

# Application of artificial intelligence in digital marketing

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## Abstract

Identification of the main directions of using artificial intelligence to optimize the marketing strategies of companies in the digital environment is important in the conditions of intensifying competition on the Internet. Artificial intelligence is considered as a tool for qualitative transformations in the use of digital marketing tools based on various information generated in the global network. The methodological basis of the study is a comprehensive analysis of scientific approaches to the practice of implementing artificial intelligence in the field of digital marketing, the formation of an information base for modeling, and the identification of optimal machine learning algorithms to ensure the competitiveness of brands on the Internet. A scheme of the main sources of information, which must be used by the company for the implementation of artificial intelligence algorithms in the process of increasing the effectiveness of digital marketing tools use, has been developed. Digital marketing tools are presented, which are used to establish communications with the target audience in the long term and ensure an economically feasible level of conversion. The main stages of companies' interaction with the audience on the Internet using modern machine learning algorithms are presented. The main directions of using artificial intelligence in digital marketing have been characterized, which enable the company to achieve a high level of loyalty among users based on personalized interaction models.

## Keywords

artificial intelligence, big data, content, digital marketing, machine learning, optimization, target audience

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## 1. Introduction

Digitization processes force companies to pay significant attention to interaction with users on the Internet. The role of digital communications is gradually increasing, as the result of demographic processes is the replacement of older generations by representatives of more innovatively oriented consumers. Generation Y has certain characteristics of conservative behavior, but they are prone to relatively active use of innovative technologies in everyday life. Along with this, representatives of the Z and Alpha generations belong to the digitized generation, as they were born during the period of intensive development of the Internet and the active introduction of various gadgets to the market [1].

Digitization leads to the transformation of the behavior of consumer groups and the growth of their dependence on innovative technologies. A huge number of modern users spend a significant part of their time on the Internet every day for work, study, leisure, etc. Digital technologies significantly simplify the performance of various tasks and the search for relevant information. Accordingly, modern generations choose more innovative models of behavior and consumption, which leads to the transformation of various types of economic activity. Companies to ensure a sufficient level of competitiveness in the markets of operation on an ongoing basis integrate advanced approaches and technologies into their activities [2, 3].

The process of interaction with users involves the development and implementation of marketing strategies that allow companies to promote products on the market and ensure an economically justified level of profitability. By using effective digital marketing tools, companies get the opportunity to identify their target audience and establish close, long-term relationships with users. The development of technology leads to the evolution of digital marketing and the emergence of more effective tools that help increase the conversion rate. Social communications migrated from the offline to the online environment, acquiring specific characteristics of interaction between users and companies. The orientation of a significant number of modern users to communication in the digital environment stimulates the development of various social networks, which are characterized by certain differences in the construction of communications and the demonstration of thematic content. There are leaders in the social media market, along with this, innovation and a high level of competition stimulate the launch of new products. In 2023, the social network and microblogging service Twitter started rebranding to X, which involves not only changing the brand name but also bringing the existing services and functionality of this network in line with the realities of the modern market. In 2021, Facebook was rebranded as Meta, due to the need to create a virtual reality universe that would function as a social media for digital user interaction [4].

The functioning of companies in a digital environment and the use of modern marketing tools enable companies to accumulate large volumes of various information. It is advisable to use specialized web analytics services for data collection. Along with this, the search for relevant information can be carried out thanks to the use of various methods that have gained significant distribution in the field of Data science. Effective methods of collecting big data in real time include site parsing, which allows for generating relevant information on legal grounds. The information obtained from various sources acts as a valuable resource for finding directions for optimizing the company's marketing strategy in the digital environment and achieving economically feasible results in specific time intervals. Automated real-time data collection

allows companies to quickly identify existing risks and make relevant effective decisions, which is impossible to achieve when using traditional statistical methods of information collection [5].

The development of the market of cloud services has led to the appearance on the market of specialized companies that allow based on powerful servers to accumulate and process large volumes of various information [6]. The presented technology has led to the active development and introduction of various machine learning algorithms used to identify hidden relationships in accumulated data. Artificial intelligence, based on machine learning algorithms and characterized by the ability to learn by the changing influence of internal and external environmental factors, is very popular in the modern world [7, 8, 9].

The purpose of this work is to study the peculiarities of the accumulation of big data and its processing thanks to artificial intelligence to increase the efficiency of digital marketing tools used. The paper considers the main algorithms of machine learning, which are implemented within the framework of artificial intelligence. The integration of artificial intelligence into digital marketing tools will allow to increase in the level of personalized models accuracy of interaction with customers and will contribute to increasing the level of the target audience loyalty.

## **2. Related works**

The functioning of modern companies in the digital environment and the presence of significant competition requires the search for innovative approaches that will allow them to achieve an economically justified level of conversion due to the loyalty of the target audience. Thanks to the use of modern mathematical algorithms by scientifically based methodological approaches for processing heterogeneous information, it is possible to optimize the use of resources available in the company. The development of server technologies has made it possible to implement effective machine learning algorithms that allow the processing of big data and quickly provide results for adjusting marketing strategies. A comprehensive analysis of research shows that there is a significant interest among scientists in identifying new directions for the use of artificial intelligence in the field of digital marketing.

A comprehensive analysis of the features of artificial intelligence use in the field of marketing in modern conditions was carried out by Dumitriu and Popescu [10]. The authors emphasize the key role of digitization processes as a locomotive for the development of the global economic environment, all types of economic activity, and individual companies. A four-stage model is presented, which allows for an increase in the visibility of the company's web resources in the digital environment based on artificial intelligence algorithms. The necessity of using machine learning in the process of improving the system of search engine optimization and identification in an automated mode of high-frequency keywords is proven. Updating the list of keywords makes it possible to ensure a high level of communication with the target audience by the preferences and behavior patterns of users in search engines.

The study of content's role in social media in building effective models of interaction with the target audience is presented by Shahbaznezhad et al. [11]. The selection of relevant content and the formation of an effective content plan make it possible to attract the attention of a large number of users and keep their attention for a long time. By driving interest in their social

media pages, companies have the opportunity to promote products and increase conversion rates. The article by Banerjee [12] is devoted to the features of content selection for social media thanks to artificial intelligence. The authors consider the issues of identifying fake content and building trust with subscribers based only on reliable information.

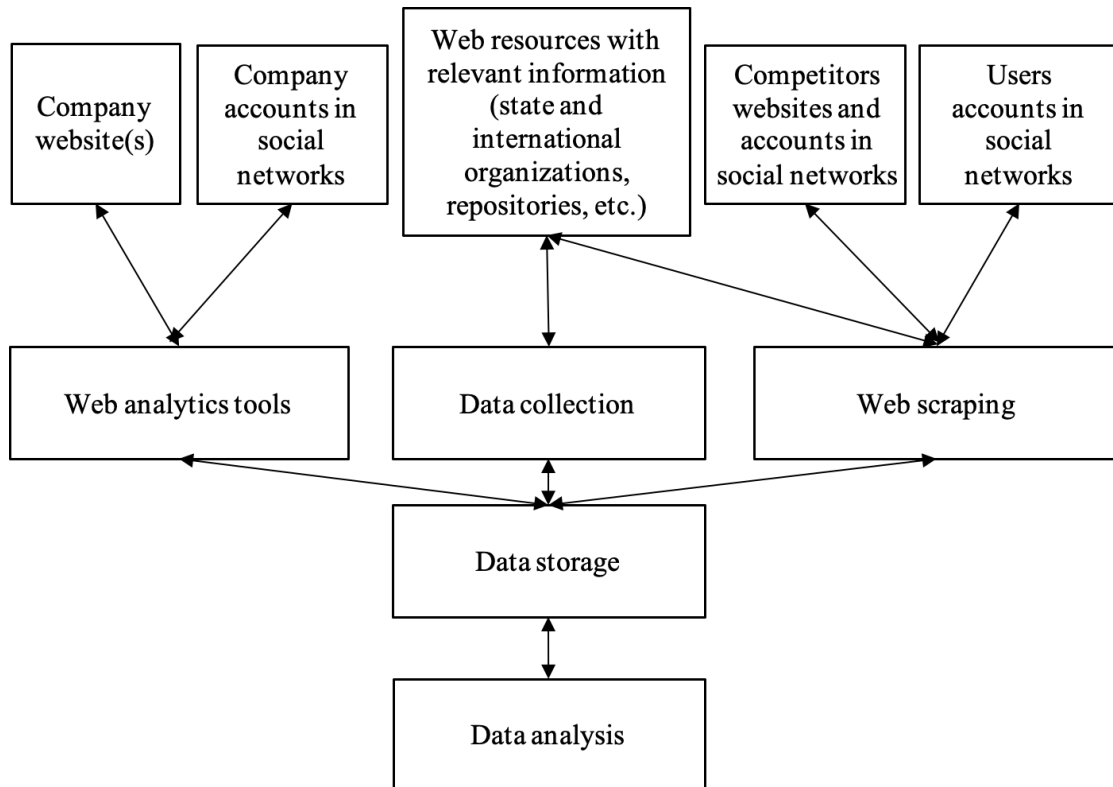
Balaji et al. [13] proved the importance of using social media for interaction with users, which is connected with the desire of modern generations to actively interact in the digital environment. The process of communications leads to the generation of big data on an ongoing basis, which makes it possible to accumulate valuable information for improving marketing strategies promptly respond to changes in user behavior, and satisfy identified needs by companies. The authors present the most effective machine learning algorithms, which are advisable to use for processing data generated in social media and developing effective management solutions based on the obtained results. Thanks to the use of artificial intelligence, companies get the opportunity to increase the number of followers on social media and generate high interest in their products.

### **3. Models and methods**

The implementation of various machine learning algorithms involves the use of large data that is accumulated by the company in the digital environment and can be used for modeling and optimization of existing processes. Figure 1 presents the main sources of information that a company can use when integrating artificial intelligence into digital marketing tools.

According to the presented approach, it is advisable to collect data in three main directions, which is explained by the peculiarities of the company's interaction with other Internet participants. To collect data from the company's own websites and social media, it is advisable to use specialized web analytics tools that connect to the company's resources and collect information about various activities on an ongoing basis. Web analytics is also used to evaluate the activity of advertising campaigns, but the traffic for advertising messages comes to the company's Internet resources [16]. Accordingly, thanks to web analytics, the effectiveness of the implementation of advertising measures is also evaluated on the company's resources. When setting up web analytics tools by science-based approaches, the system of metrics used for data collection is determined. The flexibility of this approach allows companies to update the indicators used at any time, adapting to changes in the influence of internal and external environmental factors. In some cases, it is possible to use web analytics tools to research competitors' web resources, but this approach allows companies to get only a limited set of data [17].

To collect socio-economic and demographic indicators on the Internet, including data on functioning markets, main competitors, and consumers, it is advisable to use publicly available sources. First of all, it is possible to use information from international organizations, national statistical organizations, and state administration bodies [18]. Along with this, it is possible to download data from the sites of non-governmental organizations and thematic communities. The presented information is mainly in an aggregated form and is intended for public use, as it is not a commercial secret. However, the application of these data makes it possible to adapt the marketing strategy in the offline and online environment to the existing realities, which helps to increase the competitiveness of the company in the long term.

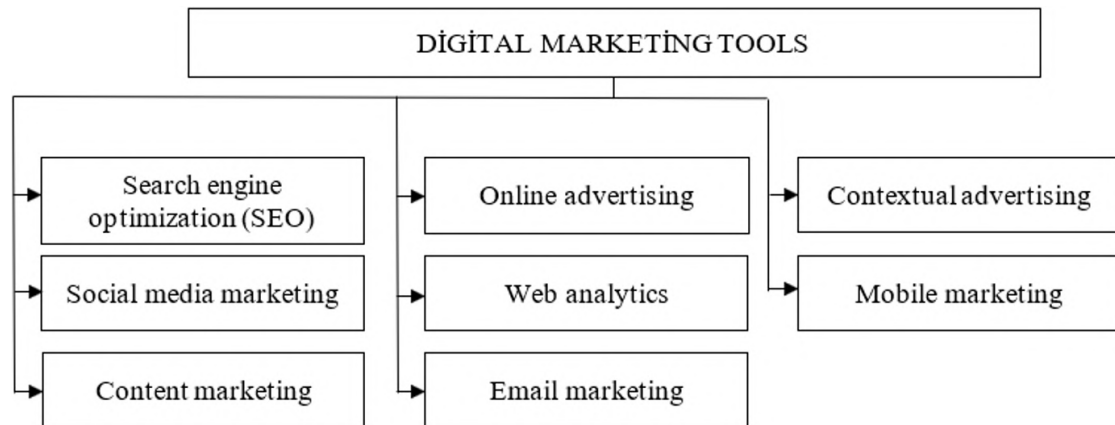


**Figure 1:** The main sources of information for artificial intelligence applications in digital marketing [14, 15].

In the conditions of digitalization, the scraping of web resources becomes an important tool for gathering information, as it allows companies to automate the search and accumulation of relevant data. In most cases, scrapers allow to quickly accumulate data that can be collected by company employees when browsing competitors' web resources, but people need much more time to search and collect valuable information [19]. For marketing purposes in the digital environment, scrapers may collect the following information about competitors and the market environment: product prices, textual content, related competitor information, product reviews and ratings, socio-demographic characteristics of customers and visitors, popular hashtags, available promotions and discounts, keywords, e-mails and other personal data of users, photos, videos, and other media content. In certain cases, unethical or illegal use of scraping is observed, which leads to obtaining personal data that is not publicly available [20].

There are a large number of tools that are characterized by certain differences and are used to interact with the target audience and establish communications in certain conditions. An effective marketing strategy in the digital environment involves the simultaneous use of several tools, the combination of which varies depending on the specifics of the influence of internal and external environmental factors. Comprehensive influence on the target audience thanks to the use of selected digital marketing tools allows to achieve the highest possible level of conversion and provides prerequisites for a loyal attitude of users to the brand over a long period. It should

be noted that the set of tools may change with the transformation of the company's marketing strategy in the digital environment. Figure 2 shows the main digital marketing tools.



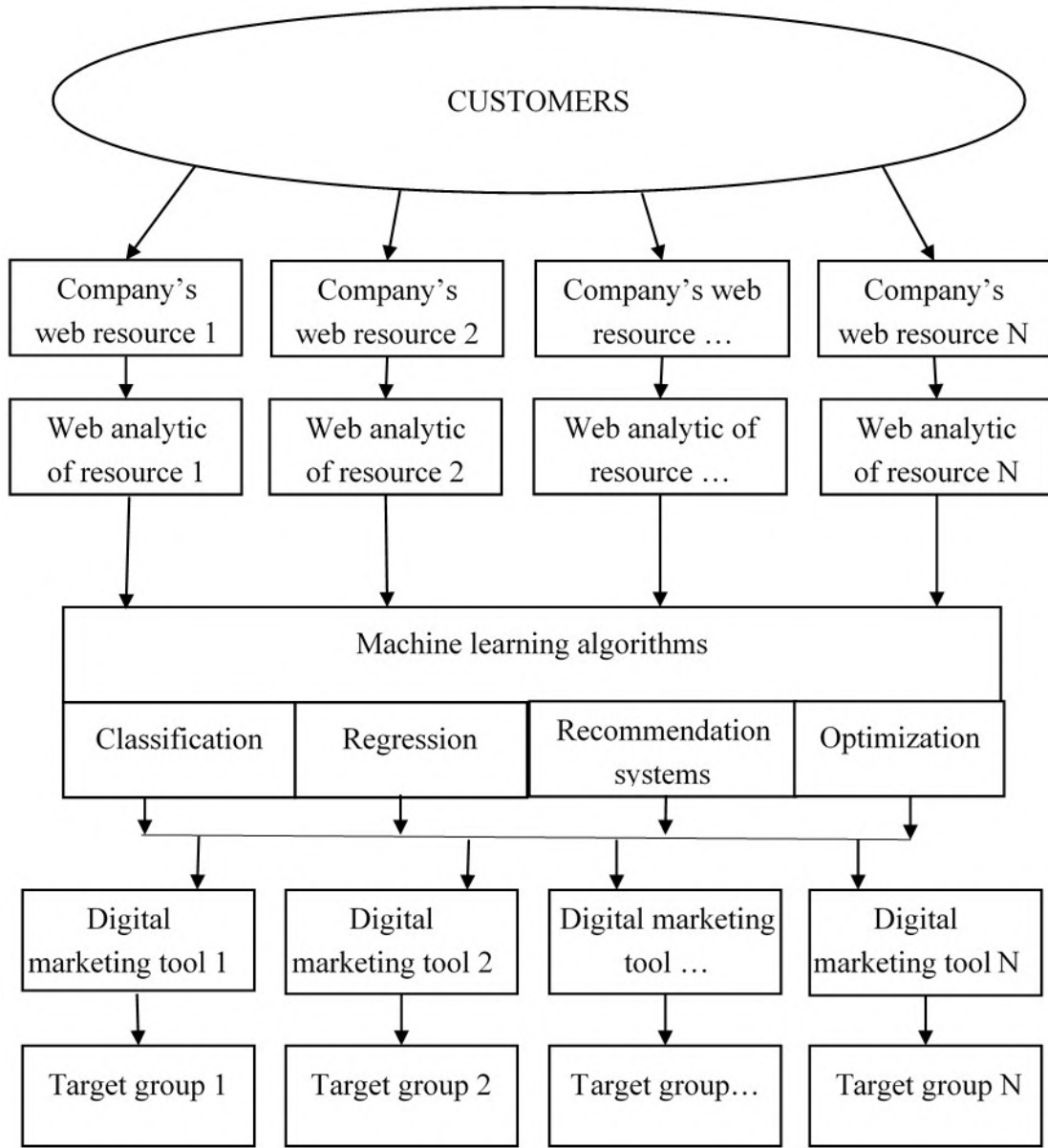
**Figure 2:** Digital marketing tools [21].

Information exchange during the implementation of digital marketing tools has a reciprocal nature, because thanks to the use of existing tools, the company gets the opportunity to collect complex data about related processes. Along with this, based on the received big data, a comprehensive analysis of the investigated phenomena is carried out, including the implementation of machine learning algorithms, and the obtained results are the basis for optimizing the use of digital marketing tools. Accumulating up-to-date information on an ongoing basis makes it possible to adjust the marketing strategy in the digital environment and achieve effective results in long-term periods [22].

Users act as an important source of information for the company, interacting with the brand through web resources (including social media, advertising messages, and other digital communication channels). The use of web analytics tools and other approaches to gathering information allows the company to accumulate large data that is used in the implementation of machine learning algorithms. Figure 3 shows companies' interaction with the audience on the Internet.

In the process of the company's interaction with users, various web resources are used, which is explained by the expediency of using a certain number of digital communication channels. Depending on the personalities of the target audience and the specifics of the company's activities and product characteristics, various interaction channels can be used. However, for communications with the target audience, in many cases, the company's official website, specialized landing pages with promotions or individual products, various social media, Internet advertising, etc. are used. The use of a certain number of digital marketing channels allows a brand to increase the reach of the target audience and ensure an economically justified level of conversion.

When users interact with specific web resources of the company, web analytics tools collect information from the selected metrics system. Accumulated information is transferred to servers and processed using machine learning algorithms. Following the scientific methodology, the data



**Figure 3:** Companies' interaction with the audience on the Internet [23, 24, 25].

processing system is adjusted, which includes the selection of the machine learning algorithm. Based on the data received from the user, a specific mathematical model is implemented and the optimal digital marketing tool is selected for further interaction with the relevant client.

Choosing a model of interaction with specific consumers based on complex calculations allows a company to achieve effective results with a high level of probability. Due to user identification, relevant content and optimal communication channels are selected. The interaction of the company with the user in the digital environment by the identified consumer behavior and

psychological characteristics is positively perceived by the client and leads to the formation of a loyal relationship with a specific brand over a long period [26, 27].

In modern conditions, machine learning algorithms are used as elements of artificial intelligence to obtain optimal results. When using artificial intelligence in digital marketing based on big data, there is a constant process of improving the realization of relevant machine learning algorithms and obtaining more accurate results. The increase in accuracy is achieved due to the self-learning of models by the action of internal and external environmental factors with a constant search for optimal solutions.

The use of artificial intelligence in the improvement of the company's marketing strategy in the digital environment allows companies to obtain a set of advantages based on the use of comprehensive information on the studied phenomena. The application of various thematic content significantly expands the possibilities for the application of machine learning algorithms. It should be noted that various groups of users communicate with the brand and other participants through the use of various behavioral models. The social networks are configured to use specific content in the communication process. The collection of heterogeneous information and its processing thanks to the use of machine learning algorithms allows for a more detailed investigation of existing processes and the identification of hidden relationships [28].

Given the importance of using artificial intelligence in digital marketing, it is necessary to describe the main areas of integration of this approach to optimize interaction between companies and the target audience. First of all, it is advisable to pay attention to the following areas of application:

1. *Analysis of big data.* Machine learning algorithms allow companies to process large amounts of information and identify hidden relationships between the company, its products, and the target audience. Thanks to different approaches, photo, audio, and video content are transformed into digital form and used for comprehensive analysis. Along with this, cause-and-effect models are implemented to determine the influencing factors on consumer behavior and forecasts are made regarding the trends in the development of phenomena related to the marketing digital environment. Artificial intelligence gradually adapts to existing circumstances and allows you to build dynamic regression and predictive models online [29].
2. *Personalization of content.* Integration into artificial intelligence of various classification models, including clustering by a large number of indicators, allows for dividing the population of users into specific groups. The identification of hidden relationships leads to the identification of groups of customers with special needs, which involves the implementation of specialized communication models to satisfy individual consumers. For each of the groups, specialized content is selected, which with a high level of probability will be suitable for the presented target audience. Thanks to the use of artificial intelligence, an individual consumer will not only receive relevant content but will also perceive interaction with the company as a personalized approach. Formation in the mind of the client of an individual approach on the part of the company leads to the construction of close long-term communications.
3. *Content generation.* Modern artificial intelligence allows companies not only to process a variety of data but also to generate a variety of content based on input information.



OpenAI company developed ChatGPT, which is very popular in today's world. Among the applied areas, it is advisable to pay attention to digital marketing, because using this service it is possible to generate relevant content by a text request. The generated text information can be used for posting on the company's web resources, writing scripts for advertisements, etc. Along with this, the received text should be used to communicate with the target audience on social media. Interaction with users and answering topical questions in social networks should be prompt, which involves the use of relevant textual content. ChatGPT allows companies to optimize the marketing of social networks and ensure a high level of interest and loyalty in the target audience. The market of artificial intelligence is actively developing, which led to the appearance on the market of Copilot (Microsoft), Gemini (Google), Bedrock (Amazon), Llama 2 (Meta), etc. Along with this, OpenAI has developed an innovative product based on Dall-E 3 and ChatGPT, which allows generating complex images based on text description. The resulting visual content contains several drawn objects that can interact with each other [30].

4. *Customer support.* The presented direction of using artificial intelligence in digital marketing combines to a certain extent the two previous directions, as it allows interaction with users, identifying their needs based on requests, and providing reliable answers with a high level of probability. The development of mathematical algorithms makes it possible to endow chatbots with certain human traits, which are positively perceived by the target audience. Thanks to the evolution and improvement of artificial intelligence, chatbots get the opportunity not only to classify a request and provide an answer from the existing library of sentences but also to independently generate answers. Along with text assistants, voice services are actively developing, and are gaining popularity among modern consumers [31].
5. *Sentiment analysis.* Companies need to receive objective information about the attitude of the target audience to brands and corresponding products. Along with the basic information provided by web analytics services about visiting resources on the Internet and revealing interest in products through views and purchases, it is also advisable to conduct a detailed analysis of user reactions in comments. When evaluating the relationship of the target audience, it is possible to use likes and other buttons with reactions, along with this, users like to leave various comments. Thanks to sentiment analysis based on artificial intelligence, it is possible to identify user points of view based on comments, emoticons, and other graphic content. Identifying the relationship of the target audience to certain activities of the brand in social media allows c to adjust the company's strategy in the digital environment to achieve an optimal result [32].

#### **4. Further research**

The obtained results show the prospects of using artificial intelligence to optimize the use of digital marketing tools by companies. The development of server technologies and programming languages makes it possible to identify new, more productive machine learning algorithms. In parallel, specialized programming languages are developing, first of all, it is necessary to pay attention to Python and libraries for implementing the corresponding mathematical algorithms.

These directions are important for the development of science as a whole and the development of innovative methodological approaches in the field of digital marketing. Deepening the study of certain machine learning algorithms according to the needs of specific digital marketing tools will significantly increase the effectiveness of interaction with the target audience, focusing on the implementation of a personalized approach and the generation of unique content according to the requests of an individual client. Studying issues related to the creation of a personal experience through artificial intelligence in the process of interaction between the brand and the client will contribute to the growth of ties between the participants of the communication process over a long period.

## 5. Conclusions

AI-based digital marketing tools are becoming a necessary component of companies' strategies on the Internet, as they allow to ensure the necessary level of competitiveness. Thanks to the application of big data generated continuously in the digital environment, machine learning algorithms are self-learning and constantly find more effective ways to improve marketing strategies. The use of artificial intelligence is constantly expanding due to the discovery of new directions and opportunities in digital marketing. The introduction of innovative approaches will be carried out in the future continuously due to significant competition between companies and the formation of a stable demand for advanced information products that allow identifying the target audience and ensuring a high level of loyalty. Along with this, in the process of implementing marketing strategies in the digital environment, there is a constant need for relevant content to form close communications with consumers.

## References

- [1] S. Azimi, Y. Andonova, C. Schewe, Closer together or further apart? Values of hero generations Y and Z during crisis, *Young Consumers* 23 (2022) 179–196. doi:10.1108/YC-03-2021-1300.
- [2] Y. Li, J. Dai, L. Cui, The impact of digital technologies on economic and environmental performance in the context of industry 4.0: A moderated mediation model, *International Journal of Production Economics* 229 (2020) 107777. doi:10.1016/j.ijpe.2020.107777.
- [3] O. B. Morgulets, T. M. Derkach, Information and communication technologies managing the quality of educational activities of a university, *Information Technologies and Learning Tools* 71 (2019) 295–304. doi:10.33407/itlt.v71i3.2831.
- [4] P. Fernandez, Facebook, Meta, the metaverse and libraries, *Library Hi Tech News* 39 (2022) 1–5. doi:10.1108/LHTN-03-2022-0037.
- [5] M. Y. S. Bak, J. B. Plavnick, A. D. Dueñas, M. T. Brodhead, S. M. Avendaño, A. J. Wawrzonek, E. Weber, S. N. Dodson, N. Oteto, The use of automated data collection in applied behavior analytic research: A systematic review, *Behavior Analysis: Research and Practice* 21 (2021) 376–405. URL: <https://www.researchgate.net/publication/355152581>. doi:10.1037/bar0000228.
- [6] V. Oleksiuk, O. Oleksiuk, The practice of developing the academic cloud using the Proxmox

- VE platform, *Educational Technology Quarterly* 2021 (2021) 605–616. doi:10.55056/etq.36.
- [7] L. O. Fadieieva, Enhancing adaptive learning with Moodle’s machine learning, *Educational Dimension* 5 (2021) 1–7. doi:10.31812/ed.625.
- [8] I. A. Pilkevych, D. L. Fedorchuk, M. P. Romanchuk, O. M. Naumchak, Approach to the fake news detection using the graph neural networks, *Journal of Edge Computing* 2 (2023) 24–36. doi:10.55056/jec.592.
- [9] O. V. Klochko, V. M. Fedorets, V. I. Klochko, Empirical comparison of clustering and classification methods for detecting internet addiction, *CTE Workshop Proceedings* 11 (2024) 273–302. doi:10.55056/cte.664.
- [10] D. Dumitriu, M. A.-M. Popescu, Artificial Intelligence Solutions for Digital Marketing, *Procedia Manufacturing* 46 (2020) 630–636. doi:10.1016/j.promfg.2020.03.090.
- [11] H. Shahbaznezhad, R. Dolan, M. Rashidirad, The Role of Social Media Content Format and Platform in Users’ Engagement Behavior, *Journal of Interactive Marketing* 53 (2021) 47–65. doi:10.1016/j.intmar.2020.05.001.
- [12] T. J. Banerjee, A System of Content Analysis of Social Media using AI and NLP, *International Journal of Research in Engineering, Science and Management* 4 (2021) 132–136. URL: <https://journal.ijresm.com/index.php/ijresm/article/view/844>.
- [13] T. K. Balaji, C. S. R. Annavarapu, A. Bablani, Machine learning algorithms for social media analysis: A survey, *Computer Science Review* 40 (2021) 100395. doi:10.1016/j.cosrev.2021.100395.
- [14] U. Sivarajah, Z. Irani, S. Gupta, K. Mahroof, Role of big data and social media analytics for business to business sustainability: A participatory web context, *Industrial Marketing Management* 86 (2020) 163–179. doi:10.1016/j.indmarman.2019.04.005.
- [15] G. Barbera, L. Araujo, S. Fernandes, The Value of Web Data Scraping: An Application to TripAdvisor, *Big Data and Cognitive Computing* 7 (2023) 121. doi:10.3390/bdcc7030121.
- [16] J. Maintz, F. Zaumseil, Tracking content marketing performance using web analytics: tools, metrics, and data privacy implications, *International Journal of Internet Marketing and Advertising* 13 (2019) 170–182. URL: <https://ideas.repec.org/a/ids/ijimad/v13y2019i2p170-182.html>.
- [17] C. Mahfoudh, B. Othmane, The Role of Web Analytics in Online Marketing, in: S. Sedkaoui, M. Khelfaoui, R. Benaichouba, K. Mohammed Belkebir (Eds.), *International Conference on Managing Business Through Web Analytics*, Springer International Publishing, Cham, 2022, pp. 411–423. doi:10.1007/978-3-031-06971-0\_29.
- [18] O. Plaksiuk, O. Yakushev, O. Yakusheva, L. Moisieienko, Analysis and Assessment of Human Capital in the Regions of Slovakia, *Economics. Ecology. Socium* 7 (2023) 13–25. doi:10.31520/2616-7107/2023.7.3-2.
- [19] M. A. Khder, Web Scraping or Web Crawling: State of Art, Techniques, Approaches and Application, *International Journal of Advances in Soft Computing & Its Applications* 13 (2021) 144–168. doi:10.15849/IJASCA.211128.11.
- [20] J. Boegershausen, H. Datta, A. Borah, A. T. Stephen, Fields of Gold: Scraping Web Data for Marketing Insights, *Journal of Marketing* 86 (2022) 1–20. doi:10.1177/00222429221100750.
- [21] M. K. Peter, M. Dalla Vecchia, The Digital Marketing Toolkit: A Literature Review for the

- Identification of Digital Marketing Channels and Platforms, in: R. Dornberger (Ed.), *New Trends in Business Information Systems and Technology: Digital Innovation and Digital Business Transformation*, Springer International Publishing, Cham, 2021, pp. 251–265. doi:10.1007/978-3-030-48332-6\_17.
- [22] C. Katsikeas, L. Leonidou, A. Zeriti, Revisiting international marketing strategy in a digital era: Opportunities, challenges, and research directions, *International Marketing Review* 37 (2020) 405–424. doi:10.1108/IMR-02-2019-0080.
- [23] M. Broersma, Audience Engagement, in: *The International Encyclopedia of Journalism Studies*, John Wiley & Sons, Ltd, 2019, pp. 1–6. doi:10.1002/9781118841570.iejs0060.
- [24] S. N. Samsudeen, M. Kaldeen, Impact of digital marketing on purchase intention, *International Journal of Advanced Science and Technology* 29 (2020) 1113–1120. URL: <https://www.researchgate.net/publication/341670094>.
- [25] R. Motoryn, K. Prykhodko, B. Ślusarczyk, P. Żegleń, Evaluation of regional features of electronic commerce in Europe, *Statistical Journal of the IAOS* 38 (2022) 1339–1347. URL: <https://content.iospress.com/articles/statistical-journal-of-the-iaos/sji220938>.
- [26] A. Aluri, B. S. Price, N. H. McIntyre, Using Machine Learning To Cocreate Value Through Dynamic Customer Engagement In A Brand Loyalty Program, *Journal of Hospitality & Tourism Research* 43 (2019) 78–100. doi:10.1177/1096348017753.
- [27] I. Ponomarenko, I. Panasiuk, V. Pavlenko, O. Panasiuk, O. Kalmykov, Use of Neural Networks for Pattern Recognition in E-Commerce, *CEUR Workshop Proceedings* 3179 (2021) 407–415. URL: [https://ceur-ws.org/Vol-3179/Short\\_15.pdf](https://ceur-ws.org/Vol-3179/Short_15.pdf).
- [28] T. Ribeiro, J. L. Reis, Artificial Intelligence Applied to Digital Marketing, in: Á. Rocha, H. Adeli, L. P. Reis, S. Costanzo, I. Orovic, F. Moreira (Eds.), *Trends and Innovations in Information Systems and Technologies*, Springer International Publishing, Cham, 2020, pp. 158–169. doi:10.1007/978-3-030-45691-7\_15.
- [29] M. S. Mazorchuk, T. S. Vakulenko, A. O. Bychko, O. H. Kuzminska, O. V. Prokhorov, Cloud technologies and learning analytics: web application for PISA results analysis and visualization, *CTE Workshop Proceedings* 8 (2021) 484–494. doi:10.55056/cte.302.
- [30] S. C. Gamoura, H. İ. Koruca, K. B. Urgancı, Exploring the Transition from “Contextual AI” to “Generative AI” in Management: Cases of ChatGPT and DALL-E 2, in: Z. Şen, Ö. Uygun, C. Erden (Eds.), *Advances in Intelligent Manufacturing and Service System Informatics*, Springer Nature Singapore, Singapore, 2024, pp. 368–381. doi:10.1007/978-981-99-6062-0\_34.
- [31] M. A. Camilleri, C. Troise, Live support by chatbots with artificial intelligence: A future research agenda, *Service Business* 17 (2023) 61–80. doi:10.1007/s11628-022-00513-9.
- [32] N. V. Babu, E. G. M. Kanaga, Sentiment Analysis in Social Media Data for Depression Detection Using Artificial Intelligence: A Review, *SN Computer Science* 3 (2021) 74. doi:10.1007/s42979-021-00958-1.