Artificial Intelligence Generated Virtual Influencers in Online Social Media⋆

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Abstract

At this stage of human development, there is an increase in the availability of digital technologies, which is associated with the intensive evolution of information technologies. Technological transformations affect the development of most types of economic activity and stimulate companies to actively introduce innovations to secure high positions in a highly competitive environment. The development of server technologies leads to the growth of databases, and the speed of processing large arrays of information, including the implementation of complex mathematical models. Among the effective areas of working with big data, it is advisable to pay attention to machine learning algorithms, which allow the identification of hidden relationships and contribute to the optimization of management decisions in all areas of human activity. Artificial intelligence refers to one of the branches of computer science and involves the use of various approaches, including machine learning. This approach is gaining popularity in practice due to the ability to process large volumes of heterogeneous information and optimize results due to learning algorithms by the action of external factors. The possibility of self-learning and the flexibility of artificial intelligence approaches allow for expanding the scope of the practical application of its use and finding more effective approaches for implementing business processes. Among the important areas of modern companies' activity, it is also advisable to pay attention to digital marketing, since brands need to constantly interact with the target audience on the Internet. Taking into account the characteristics of modern users, companies primarily implement marketing campaigns in social media. Thanks to the application of artificial intelligence in social media, it is possible to establish long-term communications by the principles of personalization.

Keywords

artificial intelligence, big data, content, machine learning, marketing, social media, target audience, virtual influencers

1. Introduction

Digital marketing is an important area of activity for companies because, in the conditions of globalization and the active introduction of innovations, there is a need for the formation of brand recognition and constant interaction with the target audience. Thanks to the use of modern digital marketing tools, it is possible to ensure a high level of targeting, which will contribute to the optimization of interaction with the target audience. The process of targeting in the digital environment involves the selection of characteristics that correspond to the characteristics of the company's potential customers. Incorrect selection of the target audience leads to losses, and can also negatively affect the image of the company in the functioning market. The social orientation of the vast majority of modern users involves taking into account relevant factors when establishing communications between companies and the target audience. It is thanks to the focus on interaction between users with common interests that various social media have gained significant popularity. As part of the implementation of communication strategies, companies

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actively use social media marketing as an effective tool for interaction with prospective and potential customers. Depending on the characteristics of users, companies should use both various social media and specific communication models. At this stage, the main users of social media are representatives of generations Z and Alpha. Along with this, a high level of activity is demonstrated by generation Y, which has spent part of its life outside the digitalization era but is characterized by a high level of interest in innovative technologies [1, 2].

The interaction of companies with the target audience in social media involves the use of various approaches, however, any communication is not possible without the use of relevant content. The formation of user interest by placing thematic content (text messages, audio, photo, and video materials) involves the creation of a scientifically based content plan and its implementation on an ongoing basis. Thanks to interesting content, the company manages to ensure a high level of attendance on the brand page in the relevant social media and the loyalty of a significant number of users on an ongoing basis.

Modern users form a significant demand for interaction with opinion leaders in various fields of activity. Thanks to specific experience and specialized knowledge, certain personalities achieve a high level of popularity in social media and enjoy authority among followers. The cooperation of companies with influencers allows them to ensure the promotion of brand products to the target audience thanks to the authority of the relevant opinion leader and his interaction with a large number of followers. Influencers can advertise the company's products, or implement covert promotion of products by conveying their own experience of using a certain product or service.

The gradual growth of the role of representatives of generations Z and Alpha leads to the formation of new models of interaction between companies and opinion leaders. In the conditions of digitalization, the number of virtual influencers is gradually increasing, which have several advantages compared to real opinion leaders. Thanks to the introduction of artificial intelligence, virtual influencers gain the ability to independently choose a model of behavior from the identified audience. AI-generated virtual influencers quickly adapt to the needs of users and can interact simultaneously with a large number of followers 24 hours per day. Thanks to the interaction of artificial intelligence, in the process of communication with the target audience, it is possible not only to generate text messages but also to create unique audio, photo, and video content. The features of the behavior of the corresponding visitor and his text comments act as parameters for content generation. The presented approach allows companies to achieve personalized marketing communications in social media and ensures a high level of audience loyalty in the long term.

2. The Aim

Implementation of effective marketing strategies in the digital environment, including social media, requires companies to search for innovative technologies to identify specific user groups on an ongoing basis and develop effective communication strategies. The intensive development of artificial intelligence involves researching and determining the optimal directions for using the presented technology to achieve the maximum possible results when the company implements a marketing strategy in social media. A comprehensive analysis of scientific research and the practice of using machine learning algorithms by companies is expected. Along with this, a company in the process of introducing artificial intelligence into a social media marketing campaign must constantly test the presented technologies and choose optimal approaches from the point of view of ensuring consumer loyalty and achieving economic results [3].

The presented study is dedicated to the study of the features of using AI-generated virtual influencers in online social media to optimize the marketing strategies of companies and ensure an economically justified level of conversion [4, 5]. Artificial intelligence is seen as a tool to create a virtual thought leader based on generative algorithms, natural language processing, and other machine learning approaches. Thanks to the use of computer graphics, it is possible to achieve a high level of avatar images, the visualized images of which are formed by the needs of the target

audience. Modern advances in the field of information technologies allow the creation of digital influencers who cannot be distinguished from living people [6, 7].

It is appropriate to analyze the main directions of using virtual influencers in the digital environment and the benefits for companies from the integration of AI-generated opinion leaders into marketing strategies. It is also important to assess the prospects for the further development of technologies for the formation of virtual opinion leaders, which will improve their interaction with users in social media.

3. Models and Methods

Social media is used by companies to achieve various goals in the process of interaction with the target audience. The implementation of marketing strategies on the Internet is focused on finding the target audience, attracting them, and forming long-term communications with the relevant brand. Web analytics allows companies to accumulate large amounts of information and analyze the effectiveness of marketing activities implemented in social media on an ongoing basis. If necessary, it is possible to quickly adjust the marketing strategy on the Internet to optimize the obtained results. Also, the digital environment is seen as an important channel for e-commerce, which allows the selling of goods and services to different groups of users. Modern consumers in many cases find the necessary products on social media and receive comprehensive information about consumer characteristics thanks to posted relevant content [8–10].

When implementing marketing strategies in the digital environment, many companies use influencers who are popular in certain areas and have a large number of followers. The effectiveness of cooperation with opinion leaders is confirmed by the active growth of the relevant services market during 2016–2023 (see Fig. 1). Along with this, there is a decrease in the demand for real influencers, because thanks to digital avatars, companies get the opportunity to spend less money and increase the level of interaction with the target audience. Due to hyper-realism, AI-generated virtual influencers are perceived by users as real characters, which positively affects the level of trust in the specified opinion leaders. Avatars can simultaneously interact with a large number of users in different regions of the world and do not need time to rest, which allows companies to provide communications 24 hours a day [11, 12].
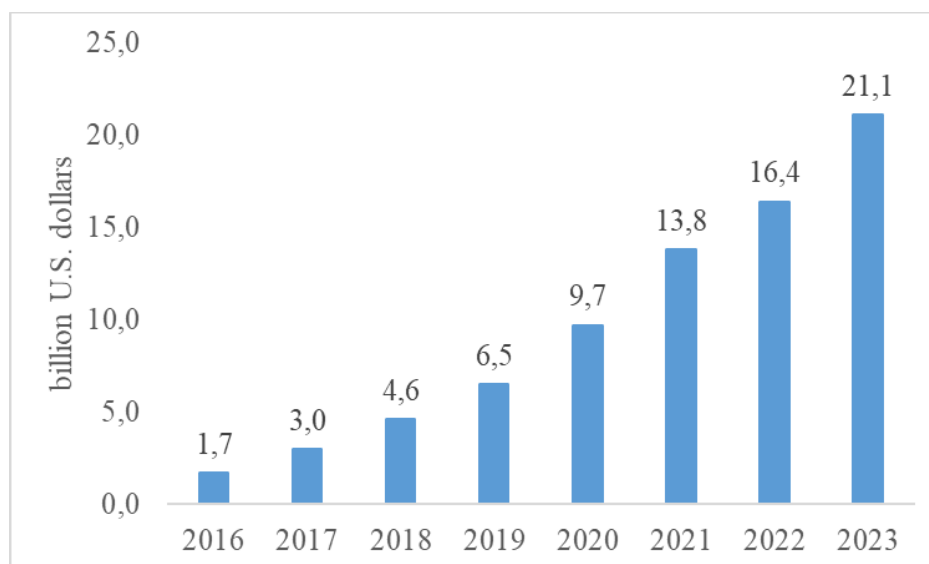

Figure 1: Size of global influencer marketing market from 2016 to 2023 [13]

The development of technologies and their introduction into marketing strategies in the digital environment leads to a change in interaction with users. The behavior of avatars with integrated artificial intelligence is also evolving due to the expansion of functionality and the implementation

of more complex behavioral models. Among the main directions of using AI-generated virtual influencers in social networks, it is advisable to pay attention to the following:

1. Authentic persona creation. The use of artificial intelligence allows companies to generate unique virtual influencers whose appearance and behavior patterns meet the expectations of the target audience. The process of self-learning based on large arrays of information allows to quickly transform various avatar characteristics according to the prevailing wishes of subscribers [14].

2. Audience engagement through generated content. Chatbots with integrated artificial intelligence allow to generate text responses to user queries. Digital innovations allow the use of algorithms to generate messages, images, and video content during the interaction of a virtual influencer with users in social media. Communication with individual users acts as a source of information for the generation of unique content, which is created taking into account the context and other characteristics. Due to adaptation to the behavior model of a specific subscriber, a virtual influencer is perceived as an interesting interlocutor, which leads to trusting long-term relationships. Avatars with integrated artificial intelligence are characterized by high efficiency and allow to significantly increase the level of engagement of the target audience of the respective brand [15].

3. Versatility and high productivity. By training artificial intelligence models on large databases with heterogeneous information, avatars get the opportunity to discuss various questions with users and provide competent answers. Virtual opinion leaders with integrated artificial intelligence can be used to promote different brands and a wide range of products. By copying the behavior patterns of real opinion leaders, virtual avatars can promote products or demonstrate positive experiences of their personal use by the principles of hidden advertising messages. The number of simultaneous contacts of the AI-generated virtual influencer with users depends on the power of the servers and the machine learning algorithms. Simultaneous interaction with a large number of subscribers can take place in the tete-a-tete mode, which in the vast majority of cases does not affect the quality of communications [16].

4. Determination of new directions of interaction with the target audience. A characteristic feature of artificial intelligence is the processing of large arrays of disparate information and the identification of hidden relationships. The use of various machine learning algorithms to optimize the work of virtual influencers allows for identifying the transformation of users and distinguishing characteristic features in the process of interaction with the target audience. In the conditions of digitalization, there is a dynamic change in the behavior of modern users, especially representatives of generations Z and Alpha, who use specific models of behavior and are characterized by a progressive system of values. Communication of AI-generated virtual influencers with younger generations and adjustment to appropriate interaction models contribute to increasing the effectiveness of marketing strategies of companies in the digital environment and obtaining loyal consumers in the long term [17, 18].

When using AI-generated virtual influencers to interact with the target audience, in many cases machine learning algorithms are used to optimize the communication process and achieve a high level of customer loyalty. An important role in achieving effective results must be played by both information collection systems and the development of suitable mathematical algorithms for processing large data and creating relevant thematic content [19]. Fig. 2 shows the scheme of using machine learning algorithms to ensure the functioning of the AI-generated virtual influencer [20–22].

At the first stage, it is advisable to use Generative Adversarial Networks, which allow to generation of images for virtual influencers. Thanks to the availability of a large number of architectures and settings, the system can quickly learn based on large data and create high-quality images that reproduce human features. In the process of interaction with the target audience in social media, algorithms can adjust the appearance of the corresponding avatar [23].

Reinforcement Learning allows to identify the personalities of the different groups users behavior, and the obtained results will be used in the process of interaction of the avatar with users. The presented approach makes it possible to adapt the behavior of a digital influencer to

each of the users, which significantly increases the level of loyalty of the audience as a whole. Copying the behavior of each user is perceived by customers as communication with a like-minded person.
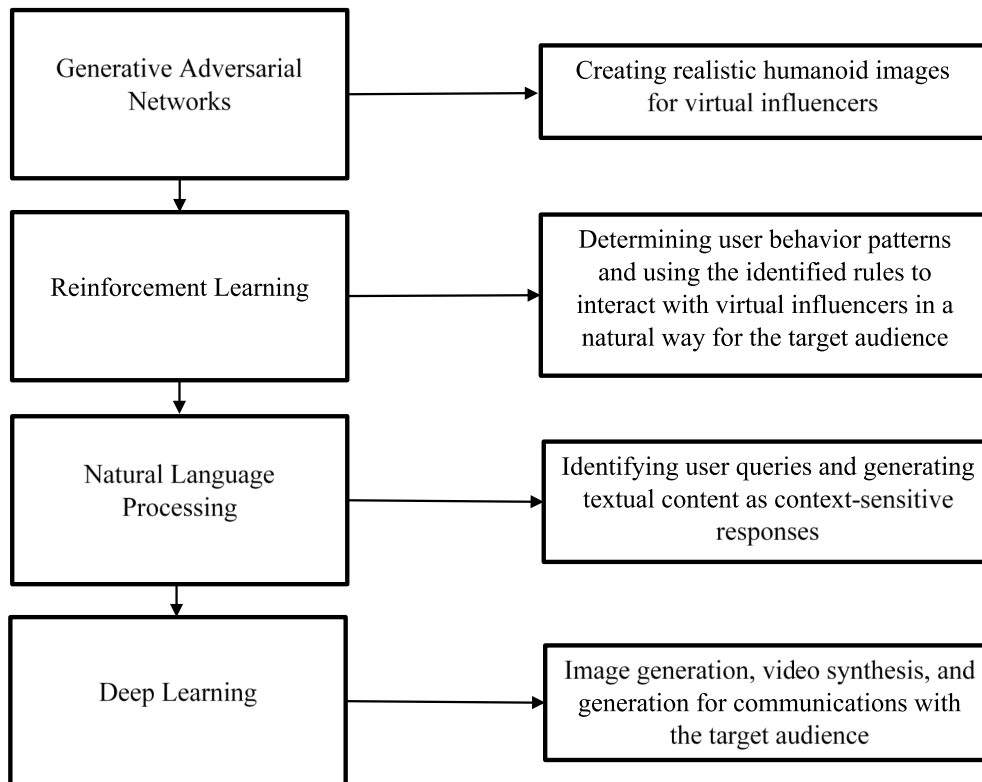


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┌─────────────────────┐         ┌──────────────────────────┐
│ Generative Adversarial │  ───▶  │ Creating realistic humanoid images │
│ Networks            │         │ for virtual influencers    │
└─────────────────────┘         └──────────────────────────┘
          │
          ▼
┌─────────────────────┐         ┌──────────────────────────┐
│                     │         │ Determining user behavior patterns │
│ Reinforcement Learning │  ───▶  │ and using the identified rules to │
│                     │         │ interact with virtual influencers in a │
│                     │         │ natural way for the target audience │
└─────────────────────┘         └──────────────────────────┘
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┌─────────────────────┐         ┌──────────────────────────┐
│ Natural Language    │         │ Identifying user queries and generating │
│ Processing          │  ───▶  │ textual content as context-sensitive │
│                     │         │ responses                  │
└─────────────────────┘         └──────────────────────────┘
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          ▼
┌─────────────────────┐         ┌──────────────────────────┐
│                     │         │ Image generation, video synthesis, and │
│ Deep Learning       │  ───▶  │ generation for communications with │
│                     │         │ the target audience        │
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Figure 2: The scheme of using machine learning algorithms to ensure the functioning of the AI-generated virtual influencer [24–26]

Natural Language Processing allows to generation of text messages in the process of providing communications with the target audience. Natural language recognition involves solving a system of questions about determining the needs of different users and identifying the content load since in many cases messages contain a certain context. Modern models with a high level of probability allow to correctly identify user messages and generate a competent response or comment [27].

Deep Learning contains a large number of algorithms, among which an important direction is the generation of visualized content with subsequent placement in social media. The interaction of digital avatars with the target audience thanks to unique, relevant photos and videos contributes to a significant increase in the number of subscribers [28].

4. Further Research

The obtained results show the expediency of further research on the creation of digital avatars with integrated artificial intelligence. The active development of information technologies and specialized infrastructure leads to an increase in the effectiveness of machine learning algorithms. Alongside this, there has been an evolution in the digital marketing tools used by companies to engage with their target audience online. In the outlined conditions, there is a need to study the multiplier effect from the combination of innovative approaches in the field of artificial intelligence and advanced digital marketing tools, which will allow companies to reach a qualitatively new level of interaction with users and compliance with personalized principles. The creation of meta-universes will lead to the transformation of social communication through the introduction of virtual reality technologies. Social media in the form of metauniverses will require the use of new

AI-generated virtual influencers, which will be positively perceived by the target audience and will allow brands to promote their products in an innovative environment [29].

Conclusions

The use of AI-generated virtual influencers in marketing campaigns of brands in social networks is gaining significant popularity in today's environment. Depending on the strategic vision and financial capabilities, various companies either have their digital avatars or use the services of third-party companies. The cost of services from digital avatars correlates with the number of their subscribers. Digital opinion leaders are most popular among Generation Z and Alpha, who use relevant social media. So, on Instagram at the beginning of 2024, the most popular AI-generated virtual influencers are Lu do Magalu (6.7M followers), Lil Miquela (2.6M followers), and K/DA (520K followers). Further digitization and virtualization of daily life require companies to develop new directions of interaction with the target audience, which stimulates the development of virtual influencers. Thanks to innovative approaches, avatars will have the opportunity to interact more effectively with users, increasingly acquiring human features and more precisely adapting to the needs of an individual social media visitor.

Declaration on Generative AI

While preparing this work, the authors used the AI programs Grammarly Pro to correct text grammar and Strike Plagiarism to search for possible plagiarism. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the publication's content.

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