



Develop Machine Learning Models to Predict Customer Lifetime Value for Banking Customers, Helping Banks Optimize Services

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ABSTRACT

The machine learning algorithms are useful in obtaining suitable data related to customer lifetime value for the banking professionals. The banking officials utilise the Customer lifetime value for fostering suitable business strategies to enhance customer satisfaction in this competitive market. This present study include knowledge regarding machine learning model inclusion to predict customer lifetime values in taking services as well as analysing customer motivation for a banking sector. Inclusion of ML is also effective to handle customer insight in managing business profitability in managing overall business operational activity maintenance. This research has summarised the importance of machine learning model in predicting CLV to Mint and business performance of banks.

Keywords: Machine Learning, Data analytics, Customer Lifetime Value, banks services

INTRODUCTION

Background

The present market is highly competitive and very dynamic in nature due to presence of a large number of service providers in the context of banking industry. According to [1], prediction of customer churn using machine learning models is quite helpful for enhanced customer segmentation and targeting also. The determination of customer lifetime value using machine learning models can help the banks in improving their services through providing improved personalised offers for the consumers [2]. It has been observed that 44% of financial services companies used machine learning applications regularly and they purchase machine learning embedded applications for workplace purposes [3].

Apart from that, the machine learning models are helpful in assessing risks and proper credit scoring by using the data about consumer behaviour patterns [4]. The customers are considered as the primary assets for the banking sector and banking organisations are responsible for implementing suitable policies to prolong the lifetime of consumers [5]. The CLV modelling has been utilised in the banking sector with the help of four machine learning algorithms such as linear regression, random forest, decision tree and support vector machine (SVM) for finding out the expected business estimate of a consumer [6]. The SVMs are employed by banking officials for detecting anomalies in consumer transaction patterns and it is helpful in obtaining customer integrity and financial stability for the consumer banks [7].

Hence, it can be inferred that machine learning algorithms are highly helpful in predicting business estimation considering the consumers and in offering personalised services to improve business transactions.

Rationale

The specific research topic is quite important in the present era as it is related with financial matter such as strategies of banking organisations for improved customer experience. Apart from that, this study is also important in understanding the effectiveness of customer lifetime value in the aspect of decision making while fostering long-term strategic goals by the banking organisations.

AIM, RESEARCH OBJECTIVE AND RESEARCH QUESTION

Aim: The aim of this research study is to explore the ways of developing machine learning models to for predicting Customer Lifetime Value for banking customers to assist the banks in optimising services



Research Objectives

- To evaluate the impacts of machine learning models in predicting Customer Lifetime Value for banking customers.
- To assess the benefits of Customer Lifetime Value prediction through machine learning models for banks in optimising services
- To investigate current challenges in predicting customer lifetime value of customers using machine learning models and in optimising banking services
- To recommend suitable strategies for successful utilisation of machine learning models in predicting customer lifetime value of customers and optimising banking services

Research questions

RQ1: What is the impact of predicting customer lifetime value of customers using machine learning models in banks?

RQ2: What are advantages of using machine learning models in predicting customer lifetime value and in optimising banking services?

RQ3: What are challenges faced by banks in determining customer lifetime value using machine learning models?

RQ4: What are suitable strategies to mitigate the issues with customer lifetime value prediction using machine learning models and optimise the banking services?

Scope of the paper

The scope of this paper is to describe the efficacy of machine learning models in predicting customer lifetime value of the banking consumers in terms of optimising banking operations. The paper also illustrates the reason behind the use of machine learning algorithms for determining consumer business estimates and also in offering best quality services to the consumers for business improvements. This study entails different kinds of machine learning models used in predicting customer churns for improving efficiency of banking operations.

LITERATURE REVIEW

Impact of Customer Lifetime Value prediction of banking customers using machine learning models

Customer lifetime value helps in maintaining balance of the long-term and short-term marketing strategies and in describing better understanding of the financial returns on the basis of investments [8]. High level of competition has been observed in the banking sector and every banking organisation tends to make better decisions for acquiring a huge customer base by predicting customer churns. The specific method of predicting customer churn has helped the banking officials in focusing on their most profitable consumers and to tailor the sales and marketing efforts towards them to retain them [9]. In addition to that, the banking officials can obtain clear ideas about consumer behaviour patterns and it leverages them in making personalised offers for valuable customers, that results in building robust customer loyalty on behalf of banking organisations. Hence, it can be inferred that significant impact of Customer lifetime value prediction lies in improved customer experiences for the banking sector.

Benefits of machine learning algorithms in optimising banking operations

Customer lifetime value is robustly linked with customer loyalty and several business operations and the banking organisations can utilise it for fostering long-term relationships with the potential customers [10]. The machine learning algorithm such as Support vector machine assists in understanding consumer demands through analysing customer transaction patterns for a significant time period. In addition to that, the machine learning models also help in identifying the crucial areas for improvements for the banking organisations such as personalised offers, 24/7 consumer services, cashback options at partner locations like restaurants, petrol pumps and shopping sites [10].

The machine learning models also alert the banking officials about fraud activities by detecting anomalies in terms of consumer transaction pattern [11]. The effective deployment of machine learning algorithms for prediction of customer lifetime value can help banking businesses in obtaining maximum value from the outcomes of these models through making informed decisions on the basis of predictions. Hence, it can be stated that banking organisations can utilise several benefits by utilising the outcomes of customer churn prediction through machine learning algorithms.

Issues faced by banking organisations in using machine learning models for predicting customer lifetime value

The banking officials have been facing issues with the complexity of different machine learning models in terms of using the outcomes for predicting customer lifetime value. It has been observed that ML algorithms largely depend on training data that helps the ML framework to achieve specific goals [12]. It is quite difficult for the banking officials to manage such complex data for their business operations. In addition to that, lack of proper data is considered as a big issue in this context. The incomplete information about user transactions and behavioural patterns leads towards malfunctions of the machine learning algorithms in the aspect of predicting correct customer lifetime value [13]. It has also been associated with cyber risks such as the attackers can mislead data through corrupting the particular machine learning model used for detection of consumer churn.

Recommended strategies for mitigating issues related to machine learning algorithm outcomes in prediction of customer lifetime value

The banking professionals need to arrange good quality data for correct prediction outcomes about customer lifetime value using machine learning algorithms [14]. The correct information about transaction frequency of the customers can help in this regard to generate suitable insights as the outcomes of machine learning models. It can help the banking officials in fostering best quality business strategies to establish long-term relationships with the potential consumers.

THEORETICAL PERSPECTIVES

Technology Acceptance Model (TAM)

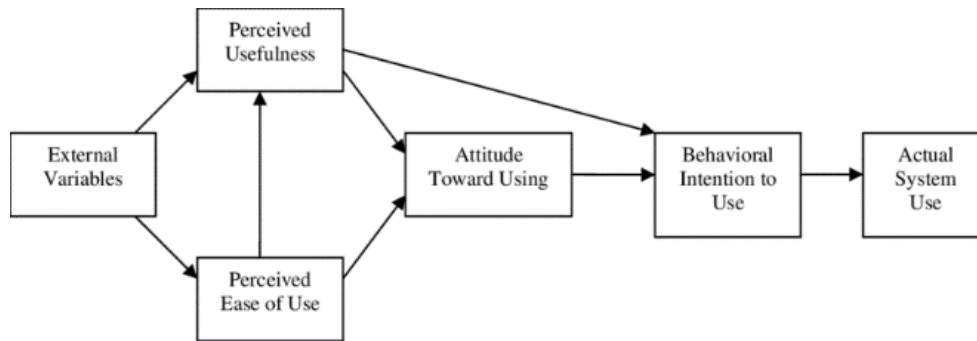


Figure 1: Technology Acceptance Model

TAM has been considered as the suitable information theory that suggests the ways individuals can utilise or implement technological concepts for business improvement. This theory encompasses ‘perceived usefulness’ along with ‘perceived ease of use’ to modify individual intention about acceptance of technological usage [15]. According to the concept of this theory, TAM is relevant with identifying the acceptance factors. For instance, the banking officials can effectively recognise the loopholes in their marketing strategy by using the outcomes of machine learning algorithms. The behavioural patterns of consumers are evaluated in this aspect by predicting customer lifetime value to make suitable policies to involve the consumers in banking business operations to obtain significant return from business operations. The consumer attitude has been prioritised in this scenario to make suitable business strategies using the machine learning models. Therefore, it can be stated that the banking officials can achieve greater results by implementing informed decisions with help of machine learning algorithms in optimisation of banking services.

METHODOLOGY

The methodology section infers about necessary procedures for the researchers to design suitable methods for conducting research study. Research philosophy, strategy, approach, data collection process and data analysis methods are required to design properly to accomplish the research study with suitable outcomes. Interpretivism philosophy has referred to the guidance about research procedures such as data collection process and data analysis process [16]. **Interpretivism research philosophy** has been utilised in this research study to accumulate suitable information about banking operations regarding utilisation of machine learning algorithms and prediction of customer lifetime value. The **inductive approach** has been incorporated in this research study to provide a description about the cause and effect phenomenon behind acceptance of machine learning model outcomes for making effective strategies to attract consumers for banks [17].



Empirical data about effectiveness of machine learning algorithms and monitoring of Customer lifetime value has been collected for this study. Secondary data is easily available and cheaper than primary research data [18]The specific accumulated data has been analysed to obtain information about impact of customer lifetime value monitoring through machine learning model on business operations of banking organisations.

Secondary qualitative data collection process has been maintained in this research study and ‘Google Scholar’ has been considered as the main database in this aspect. In addition to that, **thematic analysis** has been integrated in this research study to discuss meaningful conclusions on the basis of obtained secondary data. The themes have been generated using research objectives in this research study, while secondary data collection along with the thematic analysis process have been utilised for addressing the research questions.

IMPACT AND IMPLICATION

Theme 1: Benefits of development of machine learning algorithms to obtain customer lifetime value data

The machine learning algorithms are useful in predicting consumer churns for the banking organisations and on the basis of these outcomes of machine learning applications, the banking officials can modify their marketing strategies. The banking professionals can obtain proper information about consumer behavioural patterns in terms of customer lifetime value with less effort in this aspect. It basically helps them in making suitable business strategies for the banks to obtain greater profitability through involving more consumers [19]. The banks are also enabled to make correct financial forecasts with the help of machine learning applications. In addition to that, the specific machine learning algorithms are also helpful in detecting frauds related to customers transactions. Hence, it can be stated that use of machine learning applications is beneficial for the banking professionals in various dimensions such as proper financial forecast, risk assessment and suitable insights about potential consumers also.

Theme 2: Advantages of prediction of customer lifetime value for banking strategies

The prediction of customer lifetime value plays a crucial role in making necessary strategies for the banking organisations. The banks can identify the areas that need immediate improvement to fulfil the consumer demand. Apart from that, the banks are also enabled to make informed decisions in this regard through understanding the actual demand of the consumers [20]. The effective business strategies such as hassle free KYC update, cashback as well as discount offers are highly significant for the banks in gaining competitive advantages from the global market.

Theme 3: Challenges for developing machine learning models in predicting customer lifetime value in banking sector services

Machine learning based innovation is effective in managing online working activity, and service inclusions that helps to manage overall business services. Challenges in predicting CLV have been noticed in using ML for **improper data quality and integration** maintenance [21]. Banking sector includes a complex system to store consumer data, however it contains difficulty to manage a comprehensive view of consumer behaviour and inconsistency in data sets contains challenges in using machine learning.

Issues regarding model complicity and improper data management also contain barriers in handling customer trust that contains impact in managing CLV. **Dynamic consumer behaviour** contains negative impact in including accurate CLV values that contains negative impact to manage appropriate calculation in using ML [22]. It contains issues in managing appropriate predictions about customer lifetime value and related working activities of the banking sector in maintaining customer services using ML. On the other hand, customer preferences are changing rapidly along with influencing different factors such as products and technological advancement and others [23]. It contains struggles for the banking sector in managing appropriate calculations about CLV to take further decisions. Improper calculation of CLV contains barriers in managing overall prediction of customer attention and related banking industry business service management to satisfy their consumers in the operating market.

Theme 4: Strategic implementation of ML for optimizing banking services and predicting customer lifecycle values

Machine learning processes allow banks to monitor consumer behaviour as well as identifying anonymous activity in real time that reduces probability of fraud from banking operations. In terms of CLV calculation in using ML, **quality assurance process** implementation is efficient in handling robust data management systems [24]. Inclusion of quality analytics of information helps to manage regular checking of data and information that include accurate data management and further calculation handling related to CLV values for the banking sector. This data quality monitoring strategy is also efficient in managing overall banking decisions regarding customer engagement handling that maintain overall innovation implication and business development. **Encouraging collaboration** between team members and customers is effective to



understand customer motivation related to their purchasing decisions from an organisation [25]. Development of this collaboration also needs based understanding that further helps to manage overall banking services and facility management to develop business processes in the operating market. On the other hand, banks should focus on **interpretable models such as data analytics based on machine learning** to get predictive output inclusion that helps to manage overall visualization business transparency [26]. This strategy includes insight to enhance consumer trust and facilitate informed decisions regarding service taking processes from the banking sector that develop CLV values, and business growth opportunities in the market.

CONCLUSION

This present study has summarised knowledge regarding machine learning model inclusion to predict customer lifetime values in taking services as well as analysing customer motivation for a banking sector. Machine learning models help banks to include transformative approaches that enhance overall service optimization as well as consumer engagement. Along with leveraging Diverse information sources, it is possible to address and behavioural patterns of customers within the banking sector in creating robust predictive models using machine learning. Inclusion of this ML utilisation feature is also effective to handle customer insight in managing business profitability and high value maintenance for customers in managing overall business operational activity maintenance. However, challenges in predicting CLV have been noticed for complex value storing processes within the banking sector in managing further customer service optimization process handling. Since, prioritising ML utilisation helps to manage more appropriate actionable insight in handling strategic objectives of the banking sector. It can be concluded that CLV prediction empowers the banks for enhanced consumer experience along with optimising long term profitability that increase overall business landscape.

Future Direction

The future would have the opportunity to emphasise business directions to include predictive analytics using other technologies rather than machine learning in handling overall information analysis and CLV handling. Future research would have the possibility to conduct predictive models to handle customer lifecycle value within the banking sector along with managing banking service optimization. Lastly, the importance of innovation and data analytics within a country can be conducted in gaining more efficient knowledge about CLV on banking.

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