



A stochastic review of the impact of artificial intelligence, Machine learning and artificial neural networks in marketing

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Abstract

Artificial Intelligence (AI) and Machine Learning (ML) and artificial neural networks have significantly affect marketing sector, allowing for more efficient and effective marketing strategies. This paper define the above terms and review various applications in marketing, including customer experience and segmentation, optimization of advertising campaigns, personalized promotion, search engine optimization, predictive analytics, social media optimization, conversion rate optimization, image recognition, return on investment, cost saving and accuracy, lead scoring, dynamic pricing and data analysis accuracy. Also review through a stochastic approach the challenges of implementing these technologies in marketing.

Keywords: marketing, artificial intelligence, machine learning, artificial neural networks

Introduction

Marketing is the science of identifying, anticipating, and satisfying customer needs through the creation, promotion, and distribution of products and services. It involves a range of activities, including market research, product development, advertising, sales, and customer service (Kotler, Armstrong, Cunningham, 2019) [27]. The evolution of marketing is digital marketing which refers to the use of digital channels and technologies to carry out marketing procedures and includes strategies and tactics such as search engine optimization (SEO), social media marketing, email marketing, content marketing and paid advertising (Chaffey, Ellis-Chadwick, 2019) [9].

Artificial intelligence and machine learning are considered a revolution and are changing the way businesses approach marketing (Althoff, Dann, Hanelt, Hoppe, 2019) [5]. AI and ML algorithms allow marketers to analyze large datasets, identify patterns and trends, and make predictions that help them take more effective decisions. Marketing is now more data-driven than ever before and businesses that fail to leverage the power of AI and ML risk falling behind their competitors (Sripalawat, Thongmak, 2020) [38]. In the context of exploring the impact of AI and ML on marketing and study various applications (Aksu, Ozelik, Sahin, 2021) [4] of them is necessary to define of the basic terms.

According to Professor Christopher Manning, (2020) [13] intelligence can be defined as the ability to learn and apply appropriate techniques to solve problems and achieve goals appropriate to the environment in an uncertain, ever-changing world. Artificial intelligence is a term coined in 1955 by Stanford professor emeritus John McCarthy, who defined it as "the science and technology crimped to create intelligent machines". Research has led to programming machines to behave in intelligent ways, such as answering customers questions. Machine learning is the part of AI that studies how computers improve their perception, knowledge, thinking or actions based on experience and data and how machines self-improved and become capable of learning from experience. To that end, ML is based on computer science, statistics, psychology, neuroscience,

economics, and control theory. Today we emphasize machines that can learn, at least somewhat like humans do. Artificial neural networks has a catalytic effect on marketing techniques. The human brain processes data completely differently from a computer. Neurons are processors which are generally much slower than computers, yet human brain due to the facts of high complexity, parallel processing system and ability to organize the neurons, performs certain processes much faster than computer. Nowadays, the above functions can be largely achieved by machines based on creation of artificial neural networks and as a result machine learning has new potential for marketing (Wang, 2022) [40].

A neural network is called a circuit of interconnected neurons. Biological neurons, is a section of neural tissue. In the case of artificial neurons, is an artificial neural network based on algorithmic construction in the field of artificial intelligence, where the objective of the neural network is to solve a computational problem, or in the field of artificial neuroscience, where the objective is to simulate the operation of biological neural networks on the basis of a mathematical model. The necessity of integration of artificial intelligence by marketing becomes immediately imperative in order to take advantage of artificial neuroscience which will become widespread very soon.

Applications in marketing

Customer segmentation

One of the most significant advantages of using artificial intelligence in marketing is the ability to segment customers with high precision based on their behavior, interests, and demographics. By analyzing customer data, AI and ML algorithms can identify patterns that traditional methods may miss. These insights allow marketer to create targeted campaigns that resonate with their audience, increase conversion rates and create the appropriate products (Zhou, Mou, Fan, Pi, Yang, 2020) [48].

Especially eshops can segment their customers based on their purchase history, search queries, browsing behavior, preferences and ratings. This enables them to recommend

relevant products and personalized content to each customer, increase engagement and improve their cross-selling and upselling strategies and reducing bounce rate.

A common technique implemented by e-shop is Collaborative Filtering aims to recommend products to customers. Algorithm analyzes the past purchasing behavior of customers and promote products or services that other similar customers have purchased. According to Content-Based Filtering, AI analyzes the product features, such as size, color, material and style, and suggests products with same elements that customer has already interest in. Other techniques are Demographic Filtering of customers with information such as age, gender, and location, used to suggest products that are relevant and Contextual Filtering that customer's behavior on e-shop is deep analyzed, such as search queries, clicked products and products added to the cart and as a result machines learn and constantly improve their recommendations to customers (Yang, Wang, Shi, Zhang, 2021) ^[45].

Additionally, AI and ML algorithms optimize website and reduce bounce rates (Chen, Li, Liu, 2020) ^[10]. By implementing chatbots, can answer customer's queries 24 hours a day 7 days a week and provide instant solutions and answers. Chatbots can integrate with e-shops, providing customers with personalized recommendations, product information and purchase assistance.

Personalized promotion

Personalized promotion is an effective marketing technique to improve customer engagement and increase sales online. Artificial intelligence and machine learning techniques have a significant role in creating a personalized shopping experience for customers (Adolphs, Stocchi, 2021) ^[1]. One of the key ways AI and ML can be used for personalized promotion is through recommendation engines. These engines use algorithms to analyze customer data and generate recommendations for products or services that are interest for them. This can improve the relevance of promotions, leading to higher click-through rates and ultimately increase sales. In the study of McKinsey, personalized recommendations led to a 30% increase in conversion rates for e-commerce companies (Cameron, Korn, Srinivasan, 2019) ^[8]. Another way that AI and ML personalize promotion is through chatbots. Chatbots can use natural language processing to understand customer inquiries and provide personalized product recommendations based on their preferences and past interactions with the website and can personalize promotions by providing tailored discounts and offers based on customer behavior (Wu, Li, 2019) ^[44]. Furthermore, AI and ML create landing pages that are customized for each customer. These landing pages display product recommendations, offers and promotions based on the customer's past behavior on the website (Wang, Lu, Wang, 2020) ^[40].

Predictive analytics

Predictive analytics is the use of data, statistical algorithms, and machine learning techniques to identify the likelihood of future outcomes based on historical data. In marketing sector, predictive analytics identify potential customers, forecast demand, and optimize pricing strategies. Artificial intelligence and machine learning are increasingly being used by marketing to forecast demand across a range of

industries. These technologies offer the possibility to improve demand forecasting accuracy, speed up the forecasting process and reduce errors associated with human judgment (Chen, Jiang, Wei, 2022) ^[11]. Demand forecasting is a critical aspect of marketing planning and decision-making, as it enables organizations to allocate resources effectively, manage inventory levels and plan production schedules. By incorporating AI and ML into marketing forecasting processes, businesses can gain a competitive advantage and increase profitability.

AI neural networks can used to forecast demand, including time series forecasting, predictive modeling, and cluster analysis. Time-series forecasting involves analyzing historical demand data, which can then used to forecast future demand. Predictive modeling involves using algorithms to predict demand based on a range of variables, such as market trends, weather and consumer behavior. Cluster analysis involves grouping customers into segments based on their purchasing behavior, which can then be used to forecast demand for specific products or services (Wu, Zhang, Wang, 2023) ^[43]. For example in the field of service companies such as hotel business AI predictive analytics forecast demand and optimize staffing levels. By analyzing historical sales data, weather patterns, and other factors, the algorithm can predict the number of customers that will visit each hotel and the services they are likely to purchase. This allows business to ensure that each hotel has the right number of employees and the right services to meet customer demand.

Optimize advertising campaigns

Artificial intelligence provide marketers new tools and applications to improve efficiency and effectiveness of advertising campaigns (Chung, Yen, Cheng, 2021) ^[14]. Analyzing large amounts of data from various sources, such as social media, search engines, and website analytics, machine learning algorithms and neural networks can identify consumer behavior. This gives the opportunity to advertisers to create more accurate predictions about what types of ads will be most effective for different target audiences (Gupta, Bhardwaj, 2023) ^[20]. Machine learning can also optimize advertising campaigns focus on targeting audiences more accurately (Zhang, Xu, 2023) ^[43] thanks to deep analysis of data on consumer demographics, interests and behavior. Marketers create more precise audience segments that means ads can be targeted to people who are most likely to be interested for product categories, leading to higher click-through rates and conversion rates and increase return on investment up to 28% (AdRoll, 2020) ^[2]. Advertising targeting involves delivering advertisements to specific audiences on the basis of criteria such as location, interests and behavior and as a consequence this results to better advertisement relevance and higher engagement rates to an average increase of 59% in consumer engagement (Adverty, 2021) ^[3].

Search engine optimization

Search engine optimization (SEO) is the process of optimizing a website or eshop visibility on search engines by improving ranking in search engine results pages (Makrydakis, Skopeteas, 2022) ^[32]. Traditional SEO techniques often fall short in delivering the desired results. Artificial intelligence have emerged as promising approaches for improving SEO outcomes and empower

marketers to better understand search algorithms and develop effective SEO strategies (Khan, Ghani, 2023) ^[24].

Artificial intelligence interpret large volumes of data for online user behavior and engagement which can optimize websites in search engine rankings. Also can optimize content for search engines, and machine learning algorithms can identify relevant keywords and topics that are likely to drive traffic to a website and then to create friendly search engine content (Saleem, 2022) ^[37]. Artificial intelligence and machine learning contribute to SEO with creation of personalized search experiences, tailor search results to user's needs and as a result improve the relevance and accuracy of search results (Choi, 2020) ^[12].

SEO track natural language processing (NLP) because support search engines to understand the context of web pages and match them to user queries. Google's BERT algorithm uses natural language processing to better understand the meaning behind user queries and provide more accurate search results (Hjortland, Greenberg, 2021) ^[21]. Websites that incorporate natural language processing techniques in their content can improve their search rankings utilizing historical data, predictive analytics that can spot trends and forecast future results. Marketers can anticipate user search intent and optimize content in order to raise website search ranking. Additionally, machine learning algorithm automate SEO tasks, such as keyword research and content creation and as a result marketers save time to occupy with SEO strategies (Yu, 2023) ^[46]. However is important to underline that these technologies are not a substitute for optimized content and website design.

Image recognition

Ability of digital devices to identify and categorize objects within digital images or videos is called image recognition process. Marketing use image recognition to categorize customer photos and videos on social media and other platforms, to understand customer preferences and identify influencers. Especially in retail businesses as a cosmetic business, image recognition identify influencers who are using it's products and share content on social media. Artificial intelligence algorithm recognize products in photos and videos and identify the influencers who are using them. This allows marketing to work with the most relevant influencers and create targeted promotion campaigns.

Optimize social media

Increasing number of social media users and the enormous amount of data generated, companies turning towards artificial intelligence and machine learning to optimize their social media marketing strategies. Social media generate a vast amount of data, including demographics, interests, behavior and engagement activity. Algorithms process data more accurately and segment followers in target groups. Afterwards marketers can target specific groups with more relevant content, increasing engagement and conversion (Lefebvre, Rocha, 2022) ^[28].

Moreover with conversational marketing becoming more prevalent, chatbots can be integrated with social media to create more personalized experience for potential customers (Wang, Hu, Li, 2023) ^[43]. Predictive analytics can also support marketers to forecast social media performance, allowing them to adjust their strategies accordingly. Companies that use social media analysis have 40% increase in customer satisfaction (Hootsuite, 2023) ^[22].

Conversion rate optimization

Conversion rate optimization (CRO) is an essential aspect of digital marketing. The process of CRO involves optimizing the elements of a website, advertisements and campaigns to improve the possibility visitors to take desired actions, such as making a purchase or submitting a lead form. Artificial intelligence can optimize various elements of websites, layout, design, and content, to improve conversion rates. AI-powered tools provide the unique enhanced ability to find out behaviors from mouse movements and clicks and identify areas of a website that are causing friction and negatively impacting the user experience. Machine learning algorithms make recommendations such as wording of call-to-action buttons to increase click-through rates.

Machine learning can also personalize website content and messaging to improve CRO. An e-shop that sells shoes can use artificial intelligence to personalize the homepage content based on each user location and weather conditions, highlighting shoes that are suitable for the current climate. A/B testing is one more common practice in CRO, where two different versions of a website or advertisement campaign are tested to determine which performs better. Artificial intelligence results of A/B tests and make recommendations how to improve conversion rates. Machine learning algorithms predict which elements of a website or promotion campaign are most likely to improve CRO based on historical data (Ferreira, Veríssimo, 2021) ^[15]. Moreover AI using chatbots and virtual assistants provide users with tailor product recommendations, answer frequently asked questions and guide potential customers through a buying process. Marketers that use marketing automation see a 14.5% increase in sales productivity and a 12.2% reduction in marketing overhead (Hubspot, 2021) ^[23].

Return on investment and cost saving

Artificial intelligence and machine learning provide marketers with valuable insights to optimize return on investment (ROI) and cost savings firstly by using personalize marketing campaigns and tailored marketing messages and offers, which can lead to increased ROI. Predictive analytics, lead marketers to better decisions, leading to increased ROI and cost savings (Oracle, 2023) ^[35]. According to PwC, marketers that use predictive analytics have an average 32% increase in profitability (PwC, 2022) ^[36]. Machine learning algorithms understand and respond to customer inquiries in real-time and in 2023, 25% of customer service operations will use virtual customer assistants or chatbots, leading to a 30% reduction in customer service costs (Gartner, 2020) ^[18]. Automated advertising use machine learning algorithms to analyze customer data and create personalized ads having as a result a 10% increase in conversion rates and a 25% reduction in advertising costs (Forrester, 2021) ^[17].

Lead scoring

Artificial intelligence techniques predict which leads are most likely to convert into customers. Marketers using such algorithms thanks to the fact that can assign a lead score to each potential customer and marketers that use predictive lead scoring see a 30% increase in sales (Marketo, 2022) ^[33].

Dynamic pricing

According to study of McKinsey, companies that use dynamic pricing see a 2-5% increase in revenue and a 5-10% increase in profits (McKinsey, 2023) ^[34]. Dynamic pricing involves using data and algorithms to adjust prices in real-time based on market conditions. Marketers based on dynamic pricing adjust prices to maximize conversion rates and return on investment. Also these techniques are popular in optimizing pricing strategies by offering a more efficient and data-driven approach to pricing decisions. Traditional pricing models typically rely on human analysis of data, which can be time-consuming and prone to errors. Marketers use artificial intelligence algorithms to analyze consumer behavior, market trends, and competitor pricing strategies to determine the optimal price for their products or services. For instance, in the hospitality industry, machine learning algorithms optimize hotel room pricing based on historical occupancy rates, online search, events, and seasonal trends (Liu, Li, Zhou, Li, 2021) ^[30]. One of the key benefits of using artificial intelligence for pricing optimization is the ability to quickly process large amounts of data, analyze data from various sources, including sales history, web traffic, and social media activity, to identify pricing patterns and trends (Sun, Chai, Zhang, Wang, 2022) ^[39]. Moreover, can identify changes in consumer behavior and market trends in real-time, allowing companies to adjust their pricing strategies quickly.

Data analysis accuracy

Artificial neural networks in marketing can often provide more accurate insights and predictions than human - marketers. This is because artificial intelligence algorithms can process large volumes of data much faster than humans. Algorithms analyze vast amounts of customer data to identify customer behavior and preferences that would be impossible for a human to detect. By analyzing data from multiple sources, such as social media, website interactions, and purchase history, algorithms can provide more accurate insights for customer behavior and preferences.

The use of these technologies in marketing data analysis is expected to continue growing in the coming years and global AI in marketing market is projected to grow at a compound annual growth rate of 29.7% between 2021 and 2028 (Grand View Research, 2021) ^[19]. This growth is driven by the increasing adoption of artificial intelligence in various industries, including retail, healthcare and automotive. Is important for companies to stay up to date on the latest developments and best practices in order to fully realize the benefits of these technologies (Beane, Riesenmy, 2019) ^[7].

Stochastic approach review

While artificial neural networks, artificial intelligence and machine learning are becoming the cutting edge of marketing in many ways, there are several challenges that marketers should take into account.

These technologies require large amounts of high-quality data in order to operate effectively. If data are incomplete, outdated, or inaccurate, it can lead to flawed results and negatively impact on marketing decisions and campaigns (Moliner, Mezcuca, 2018) ^[6]. Algorithms can sometimes have inherent biases that reflect the data they were trained on. This can lead to unintended consequences, such as discriminatory targeting or inaccurate predictions.

Additionally, effective and efficient application of these technologies with technical complexity requires necessary skills. Implementing artificial intelligence and machine learning in marketing requires special technical skills, including expertise in data science, website coding, machine learning, and programming and this could be a challenge for marketing and businesses without in-house technical resources (Forbes, 2021) ^[16].

One more challenge is that integrating new technologies with existing marketing systems such as Google Ads, Analytics, metrics, email management systems, content management systems, CRM and ERP can be complex and time-consuming, requiring significant technical expertise and very expensive as well, particularly for smaller businesses that may not have the budget to invest in these technologies.

There are also data privacy concerns that should be considered from marketers. These technologies require vast amounts of data to train and learn from. Marketers and businesses should ensure that they have the proper consent from customers and visitors to collect and use their personal data. They should also have security measures to protect these data from unauthorized access (Lehr, 2021) ^[29]. Is important to be transparent with customers about how their data is being used and should clearly communicate their data collection and usage policies to customers, including how their data is being processed and who is being shared with.

Also, algorithms are only as unbiased as the data they are trained on and any marketer has to ensure that data is diverse and free from bias (Lucherini, Liberini, 2020) ^[31]. They should also periodically test their algorithms for bias and make adjustments as necessary. Moreover marketing departments desire customers to trust company how to use their data with ethically and responsibly way (Koetsier, 2021) ^[26]. So should be transparent about how they are using customer data and should only use it for the intended purposes.

Despite the potential benefits of pricing optimization, some challenges need to be addressed. One of the main concerns is the lack of transparency in algorithms, making it difficult to understand how they arrive at pricing recommendations. As a result, marketers need to ensure that pricing models are fair, unbiased and comply with regulations. Additionally, marketing departments need to invest in the necessary technology and expertise to implement and maintain artificial intelligence pricing models successfully in the long term (Khan, Butt, Jadoon, 2023) ^[24].

Conclusion

In conclusion, the implementation of artificial neural networks, artificial intelligence and machine learning in marketing is no longer a luxury but a necessity for marketers and businesses seeking to remain competitive. The benefits for marketing are numerous, including increased efficiency, improved customer experience, reduce costs, higher return on investment and enable marketers to extract valuable insights from vast amounts of data and tailor their strategies to meet the needs of individual customers. Marketers can also automate tasks, personalize messaging and optimize advertising campaigns, allowing them to stay ahead of developments and achieve marketing objectives. However, the implementation of these technologies also poses several challenges, including the need for data quality, skilled personnel, ethical considerations, and transparency. As artificial intelligence

continues to evolve, marketers must carefully navigate these challenges to reap the full benefits of technologies while also ensuring that they use them responsibly and ethically.

Article type: literature review

References

- Adolphs S, Stocchi L. Artificial intelligence and digital marketing: Towards a human-centered approach. *Journal of Business Research*,2021:135:362-371.
- AdRoll. How AI is Transforming Ad Targeting. Retrieved from, 2020. <https://www.adroll.com/blog/marketing/how-ai-is-transforming-ad-targeting>
- Adverity. How to Optimize Ad Campaigns with Machine Learning. Retrieved from, 2021. <https://www.adverity.com/blog/how-to-optimize-ad-campaigns-with-machine-learning/>
- Aksu A, Ozcelik Y, Sahin A. Artificial intelligence in marketing: Current applications and future directions. *Journal of Business Research*,2021:130:411-422.
- Althoff T, Dann S, Hanelt A, Hoppe U. Artificial intelligence and marketing: Theoretical overview and future research directions. *Journal of Business Research*,2019:98:365-374.
- Arroyo Moliner L, Ruiz Mezcua B. Artificial Intelligence and Digital Marketing: Opportunities and Challenges. *Spanish Journal of Marketing - ESIC*,2018:22(1):23-36.
- Beane R, Riesenmy K. Artificial intelligence, marketing, and consumer welfare. *Journal of Public Policy & Marketing*,2019:38(2):209-222.
- Cameron B, Korn S, Srinivasan S. Personalization in E-Commerce: A McKinsey Global Survey. McKinsey & Company, 2019.
- Chaffey D, Ellis Chadwick F. *Digital Marketing: Strategy, Implementation and Practice*. Pearson, 2019.
- Chen J, Li J, Liu Y. How artificial intelligence is changing e-commerce. *Journal of Business Research*,2020:109:1-10.
- Chen X, Jiang Y, Wei Y. Demand forecasting with artificial intelligence and machine learning: A systematic review. *Technological Forecasting and Social Change*,2022:175:121132. doi: 10.1016/j.techfore.2022.121132
- Choi Y, Choi J. A systematic review of artificial intelligence and machine learning for search engine optimization. *Journal of Computer Information Systems*,2020:60(2):134-142.
- Christopher Manning. *Artificial Intelligence Definitions*, Stanford University, Human-Centered Artificial Intelligence, 2020. <https://hai.stanford.edu/sites/default/files/2020-09/AI-Definitions-HAI.pdf>
- Chung N, Yen CH, Cheng MJ. Artificial intelligence and online advertising effectiveness. *Journal of Business Research*,2021:123:672-680.
- Ferreira J, Veríssimo J. Machine Learning for Website Conversion Rate Optimization. In *Trends and Innovations in Marketing Analytics*. Springer, 2021, 171-183.
- Forbes. The biggest challenges of implementing AI in marketing, 2021. <https://www.forbes.com/sites/forbescommunicationscouncil/2021/03/08/the-biggest-challenges-of-implementing-ai-in-marketing/?sh=7a69e734638c>
- Forrester. The Total Economic Impact™ Of IBM Watson Advertising Accelerator. Retrieved from, 2021. <https://www.ibm.com/downloads/cas/04ZJWW8Z>
- Gartner. Gartner Top Strategic Technology Trends for 2020. Retrieved from, 2020. <https://www.gartner.com/smarterwithgartner/gartner-top-strategic-technology-trends-for-2020/>
- Grand View Research. AI in Marketing Market Size, Share & Trends Analysis Report By Application (Customer Segmentation & Targeting, Customer Relationship Management), By End Use, By Region, And Segment Forecasts, 2021-2028. <https://www.grandviewresearch.com/industry-analysis/ai-in-marketing-market>
- Gupta P, Bhardwaj A. The Impact of Artificial Intelligence on Advertising: A Review. *Journal of Marketing Intelligence and Insight*,2023:1(1):1-18.
- Hjortland K, Greenberg A. Exploring the impact of AI and machine learning on SEO. *International Journal of Human-Computer Interaction*,2021:37(5):459-471.
- Hootsuite. Social Media Analytics: The Ultimate Guide. Retrieved from, 2023. <https://www.hootsuite.com/resources/social-media-analytics-guide>
- Hubspot. Marketing Automation: Definition & Guide. Retrieved from, 2021. <https://www.hubspot.com/marketing-automation>
- Khan MA, Butt AR, Khan W, Jadoon I. Artificial Intelligence-Based Pricing Models: An Empirical Study of Success Factors. *IEEE Access*,2023:11:2075-2088.
- Khan S, Ghani S. The role of artificial intelligence and machine learning in SEO: A systematic literature review. *Journal of Business Research*,2023:144:91-100.
- Koetsier J. The Ethics of AI Ethics in Marketing. *Forbes*, 2021.
- Kotler P, Armstrong G, Cunningham P. *Principles of Marketing*. Pearson, 2019.
- Lefebvre D, Rocha Á. Machine learning for social media marketing: A systematic literature review. *Journal of Interactive Marketing*,2022:65:1-16. doi: 10.1016/j.intmar.2022.03.004
- Lehr A. How to Balance AI and Privacy in Marketing. *Adweek*, 2021.
- Liu Y, Li M, Zhou Z, Li M. Pricing optimization for hotels with machine learning. *International Journal of Hospitality Management*,2021:94:102860.
- Lucherini E, Liberini F. Machine Learning and Data Privacy: An Overview. *Data Science Journal*,2020:19(1):38.
- Makrydakis NS, Skopeteas I. Analyzing E-shop onsite optimization factors in the context of E-commerce search engine optimization. *International Journal of Research in Marketing Management and Sales*,2022:4(2):40-47. DOI: 10.33545/26633329.2022.v4.i2a.111
- Marketo. Predictive Lead Scoring. Retrieved from, 2022. <https://www.marketo.com/marketing-automation/predictive-lead-scoring/>
- McKinsey. AI and Analytics in Marketing and Sales. Retrieved from, 2023. <https://www.mckinsey.com/business->

- functions/marketing-and-sales/our-insights/ai-and-analytics-in-marketing-and-sales
35. Oracle. Using AI to Optimize Marketing ROI. Retrieved from, 2023. <https://www.oracle.com/marketingcloud/resources/using-ai-to-optimize-marketing-roi/>
 36. PwC. Predictive Analytics. Retrieved from, 2022. <https://www.pwc.com/us/en/services/consulting/analytics/predictive-analytics.html>
 37. Saleem T. How to use AI in SEO to improve your search rankings. Search Engine Watch. Retrieved from, 2022. <https://www.searchenginewatch.com/2022/02/23/how-to-use-ai-in-seo-to-improve-your-search-rankings/>
 38. Sripalawat J, Thongmak M. Artificial intelligence and marketing: A review. *Journal of Asian Finance, Economics, and Business*,2020:7(8):215-223.
 39. Sun Y, Chai J, Zhang Y, Wang J. The Role of Artificial Intelligence in Pricing Optimization: A Systematic Review and Future Research Agenda. *Journal of Business Research*,2022:146:534-545.
 40. Wang Y, Hu Y, Li X. Chatbots for social media marketing: A review and research agenda. *International Journal of Information Management*,2023:63:102372. doi: 10.1016/j.ijinfomgt.2022.102372
 41. Wang Y, Lu Y, Wang X. A Hybrid Recommendation Algorithm for Personalized Landing Page. *International Journal of Distributed Sensor Networks*,2020:16(1): 155014771990073. doi:10.1177/1550147719900732
 42. Wang. Data Marketing Optimization Method Combining Deep Neural Network and Evolutionary Algorithm. *Wireless Communications and Mobile Computing*, 2022.
 43. Wu C, Zhang Y, Wang L. A clustering-based demand forecasting method using machine learning. *Applied Soft Computing*,2023:111:107198. doi: 10.1016/j.asoc.2022.107198
 44. Wu M, Li M, Li W, Li X. A Personalized Recommendation Algorithm for E-commerce Based on Improved RFM Model. *Journal of Computational and Theoretical Nanoscience*,2019:16(5):2405-2412.
 45. Yang X, Wang H, Shi C, Zhang Y. An adaptive deep reinforcement learning method for personalized recommendation. *IEEE Transactions on Neural Networks and Learning Systems*, 2021.
 46. Yu R. The future of SEO: How AI and machine learning will change search. Search Engine Land. Retrieved from, 2023. <https://searchengineland.com/the-future-of-seo-how-ai-and-machine-learning-will-change-search-327864>
 47. Zhang X, Xu X, Xu L. Personalized Advertising Campaign Optimization Based on Machine Learning. *Journal of Computer Science and Technology*,2023:38(2):391-402.
 48. Zhou G, Mou N, Fan Y, Pi X, Yang Z. Deep interest network for click-through rate prediction. *IEEE Transactions on Knowledge and Data Engineering*,2020:32(4):689-702.