Utilisation of Machine Learning and Other Forms of Computational Intelligence for Marketing Purposes

Anwer Basha*

Department of Computer Science, Saveetha College of Liberal Arts and Sciences, SIMATS Deemed University, Chennai

ABSTRACT In order to better understand how artificial intelligence (AI) may be used to aid in corporate decision-making, this study first examines the previous research in this area. AI has the potential to reduce the quantity of human labor needed for certain tasks, while increasing productivity in other areas of a business. The current research made an effort to apply the results of secondary data (in the form of past studies) to the functioning of the company as a whole. The repercussions would be significant for any business, but they are especially significant for large businesses operating in highly competitive areas. For certain businesses, slipping behind a rival that uses AI to improve the way they make choices might be disastrous. Since currently only minimal efforts have been undertaken to assess the relationship between AI and the process of strategic decision-making, researchers believe that the results of this study will be able to contribute something of value to the overall gamete of how AI is being applied to business.

INDEX TERMS artificial intelligence, data protection, internet of things, strategic decisions

I. INTRODUCTION

AI has transformed advertising. Consumers increasingly expect a customized experience based on their demographics, geography, and brand history. AI helps marketers to better understand their consumers and to provide relevant, personalized messages. Spotify uses AI to produce playlists based on popular genres and artists. By analyzing previous client purchases, it may propose new purchases. AI may help organizations to understand their customers. It can target ads using Twitter and Tumblr data. Marketers may utilize this data to construct a comprehensive customer profile, including what they enjoy and how to sell more of it. AI may simplify customer segmentation and assist to avoid marketing unavailable items. It may also enhance top-line revenue by engaging consumers [1]. Moreover, it can help firms understand their customers. It can process massive amounts of data from blogs and social media. Analyzing client purchase behavior and site interactions may help marketers to create personas. They may avoid promoting out-of-stock items and concentrate their promotion. Consequently, the number of satisfied consumers who don't switch would increase. AI may also help marketers to refine their strategies. It may influence consumer purchases and deliver a fast service. Hence, AI marketing solutions may help companies to grow and satisfy customers [2].

AI has revolutionized customer care and assistance, in addition to its influence on advertising [3]. AI-powered chat bots and virtual assistants have gotten increasingly intelligent in interpreting and reacting to client enquiries, as natural language

*Corresponding Author: raakhod1982@gmail.com

processing and machine learning have advanced [4]. These clever bots can deliver real-time, accurate information, fix common problems, and even manage complex transactions. Companies that use AI may provide round-the-clock help, reduce response times, and increase overall customer happiness [5].

AI has allowed businesses to get important insights into their customers' tastes and habits. AI systems may detect patterns, trends, and correlations that human marketers may ignore by analyzing massive volumes of data gathered from multiple touch points, such as social media, website interactions, and purchase histories [6]. This comprehensive awareness of client demands enables the firms to adjust their marketing plans and campaigns, providing personalized messages and product suggestions to the correct audience at the right time.

AI-powered recommendation systems have been shown to be extremely effective in enhancing sales and consumer engagement. Companies such as Amazon and Netflix use AI algorithms to recommend items or content based on individual tastes and prior activity [7]. These personalized suggestions not only improve the customer experience but also add to up selling and cross-selling opportunities, resulting in increased revenue and client loyalty [8].

AI has the potential to change the way companies conduct market research and gather consumer insights in a number of ways. In terms of the scope and time involved, traditional methods such as surveys and focus groups can be time consuming and limited in their scope. However, analytics platforms powered by AI can, on the other hand, be used to analyze vast amounts of data quickly and efficiently in order to gain insights which are useful in shaping marketing strategies and informing product development decisions. Using AI in market research is a powerful way for companies to stay ahead of trends, gain a deeper understanding of their customers' changing needs, and make confident data-driven decisions [9].

A. OBJECTIVES

The current research aims to fulfill the following objectives:

- To describe the impact of AI on digital advertising
- To study the benefits of using AI in marketing

II. METHODOLOGY

The current research bridges the gap between computer science and the field of marketing. Research into AI draws from many fields. Online advertising is still at a low level. Marketing research might benefit from an AI study. Research on digital marketing in combination with AI seldom examines particular procedures [10]. Most academic research ignores more complex marketing problems that firms are aware of in favor of more broad topics like e-business, consumer behavior, e-commerce tactics, social media advertising, search engines, and consumer predictive modelling. Social media user behaviors, specific ads, social media marketing, conversion optimization, online shopping prediction models, chatbots, and so on are all examples of this phenomenon. Despite being a major study topic with numerous publications, digital marketing in combination with AI lacks scholarly coverage. Still, there is a lot of interesting work available on the confluence of digital marketing and AI. In this regard, this paper provides a road map of the current state of AI applications in the field of digital marketing. It features prominent

publications, identifies gaps where AI has not yet made an impact, and proposes potential explanations for this phenomenon.

This study employs a systematic technique to fill the gap in scientific publications integrating digital marketing and AI. It begins with a thorough assessment of the literature in both the digital marketing and AI sectors, with the goal of identifying existing studies that investigate the confluence of these two disciplines.

The research then applies a qualitative analysis technique to thoroughly evaluate the listed articles. This entails obtaining pertinent information, such as the AI approaches employed, the specific digital marketing sectors handled, and the conclusions or findings of each research. It intends to uncover common themes, successful applications, and gaps in the literature where AI has not yet made a substantial influence on digital marketing by categorizing and synthesizing the available material [11].

To supplement the analysis, this study includes case studies and real-world examples of AI deployment in digital marketing. Examining industry practices and success stories can provide significant insights into the problems encountered, best practices, and possible advantages of AI adoption in diverse marketing contexts.

In order to provide plausible explanations for the gaps in the literature, this study takes into account a number of aspects that may contribute to the scarcity of scholarly papers on the junction of AI and digital marketing. The fast-paced nature of technical breakthroughs, the complexity of AI algorithms, and the necessity for multidisciplinary collaboration between computer science and marketing specialists are among the issues.

Researchers, practitioners, and policymakers will gain a comprehensive understanding of the current state of AI applications in digital marketing through the use of this methodology. In order to maximize AI's potential to enhance digital marketing strategies and results, further exploration and innovation are needed to uncover the full potential of this study's findings.

III. Research on the Impact of AI on Digital Advertising

It is important to introduce the many branches/areas of AI before discussing their implications for digital marketing strategies. The aim is to analyse which of these areas are relevant to the strategies used by digital marketers. This will show how much of an effect AI has on data collection for digital marketing [12]. There are many sub-fields of AI including modelling the brain, predicting time series, and classifying data, all of which are examples of the applications of neural networks.

Common examples of evolutionary computation include genetic algorithms and genetic programming. Vision encompasses techniques such as object identification and picture comprehension. Intelligent control and self-directed exploration methods, among others, are all examples of robotics. Expert systems are a general term that may include a lot of applications: decision support and intelligent tutoring system, and other specialized solutions based on AI. Likewise, the words Speech processing, recognition, production, etc., are used synonymously or interchangeably but without any additional context the meaning is unclear or incomplete. Such labels need to be better defined or framed within context in accordance with the role and the

scope of these labels in the field of study [13]. Machine translation is an example of natural language processing. Planning here is defined as organizing the times, places and the game rules, is too narrow and is used in the wrong context. In research, planning usually refers to strategic planning, goal planning and coordination of resources, but not recreational logistics. Methods like data mining and decision tree analysis are examples of machine learning. There seems to be a large number of academic studies focused on search engine optimization (SEO) [3]. It bridges the gap between computer science and the field of marketing. Further, it catagorises the research into digital marketing and AI and gives a machine learning model for many scientific areas of digital marketing.

The field of research in AI is interdisciplinary in nature, but the implementation of AI in digital marketing has not received much scholarly attention. Although AI is being rapidly embraced by the industry to online advertise, chatbots, conversion optimization, predictive modelling of consumer behaviour in the social media, scholarly literature is more inclined towards broad themes such as e-commerce, social media strategy, and consumer behaviour in general, without much consideration to the actual, complex issues that a marketer faces. Although the real-world innovations have risen, a significant gap in the number of academic works concerning concrete AI-driven digital marketing processes may be noticed. This paper charts the status of AI in digital marketing research, the under-researched fields, and an outlook roadmap on how to connect the theory with practice [3].

Data collection is one of the primary areas where AI has had a substantial influence. AI-powered computers can analyse massive volumes of data in real-time, allowing marketers to get important insights into customer behavior, preferences, and trends. With this data-driven strategy, marketers can design targeted and personalized advertising campaigns that resonate with their target demographic, resulting in increased engagement and conversion rates.

AI subfields such as neural networks can simulate the brain and predict time series data. Digital advertising uses these methods to forecast client behaviour and optimise ad placements based on historical data. By utilizing neural networks, marketers can optimize their advertising strategy based on actual data [14].

Digital advertising has been transformed by natural language processing (NLP). Through NLP, marketers are able to analyze customer sentiment, extract insights from social media conversations, and construct personalized chatbot experiences in real-time. The use of NLP can help marketers to engage customers more effectively and provide more relevant and timely advertising messages to them.

Despite the increasing expansion/ application of AI in digital marketing, there is still a scarcity of scholarly literature on the issue. Most of the studies are focused on general subjects such as e-commerce techniques, customer behaviour, and social media advertising, rather than particular AI-driven marketing methods. However, there have been interesting breakthroughs in the sector and academics are beginning to investigate the possibilities of AI in digital advertising.

The use of AI has revolutionized digital advertising, revolutionizing marketing data collection, optimization campaigns, and engagement with target audiences. Marketers can make data-driven decisions, create unique experiences, and improve

campaign performance using AI, including neural networks, machine learning, and natural language processing. Digital advertising is expected to become increasingly reliant on AI as it advances [15].

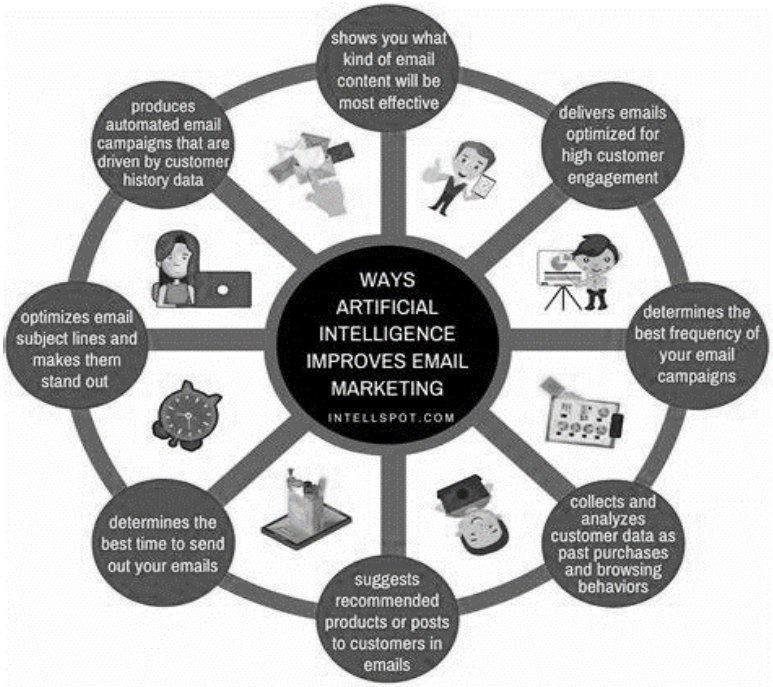

FIGURE 1. AI in email marketing

IV. BENEFITS OF USING AI IN MARKETING

There are several benefits of using AI in marketing.

The use of AI in marketing carries with it a plethora of potential benefits for businesses. These chances and benefits will continue to grow in tandem with the advancements in the capability of the underlying technology.

The use of AI in marketing comes with a number of major benefits, some of which are listed below [5].

A. LARGER AMOUNT OF MONEY MADE POSSIBLE BY INVESTMENT

Using AI technologies that analyse previous data, one attains the ability to determine which marketing techniques have the most potential to generate a better return on investment (ROI). Hence, one may be able to increase the ROI of one's marketing over time with the assistance of AI, thus enabling more informed strategic decisions.

B. MORE EFFICIENT UTILIZATION OF AVAILABLE RESOURCES

With the assistance of AI technology, it is easier to arrive at decisions in a shorter amount of time and automate various aspects of marketing, both of which save time and enable personnel to accomplish a greater number of responsibilities.

C. INCREASED USER CONTENTMENT

AI may improve the entire customer experience by using strategies such as personalization, chatbots, and other applications powered by AI. Due to these advancements, interactions with consumers improve which, in turn, results in greater customer loyalty.

D. IMPROVE DECISION-MAKING IN TERMS OF BOTH QUALITY AND DEPTH

Since AI offers the power to evaluate enormous volumes of data and pull useful insights from that analysis, decisions can be made that are both more strategically sound and better informed.

The use of AI will become more important in the field of marketing in the years to come. There is a good chance that a sizeable number of one's competitors are already making use of it. Over the course of the next few years, that number will only continue to grow. When one starts working with AI sooner rather than later, one is more equipped for the difficulties that lie ahead and able to keep advantage over the competition for a longer period of time [6].

Customer targeting and personalization can be enhanced with AI during marketing. In order to create detailed profiles of customers, AI algorithms can be used to analyze vast amounts of demographic, browsing, purchasing, and social media data. Marketers can use this data to send highly targeted and personalized messages, offers, and recommendations to specific segments of customers. In this way, businesses can significantly improve customer engagement, satisfaction, and conversion rates by tailoring marketing efforts to meet the needs and preferences of customers.

AI is very important in optimizing marketing efforts and increasing ROI. AI computers may analyze historical data to uncover patterns and trends that human marketers may ignore using predictive analytics. Businesses may use this data to make data-driven decisions regarding ad placement, content production, budget allocation, and scheduling, maximizing the efficacy of their marketing efforts and minimizing waste.

Chatbots and virtual assistants powered by AI have revolutionized customer service. With the help of intelligent bots, customers can receive instant help, resolve common issues, and free up human resources to focus on other tasks. Businesses can enhance customer satisfaction and loyalty by providing prompt and accurate customer support.

In addition to these advantages, AI enables marketers to get actionable insights from social media data. To gauge customer mood, predict developing trends, and monitor business reputation, AI systems may analyze social media postings, comments, and interactions. This data may be used to improve marketing campaigns, handle consumer complaints, and interact with customers in real-time.

Ultimately, the use of AI in marketing has several advantages, including greater ROI, resource optimization, enhanced client targeting, personalized experiences, and efficient customer support. Businesses may get a competitive edge in digital marketing by embracing AI technology and exploiting data-driven insights to provide excellent customer experience.

V. RESULTS AND DISCUSSION

Academic researchers who might have stayed at universities or research centers choose to work for private firms instead.

This is due to the fact that as businesses have grown over the last several years, there has been an increased need for recruiting skilled people. The proliferation of AI outside of academics and into technological products may be explained by the fact that the maturity level of AI research in the corporate sector is much greater/higher. AI researchers in academia have a smaller quantity of data with which to grow their models than their counterparts in the commercial sector, who manage to acquire and store billions of bytes of data every day, adequate for their own study. Certainly, this is one of the main reasons that there is a severe lack of data and scientists are feeling the effects. According to eMarketer, marketers struggle to adequately describe AI. It is used to describe processes including data analysis, intelligent devices, user profiling, keyword searches, data mining, and predictive modelling. Indeed, marketing is a language that most IT pros and CS experts do not speak/know [7].

Several causes can be linked to the growing tendency of academics to work for commercial companies, rather than universities or research institutes. One important cause is the increased need for competent workers in the business sector. As organizations have grown in recent years, there has been an increased demand for competent people, especially AI researchers.

Scientists working in AI face a significant challenge due to the lack of data. Without access to sufficient data, researchers may struggle to train their models effectively and achieve accurate results. Research in AI can be hindered due to this limitation and researchers may be compelled to conduct their work in private firms with more readily accessible data resources.

Interdisciplinary collaborations between academia and industry are crucial to address these challenges and bridge the gap. Developing AI models and algorithms aligned with real-world marketing needs can be the outcome of this collaboration, as it can facilitate data sharing and promote cross-disciplinary knowledge transfer. It is possible to advance both theory and practice by fostering partnerships between academic researchers, marketing professionals, and data scientists, resulting in the advancement of AI-powered marketing.

By leveraging existing datasets, collaborating with industry partners, and conducting large-scale studies collaboratively with businesses, academic institutions can enhance their data collection and access efforts. By using a wide variety of datasets, researchers would be able to develop AI models that are both more accurate and applicable.

It is expected that academic researchers would be able to enhance their contributions to AI in marketing by addressing the challenges of data availability and language barrier. Through collaboration and knowledge sharing, both academia and industry can advance AI techniques, improve the understanding of marketing challenges, and develop practical solutions that benefit researchers and marketing professionals. For AI research and its practical applications to advance, academia and industry must collaborate and exchange knowledge.

FIGURE 2. AI marketing benefits

A. CONCLUSION

Most of the existing research that touches on or specifically addresses the use of AI in digital marketing is in its nascent phase. Thanks to the advances in marketing and computing, we may now expect to experience individualized content, precise targeting, great conversion rates, and excellent returns on investment, among others. The time is now for marketers, company owners, and decision-makers to grasp the initiative and produce extraordinary results. There is little question/doubt that AI will create new needs for digital advertising in both academic and business settings. The business world is some steps ahead of academia at present. Soon, universities will catch up to the AI revolution. AI models are used by corporations. Businesses rely on the fresh information that is developed/knowledge created in academic institutions; therefore, marketing is a field that is always changing.

CONFLICT OF INTEREST

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

DATA AVAILABILITY STATEMENT

Data supporting the findings of this study will be made available by the corresponding author upon request.

FUNDING DETAILS

No funding has been received for this research.

REFERENCES

[1] P. Thaichon and S. Quach, *Artificial Intelligence for Marketing Management*. London, U.K.: Routledge, 2022.

[2] L. Donahue and F. Hajizada, "Artificial intelligence in cloud marketing," in *Artificial Intelligence and Machine Learning for Business for Non-Engineers*, S. S. Jones and F. M. Groom, Eds., Boca Raton, FL, USA: CRC Press, 2019, pp. 77–88.

[3] J. Cioffi, "Artificial intelligence in marketing," in *Artificial Intelligence*

and Machine Learning for Business for Non-Engineers, S. S. Jones and F. M. Groom, Eds., Boca Raton, FL, USA: CRC Press, 2019, pp. 71–76.

[4] R. Gradient, "How artificial intelligence can change the core of marketing theory," *Innov. Mark.*, vol. 16, no. 2, pp. 91–103, June 2020, doi: https://doi.org/10.21511/im.16(2).2020.08.

[5] K. Chung, J. D. Le, P. Thaichon, and S. Quach, "Types of artificial intelligence (AI) in marketing management," in *Artificial Intelligence for Marketing Management*, P. Thaichon and S. Quach, Eds., London, U.K.: Routledge, 2022, pp. 29–40, doi: https://doi.org/10.4324/9781003280392-4.

[6] M. Barwari, S. Quach, and P. Thaichon, "New developments in artificial intelligence (AI)-powered products in marketing," in *Artificial Intelligence for Marketing Management*, P. Thaichon and S. Quach, Eds., London, U.K.: Routledge, 2022, pp. 55–75, doi: https://doi.org/10.4324/9781003280392-7.

[7] M. Ding and A. Goldfarb, "The economics of artificial intelligence: A marketing perspective," *Rev. Mark. Res.*, vol. 20, pp. 13–76, 2023, doi: https://doi.org/10.1108/S1548-643520230000020002.

[8] F. Ricci, L. Rokach, and B. Shapira, "Recommender systems: Fundamentals and applications," in *Recommender Systems Handbook*, 2nd ed., F. Ricci, L. Rokach, and B. Shapira, Eds. Cham, Switzerland: Springer, 2022, pp. 1–39, doi: https://doi.org/10.1007/978-1-0716-2647-8_1.

[9] T. H. Davenport, A. Guha, D. Grewal, and T. Bressgott, "How artificial intelligence will change the future of marketing," *J. Acad. Mark. Sci.*, vol. 48, no. 1, pp. 24–42, Jan. 2020, doi: https://doi.org/10.1007/s11747-019-00696-0.

[10] I. Papasolomou and Y. Melanthiou, "Artificial intelligence in digital marketing: A review of current research and future directions," *Int. J. Bus. Innov. Res.*, vol. 27, no. 3, pp. 251–270, 2022.

[11] M. H. Huang and R. T. Rust, "A strategic framework for artificial intelligence in marketing," *J. Acad. Mark. Sci.*, vol. 49, no. 1, pp. 30–50, Jan. 2021, doi: https://doi.org/10.1007/s11747-020-00749-2.

[12] Y. K. Dwivedi *et al.*, "Artificial intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research and practice," *Int. J. Inf. Manag.*, vol. 59, Aug. 2021, Art. no. 102199, doi: https://doi.org/10.1016/j.ijinfomgt.2020.102199.

[13] D. Jurafsky and J. H. Martin, *Speech and Language Processing*, 3rd ed., draft. Cambridge, U.K.: Cambridge Univ. Press, 2023.

[14] J. Zhang, Y. Chen, M. Liu, and S. Liu, "Deep neural networks for real-time bidding and user response prediction in online advertising," *IEEE Trans. Knowl. Data Eng.*, vol. 33, no. 5, pp. 1932–1944, May 2021, doi: https://doi.org/10.1109/TKDE.2019.2940967.

[15] T. Chung, M. Wedel, and R. van der Lans, "AI in marketing: A framework, a review, and research agenda," *J. Mark. Res.*, vol. 59, no. 5, pp. 867–890, Oct. 2022, doi: https://doi.org/10.1177/00222437221102264