Machine Learning Approach in Digital Marketing: Analyzing its Influence on Consumer Buying Behavior

Malay Bandyapadhyay

Assistant Professor
MSH Department,
MCKV Institute of Engineering, Howrah, India

ABSTRACT:

The significance of digital marketing has grown over time in the current digital era as a method to provide clients with innovative properties for education, engagement, and the sale of goods and services. Millions of people's everyday lives are gradually being impacted by digital marketing via mobile and social media, which is expanding into the typical social media activities that foster customer interactions. Companies turned to digital marketing as a logical response to take advantage of and profit from the increased consumer focus on the Internet. Businesses, hospitals, schools, professional groups, councils, and NGOs (Non-Governmental Institutions) are just a few examples of the many organizations that employ digital marketing as part of their marketing strategy and deployment plans to address challenging market issues. They promote the use of machine learning technology to overcome those circumstances. Sentiment analysis is one of several types of analytics that many businesses use today to better understand and respond to what consumers think about them and their goods in digital marketing. Business companies will rely increasingly on machine learning technologies and other mining approaches in the future for analyzing dynamic data.

Index Terms – **Digital marketing, social media, machine learning, sentiment analysis.**

I. INTRODUCTION

Digital marketing's game-changing machine learning technology captures, examines, and reuses clicks and comments on companies to identify the emotions associated with them (Ullal et.al, 2021). The methods supported by machine learning aid in improving client visits by classifying the various click-through responses to companies that engage customers on a highly personalized level (Ashley and Tuten, 2015). For the development of decision support management information systems and analysis, machine learning is very pertinent. The development of artificial intelligence (AI) solutions to improve corporate efficiency and expedite marketing procedures is one of the key developments in digital marketing strategy. Results from machine learning are used by businesses to improve their marketing tactics and obtain a thorough grasp of

customer attitudes. Digital marketers may find use in machine learning techniques, which help them better reveal and comprehend data (Arasu et.al., 2020).

One advantage of machine learning techniques is their ability to analyze data with complicated structures, such as large-scale network or tracking data, as well as unstructured data, such as text, pictures, audio, and video. Additionally, machine learning techniques may combine data from hybrid forms, such as a mix of text, images, and structured data. The recent data boom has been mostly driven by unstructured data, which has increased the significance of machine learning techniques (Huang and Rust, 2018) (Rust, 2020). Machine learning techniques can manage a bigger number of data compared to econometric models. When using the econometric technique, data are often collected on the size of a few hundred or thousands of customers, with few variables and constrained decision sets. Even lower sample sizes may be used for predictive models. In contrast, bigger datasets are common in machine learning approaches, where millions of samples are the standard. Large dataset training is made possible by effective optimization strategies like gradient descent and distributed processing. Implementation is also made simple by readily available instruments with high-performance computing capabilities. Scalable techniques are undoubtedly desirable given the rising volume of data in the actual world (Ma and Sun, 2020).

"Marketers may utilize machine learning to more effectively engage potential new clients who fit their existing client profiles. The marketing team may integrate customer preferences, buying patterns, and past transactions to provide a sizable amount of data that can be examined and filtered under future objectives (Thilagavathy,and Kumar, 2021) (Painoli, et.al, 2021). By enabling businesses to develop very effective email marketing, promotional material, online marketing, and SEO strategies that would not be feasible without machine learning's processing capacity, this increases marketing efficiency. The hardest part of gaining new clients is keeping them happy (Davenport and Kalakota, 2019) (Desai, 2019). The success of every business depends on its existing clients, so offering value and helpful material is just the start. Through the use of digital marketing technologies, machine learning enables businesses to stay current with minimal input, distribute content that has been modified for their target audience, generate individualized recommendations, and provide individualized, human-interested service. "Chatbot gives individualized information to all consumers, either in real-time or in a pleasant and meaningful manner, helping you enhance productivity while cutting your expenses," says a chatbot. Machine learning increases efficiency while enhancing the user experience through customization and strategic timing. For the majority of customers, chatting with a chatbot is becoming more and more commonplace (Saini, 2022).

Therefore, the primary goal of this research is to investigate the significance and function of machine learning methodologies in digital marketing. This study also aims to determine how machine learning techniques are incorporated into digital marketing and how this helps marketers make better judgments.

II. Literature Review

In 2019 Susan A.M. Vermeer et al. Investigated the value of machine learning in businesses by locating the pertinent social media electronic word-of-mouth. They performed a poll and gathered data on 16 different companies from eight different industries, totaling over 60,000 comments on Facebook and 11,000 tweets. They used machine learning, dictionary-based, and sentiment analysis tools to find, evaluate, and contrast the effectiveness of pertinent electronic word-of-mouth. They concluded from the conclusion that machine learning offers a useful starting point for autonomously analyzing electronic word-of-mouth (Vermeer et.al., 2019).

In 2020 Wael Basri examined the effects of social media marketing supported by artificial intelligence on Saudi Arabia's small and medium businesses' performance. They carried out a survey and gathered information from a Saudi Arabian corporate organization. They conducted SEM analysis using the data they had gathered. They concluded that Saudi Arabia's small and medium-sized businesses should concentrate on intelligence-assisted social media marketing techniques to enhance marketing strategies and automatically boost performance by reducing problems with marketing strategies (Basri, 2020).

In 2022 Gioia Volkmar et al. examined the motivations, constraints, and potential of machine learning and artificial intelligence in marketing management. They used a two-step process to investigate the objective. They performed a structured interview in the first round to get the data they need. They employed a questionnaire in the second step to gather data from marketing managers. Their research helped researchers better grasp how humans influence machine learning and artificial intelligence (Volkmar et. al., 2022).

In 2022 Ashkan Fredstrom et al. explored the promotion of innovation through the application of AI and ML. To improve performance, they also looked at how mentioning collaboration affected market sentiment. They conducted Vader sentiment analysis after gathering the necessary information from respondents. They concluded that businesses should communicate using terms connected to artificial intelligence and machine learning, particularly when the subject is innovation and teamwork (Fredström et. al., 2022).

In 2019 Andrej Miklosik et al., explored the significance of using sophisticated analytical tools while developing and implementing a marketing strategy. Additionally, they showed how ML technologies may be used in marketing. They spoke with the responders in-depth and gathered the necessary information. Additionally, they used a structured questionnaire to gather the data. They conducted an analysis using the data they had gathered and discovered that artificial intelligence affected digital marketing (Miklosik, 2019).

In 2020 Sheshadri Chatterjee and Arpan Kumar Kar et al., identified the elements that would encourage Indian small and medium-sized businesses to implement social media marketing strategies for increasing the impact of their businesses. The improvement of small and medium firms' business outcomes is significantly impacted by their use of social media marketing. A survey of 310 businesses was used to experimentally validate the theoretical model, and structural equation modeling was then used for further study. Their findings showed that perceived utility, perceived simplicity of use, and compatibility all had a favorable influence on SMM's impact after being adopted by SMEs (Chatterjee and Kar, 2020).

In 2022 Sandip Rakshit et al., developed a comprehensive social network marketing statistic for small and medium-sized businesses engaged in business-to-business transactions. Through structured questionnaire surveys and semi-structured interviews, they gathered information from 254 business-to-business small and medium-sized firms in India. They researched the collected data and discovered that social networking has a significant, advantageous impact on the expansion of SMEs (Rakshit et. al., 2022).

In 2021 Surajit Bag et al., examined user engagement and digital artificial intelligence technology. They also looked at how happy customers felt after making purchases online. In a developing country, they conducted initial data collection (India). They conducted an investigation and discovered a favorable correlation between consumer engagement and conversion and AI technology. Additionally, they discovered a link between a positive user experience and a consumer's desire to make another purchase (Bag et.al., 2021).

III. RESEARCH PROBLEM

3.1 Research Gap

There is a gap in our understanding of how different types of marketing are impacted by machine learning, though. The purpose of the study is to comprehend how machine learning impacts India's digital marketing environment. Our objective is to add to the body of knowledge previously accessible on machine learning and its use in digital marketing, which formed the basis for the study and was necessary.

➢ What aspects of customers' views of machines in digital marketing are responsible?
➢ What are the factors that account for consumers' perceptions of machines in digital marketing?
➢ What effects do machine learning methods' incorporation into digital marketing have on consumers' purchasing patterns, and how does this help marketers make more informed choices?

Several significant questions concerning consumer behavior, decision-making, and emotions are brought up by the analysis of the literature. These are the inquiries that the study is attempting to answer. Based on the results, we develop the specifications and capabilities of a machine for marketing and sales.

3.2 Research Objective

The research makes it feasible to appreciate the commercial strategies of companies using machine learning technology, as well as their benefits, challenges, and ethical ramifications. Understanding the elements required for a machine learning approach to be successfully applied when online product marketing was thought to be significant. Businesses will be able to encourage the adoption of a successful machine learning marketing strategy with the aid of this research endeavor. By analyzing the existing and prospective future implications of these approaches on this business, the research seeks to understand the current status of machine learning techniques in digital marketing. The following are the precise goals of this work:

➢ List the key benefits of using machine learning techniques in digital marketing.
➢ Identify the primary challenges and ethical issues related to integrating machine learning into digital marketing.
➢ Examine the challenges that machine learning applications are used to solve as well as the methods by which firms use machine learning in digital marketing.

➢ Recognize the implications that machine learning is already having and those that it could have in the future on digital marketing.

➢ Ascertain the impact of machine learning techniques on consumer purchase behavior in digital marketing.

3.3 Research Hypothesis

H_1- Machine learning approaches can provide superior customer experiences and influence consumer buying behavior.

H_2- Machine learning in digital marketing improves service quality and operational efficiency.

H_3- Machine learning helps to build trust in digital platforms

H_4- Automated decision-making impacts the customer buying attitude
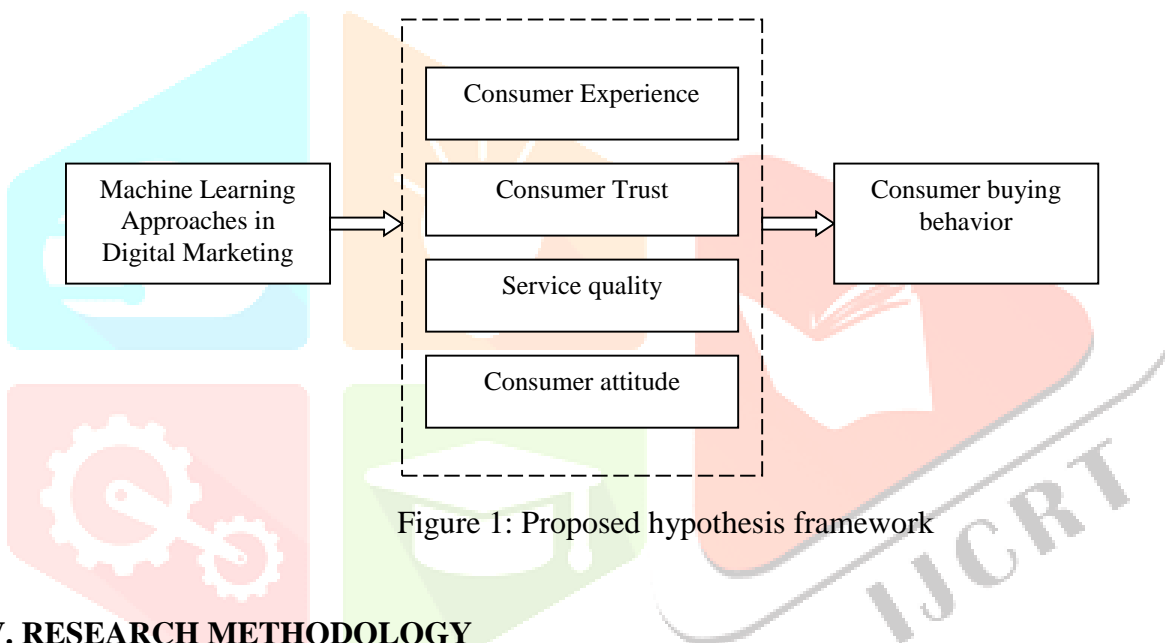
3.4 Research Hypothesis Framework

Figure 1: Proposed hypothesis framework

IV. RESEARCH METHODOLOGY

Most of the study's methodology is qualitative and descriptive. Even though because of their ongoing relationship with them, consumers always assume that they are central and structuring figures in research, this study made an analysis focused on the viewpoint of those who work with machine learning dependent on the circumstances of the machine learning tools applied in marketing, discussed in the preceding points. The objective of this exploratory and descriptive study is to understand the machine learning strategies employed by organizations, as well as their benefits, downsides, and moral ramifications. We also want to understand how these tactics impact the revenue of companies. It is considered pertinent to understand which elements are thought crucial for the successful implementation of a machine learning strategy in digital marketing because this research aims to be a contribution to enterprises and an accompanying document in the execution of a sophisticated machine learning strategy in marketing. The theoretical underpinnings of the study were given in the first section using secondary data taken from scholarly books, papers, journals, and articles. The second portion was where the bulk of the data was gathered to compare it to the theoretical foundations.

4.1 Research design

The perception of machine learning tactics in digital marketing by Indian customers was investigated using a multi-method approach. India is a multiethnic country with a dynamic population. The research used to survey and interviewing methodologies to accomplish its objectives. It was anticipated to determine the degree of machine learning awareness among digital marketers through interviews. Since they enable participants to offer information, interview techniques are the main method for acquiring qualitative data in social research. 120 digital marketers from different Indian IT hubs were approached and interviewed for the study. Surveys for online shoppers were made using the data obtained in this manner. Surveys are a rather successful research method for analyzing consumer behavior. Customers' and professionals' questions tended to center on machine learning-based behavior and decision-making. Depending on their level of education and knowledge of marketing technologies, the respondents were separated into groups. The poll was then given out to digital customers, social media users, and marketers in three Indian cities.

This study will be based on the research questions and hypothesis to examine the impact of machine learning approaches in digital marketing and buying behavior of the consumer. Four hypotheses were developed to validate the results. SEM and ANOVA are the analysis to be performed in the proposed hypothesis. Also, the analysis suitable for this research will be performed.

REFERENCES:

.[1] Arasu, B.S., Seelan, B.J.B. and Thamaraiselvan, N., 2020. A machine learning-based approach to enhancing social media marketing. Computers & Electrical Engineering, 86.

[2] Ashley, C. and Tuten, T., 2015. Creative strategies in social media marketing: An exploratory study of branded social content and consumer engagement. Psychology & Marketing, 32(1), 15-27.

[3] Bag, S., Srivastava, G., Al Bashir, M.M., Kumari, S., Giannakis, M. and Chowdhury, A.H., 2021. Journey of customers in this digital era: Understanding the role of artificial intelligence technologies in user engagement and conversion. Benchmarking: An International Journal.

[4] Basri, W., 2020. Examining the impact of artificial intelligence (AI)-assisted social media marketing on the performance of small and medium enterprises: toward effective business management in the Saudi Arabian context. International Journal of Computational Intelligence Systems, 13(1), 142.

[5] Chatterjee, S. and Kar, A.K., 2020. Why do small and medium enterprises use social media marketing and what is the impact: Empirical insights from India. International Journal of Information Management, 53, 102103.

[6] Davenport, T. and Kalakota, R., 2019. The potential for artificial intelligence in healthcare. Future healthcare journal, 6(2), 94.

[7] Desai, V., 2019. Digital marketing: A review. International Journal of Trend in Scientific Research and Development, 5(5), 196-200.

[8] Fredström, A., Parida, V., Wincent, J., Sjödin, D. and Oghazi, P., 2022. What is the Market Value of Artificial Intelligence and Machine Learning? The Role of Innovativeness and Collaboration for Performance. Technological Forecasting and Social Change, 180.

[9] Huang, M.H. and Rust, R.T., 2018. Artificial intelligence in service. Journal of Service Research, 21(2), 155-172.

[10] Ma, L. and Sun, B., 2020. Machine learning and AI in marketing–Connecting computing power to human insights. International Journal of Research in Marketing, 37(3),481-504.

[11] Miklosik, A., Kuchta, M., Evans, N. and Zak, S., 2019. Towards the adoption of machine learning-based analytical tools in digital marketing. Ieee Access, 7, 85705-85718.

[12] Painoli, A.K., Bansal, R., Singh, R. and Kukreti, A., 2021. Impact of Digital Marketing on the Buying Behavior of Youth With Special Reference to Uttarakhand State. In Big Data Analytics for Improved Accuracy, Efficiency, and Decision Making in Digital Marketing (pp. 162-182). IGI Global.

[13] Rakshit, S., Islam, N., Mondal, S. and Paul, T., 2022. An integrated social network marketing metric for business-to-business SMEs. Journal of Business Research, 150, 73-88.

[14] Rust, R.T., 2020. The future of marketing. International Journal of Research in Marketing, 37(1), 15-26.

[15] Saini, S., 2022. Artificial Intelligence in Digital Marketing: Applications and Challenges. Artificial Intelligence, 10(5).

[16] Thilagavathy, N. and Kumar, E.P., 2021. Artificial Intelligence on digital Marketing-An overview. NVEO-NATURAL VOLATILES & ESSENTIAL OILS Journal| NVEO, 9895-9908.

[17] Ullal, M.S., Hawaldar, I.T., Soni, R. and Nadeem, M., 2021. The role of machine learning in digital marketing. Sage Open, 11(4).

[18] Vermeer, S.A., Araujo, T., Bernritter, S.F. and van Noort, G., 2019. Seeing the wood for the trees: How machine learning can help firms in identifying relevant electronic word-of-mouth in social media. International Journal of Research in Marketing, 36(3), 492-508.

[19] Volkmar, G., Fischer, P.M. and Reinecke, S., 2022. Artificial Intelligence and Machine Learning: Exploring drivers, barriers, and future developments in marketing management. Journal of Business Research, 149, 599-614.