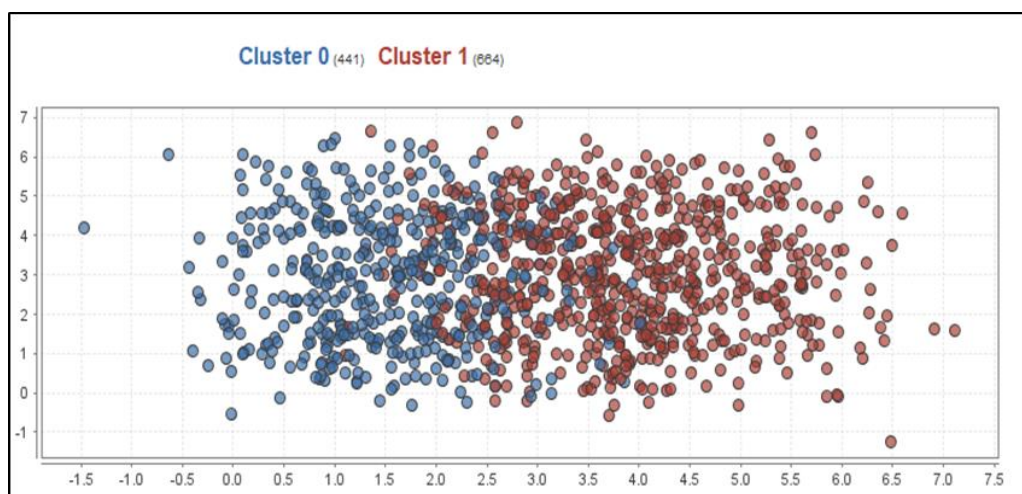

Figure 8. x-Means Cluster Tree of Service Quality

Figure 9. ScaterPlot of both the Clusters

As per the above figure 9, it is shown the scatter plot of two clusters. In cluster 0, 441, and cluster 1, 664 out of 1106 responders. In the x-Means Tree (figure 7 & 8), we can observe the result, Individual Customer Programmer (ICP) has more impact on customer retention and according to the centroid table (figure 4) on average 74.02% larger than compared the other criteria of customer retention. On the other side, an Employee'sunderstanding of the specific needs of the customers (ESC) has more impact on service quality. According to the centroid table (figure-5) on average 74.36% is larger than compared to the other criteria of service quality in both public and private sector banks.

CONCLUSION

The mean ranking of individual attention to understanding the specific needs of customers is lower in both public and private sector banks in terms of their respective dimensions and mean values. It has been seen Public sector banks are rated higher than private sector banks, and public sector banks are more interactive and friendly with their customers. Sometimes Public and private sector customer retention management practices are a little bit identical. But the Customer perceptions of service quality in both

sectors are extremely low. As a result, it has been suggested that both sector banks improve their service quality ratio, and customer interaction adoption of new management strategies to increase customer retention management. Due to service quality Employee's understanding of the specific needs of the customers (ESC) has only been more pragmatic, effective and customer-oriented. Customer retention was observed only by Individual Customer Programmer (ICP) which is more effective than others.

The recent study offers some valuable recommendations for relationship management. Customers who are defined are loyal if their retention rate is much higher which gives overall profitability to the banks. So CRM is one of the most prevalent ways for banks to establish customer relationships. Banks must improve customer retention, profitability, and loyalty by increasing their customer's share of the bank. Banks must grip CRM as a principle and implement a customer-centric approach in relationship management strategy that effectively addresses three key areas: customers, processes, and technology (CPT). Finally, banks should take care of such as job recognition and delegation, freedom to handle customer complaints and management approval in different fields which caters great success to making decisions more meaningful and decision-oriented in the prevailing circumstances.

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