

Uncovering Customer Insights with CLV

- A Review of Current Strategies and Future Directions

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Abstract— In recent years, Businesses have witnessed significant advancements in efficiency and convenience, resulting in their rapid growth and progress. However, many companies still focus more on their brands and products than on their customers, which can make it difficult to identify potential customers and their unfulfilled needs. Our solution revolves around leveraging the wealth of data collected by companies to enable accurate CLV predictions. By harnessing this data effectively, businesses can offer suitable prices tailored to each customer segment, thereby catering to individual preferences and maximizing customer satisfaction. This approach emphasizes the importance of understanding and addressing customers' evolving needs to drive business growth and success. This review aims to discuss models that can predict the customer lifetime value (CLV) of stocks using the current dynamics of customers, which can be applied to a wide range of industries. Given the fast-changing needs and expectations of customers in today's world of technologies and social media, predicting the CLV is challenging, yet important for companies to gain customer support and satisfaction. This approach recognizes the importance of understanding and meeting customers' evolving needs to drive business success. It also emphasizes the significance of predicting CLV in today's competitive business landscape. It highlights the need for businesses to shift their focus towards customer-centric approaches and utilize data-driven models to better understand customer behavior and preferences.

Keywords – *CLV, CLTV, Customer lifetime value; Stock market prediction, Customer segmentation.*

I. INTRODUCTION

In today's customer-focused market, businesses must adapt to changing customer needs and preferences to stay competitive. The importance of retaining existing customers and increasing their worth to the business is often understated. Traditionally, businesses measure growth in two ways: by acquiring new customers and by retaining existing ones, measured through Customer Lifetime Value (CLV). CLV represents the total worth of a customer to the business over the entire history of their relationship. Studies show that retaining existing customers is more profitable than acquiring new ones, which is costly and difficult. Therefore, focusing on increasing CLV is crucial for business growth. Despite the importance of CLV, its application is not prevalent, and measuring it remains a challenge. However, advances in technology and access to insightful data have made measuring customer value more relevant and critical. In this paper, we discuss the growing importance of CLV and propose a model to predict it using machine learning techniques.

This paper aims to provide a comprehensive review of the existing literature on CLV and its significance in modern business. The paper begins by defining CLV and its importance in business strategy. It then presents a critical review of the literature on CLV, highlighting its applications in different industries and the challenges associated with its implementation. The paper also examines the factors that influence CLV, such as customer loyalty, satisfaction, and engagement. Furthermore, the paper explores the role of technology, particularly machine learning and data analytics, in predicting and improving CLV. It also discusses the ethical considerations associated with the use of customer data for CLV analysis. Based on the literature review, this paper presents future research directions for CLV, including the need for more accurate and reliable CLV models, the integration of CLV into marketing strategy, and the development of ethical frameworks for CLV analysis.

II. RELATED WORKS

Customer lifetime value (CLV) models have become increasingly relevant in recent years, as they enable businesses to make data-driven decisions and build long-term relationships with customers. The use of CLV models can also help businesses to invest more efficiently in marketing tools and strategies. Researchers have developed various CLV models, including methods that take into account shifting market conditions using big data analytics. Abdolreza Mosaddegh et al. [1] developed a novel method for anticipating CLV that leverages big data analytics and has shown promising results. Suman Saha et al. [2] provided a succinct summary of graph-based methods that are commonly used in stock market research. Essam H. Houssein et al. [3] introduced an EO-SVR model that outperforms other models and is considered an ideal model due to its superior results.

In the field of stock market forecasting, researchers have explored decision fusion techniques to improve predictive accuracy. Cheng Zhang et al. [4] provided an overview of future directions in decision fusion for stock market forecasting, which includes innovative algorithms and merging sentiment analysis with decision fusion techniques. Fernando G. D. C. Ferreira et al. [5] conducted a comprehensive review of the literature on artificial intelligence for stock market betting, focusing on portfolio optimization, stock market forecasting, financial sentiment research, and combinations of two or more techniques.

Ramamani Venkatakrishna et al. [6] used machine learning models to forecast CLV based on customer sales data, and employed consumer segmentation to develop marketing strategies. R. Ali et al. [10] evaluated CLV in the gaming industry using a dataset and identified CLV functions based on important variables.

In summary, various CLV models have been developed and applied in different industries to improve decision-making and develop effective marketing strategies. Additionally, researchers have explored decision fusion techniques to enhance predictive accuracy in stock market forecasting. These studies demonstrate the importance of CLV models and decision fusion techniques in driving business success.

III. THEORETICAL OVERVIEW

Customer Lifetime Value (CLV) is a key metric that measures the potential profits that a customer can bring to a business over their entire relationship with the company. For example, an online store that sells bicycles and accessories can expect a new customer to purchase more items in the future, such as helmets, tires, and baskets, and possibly even buy another bike. These potential purchases and revenues are all factored into the CLV. Understanding CLV is crucial for maximizing a company's efficiency and profitability. By analyzing the total cash flow of a given customer, a business can better understand customer retention and maximize its return on investment (ROI). CLV is especially important in e-commerce and digital marketing, where it has become a well-known metric. Customer lifetime value prediction provides valuable information about customer retention strategies. The increasing average CLV demonstrates that a company's efforts to maintain and increase sales are paying off and positively influencing the customer's likelihood of returning. In today's data-driven era, artificial intelligence and machine learning algorithms can provide insights like customer sentiment analysis based on social media, allowing companies to predict behavior for months ahead. Many companies are now beginning to adopt these technologies, with some like Netflix already seeing significant benefits. Therefore, understanding and utilizing CLV is becoming increasingly essential in the competitive landscape of modern business. This paper aims to explore the importance of CLV in e-commerce and digital marketing.

IV. UNDERSTANDING CLV

One of the crucial statistics that companies track as part of their customer experience programs is Customer Lifetime Value (CLV). Unlike measuring only the value of the first purchase, CLV gives you an idea of how valuable a customer can be to your business in the long run. This metric helps determine the reasonable cost of customer acquisition. CLV calculates the total worth of a customer's relationship with the business throughout their lifetime. It is a crucial metric as retaining existing customers is cheaper than acquiring new ones, making it an excellent way to drive business growth.

Customer lifetime value (CLTV) is a crucial metric for marketers, as it enables them to estimate the revenue that can be expected from a customer over the course of their relationship with the business. As the duration of a customer's engagement with a company increases, so does their lifetime value. There are various methods available to calculate CLTV, but it's important to choose the one that best suits your business context and customer base. To create a CLTV model, it's essential to first understand the nature of the business and its customers. Generally, two

types of business contexts can be classified based on customer relationships and purchase opportunities. These are contractual and non-contractual.

- Contractual business refers to situations where there is a definite timeline for when the customer is going to discontinue their engagement with the company. These types of customers are known as subscription customers, and examples include Hotstar, Netflix, and Amazon Prime. Calculating CLTV for contractual customers is relatively easier, as the end date of their engagement is known.
- Non-contractual businesses deal with customers who may stop purchasing from the company silently, without any indication that they are leaving. This makes calculating CLTV much more challenging, especially for retail or e-commerce businesses. However, despite the difficulties, businesses need to estimate their customers' lifetime value accurately, as it can help them develop effective customer retention strategies and optimize their marketing efforts.

V. CLV METHODOLOGY AND APPROACH

Several factors account for the growing interest in the concept of CLV. Firstly, traditional marketing metrics like brand awareness and value, market share, and growth do not often justify marketing investment. Secondly, financial metrics like stock price and total profit also do not measure the success of the business. Though these measures are useful, they have limited diagnostic capability. Thirdly, advances in IT have made it easy for organizations to collect a vast amount of transactional data, especially in the area of sales. This data can be analyzed and used to understand the revealed preferences of customers rather than intentions. Furthermore, IT can process huge amounts of data, making sampling redundant as the entire customer base can be made available for analysis. Also, analysts can convert this data into meaningful insights very easily with the help of many sophisticated modeling techniques. These insights can be leveraged to customize marketing programs for a focused group of customers or even individual customers again with the help of technology. Purchase opportunities can be broadly classified into two types: continuous and discrete.

a) Continuous: Continuous purchase opportunities are those where customers can make purchases continuously, without any specific period or limitation. For example, a customer can buy a product or service whenever they want, without any restrictions on the frequency or timing of the purchase.

b) Discrete: Discrete purchase opportunities are those where the purchase happens at specific intervals or time periods. Examples of such purchase opportunities include subscription plans, where customers pay for a product or service on a recurring basis, typically monthly or annually.

Choosing the best purchase opportunity type for a business depends on its context and goals. If the business aims to provide flexibility to customers and encourage frequent purchases, a continuous purchase opportunity may be more appropriate. This type of purchase opportunity can help increase customer engagement and loyalty, as customers can make purchases at their convenience. Ultimately, the choice between continuous and discrete purchase opportunities should be based on a thorough analysis of the business context and customer needs. By understanding the preferences and behaviors of their target audience, businesses can create purchase opportunities that are both convenient and effective.

The objective of this research is to explore viable approaches for estimating the potential revenue generated by a specific group of active customers in the context of non-contractual-continuous businesses. In order to achieve this objective, we have employed various probabilistic models such as Pareto-NBD, BG-NBD, MBG-NBD & Gamma Gamma in a case study from the industry. Additionally, customer segmentation was conducted using unsupervised machine learning to showcase its effectiveness as a tool for planning strategies.

VI. DISCUSSIONS AND CHALLENGES

Most of the existing literature on customer lifetime value (CLV) has focused on using prior customer behavior data to calculate CLV. However, with the rapid advancement of technology and goods, new situations arise that cannot be predicted by historical data. In the age of new media and social networks, customers' wants and expectations change rapidly, leading to volatility in CLV. As a result, there is a need to explore new methods and models that take into account the evolving customer behavior patterns in order to accurately estimate CLV. However, measuring CLV can be a challenging task for some companies. Some businesses struggle to measure CLV due to various reasons such as segregated teams, inadequate systems, and untargeted marketing. These challenges make it difficult for companies to assess the value of their customers accurately. However, addressing these challenges can lead to long-term benefits, such as developing targeted marketing strategies, improving customer experience, and

maximizing return on investment (ROI). Thus, companies should prioritize overcoming these challenges to measure CLV effectively and improve their bottom line.

VII. CONCLUSION

In conclusion, the concept of CLTV is essential for companies to understand and leverage in their marketing strategies. By focusing on CLV, companies can build strong customer relationships, enhance customer experience, and ultimately achieve sustainable growth and profitability. Despite its importance, the application of CLTV in practice remains a challenge for many organizations. However, with advances in IT and access to insightful data, companies can measure the value of their customers more effectively and develop customized marketing programs that meet their needs. This paper emphasizes the importance of CLV in modern business and its potential for creating long-term value for customers and companies. It provides insights for researchers, practitioners, and managers on how to implement CLV effectively and responsibly in their organizations.

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AUTHORS PROFILE



I am Suganya T. I obtained my Bachelor's degree in Computer Science and Engineering from Anna University in Chennai, Tamil Nadu, India. I further pursued my Master's degree in Computer Science and Engineering from the same university. Currently, I have more than 14 years of teaching experience and I'm working as an Assistant Professor in the Department of Artificial Intelligence and Data Science at KGiSL Institute of Technology in Coimbatore, Tamil Nadu. My main areas of interest include Pattern Analysis and Image Processing. I have published over 25 papers in reputed international and national-level conferences, as well as international journals.



I'm Arun Raj K, and I am a pre-final year student studying Artificial Intelligence and Data Science at KGiSL Institute of Technology. During my academic journey, I have successfully completed two projects: one focusing on customer lifetime value calculation and the other involving the development of a chatbot for college enquiries using machine learning techniques. My areas of interest include Poster making and designing. I look forward to continuing my journey of learning and growth in these exciting disciplines.



I'm Fazmila Fathima M, a prefinal year student studying B.Tech in Artificial Intelligence and Data Science at KGiSL Institute of Technology. I have worked on two projects, and currently, I am working on a project called 'Dementia Detection and Management'. My interests include machine learning, data science, and psychology. By applying advanced machine learning techniques and psychological research, I aim to make a positive impact on the lives of individuals. Through my academic pursuits and project work, I strive to enhance my knowledge and skills in AI, ML, and psychology.



I'm Subash V, currently pursuing my Bachelor's degree in Artificial Intelligence and Data Science as a pre-final year student at KGiSL Institute of Technology. I am passionate about exploring the applications of AI and DS in solving real-world problems. With a strong interest in programming and data analysis, I am constantly seeking opportunities to expand my knowledge and skills in the rapidly evolving field of AI. I am excited to contribute to the advancements in AI and data science through innovative projects and research.