

Advertising in the Era of Artificial Intelligence

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Abstract: This article explores the impact of artificial intelligence (AI) on the advertising industry, detailing its evolution from traditional to AI-driven methods. Advertising has historically been a crucial medium for promoting messages, with its impact magnified during public health crises. The integration of AI has revolutionized advertising by automating functions such as ad optimization, media buying, and personalized ad creation. AI's ability to analyze large data sets and predict consumer behavior has enhanced the efficiency and effectiveness of advertising campaigns, leading to higher returns on investment (ROI). Using a case study methodology, the article examines the social and demographic impacts of AI-driven advertising, particularly on youth and the elderly, and addresses the ethical implications and challenges associated with AI's pervasive use in advertising. Additionally, the case study of Being Patient, an online platform for Alzheimer's disease, illustrates the significant impact of well-crafted AI advertising on business success and community engagement. The article concludes with a call for further research to evaluate AI advertising's reception across different age groups and to develop strategies for its broader acceptance and integration into mainstream practices.

Keywords: Artificial Intelligence, Advertising, Consumer Behavior, Digital Media, Personalization

1. Introduction

Advertising refers to the promotion of a message to the public in an open and widespread manner and at a certain cost, through a certain form of media, that serves a specific need. Advertising campaigns can play a key role during a public health crisis or epidemic. Such campaigns can increase public awareness of the health crisis and convince people to take precautions to avoid health hazards. However, any misinformation spread through such campaigns can cause public panic, which can have adverse consequences [1]. The emergence and spread of advertising also represent the progress of the times. Advertising has become a part of our daily life and is everywhere in our lives. Advertising will spread more information that we don't know. However, the negative impact of advertising cannot be ignored. Advertising can cause public panic due to the spread of wrong information or lead to an imbalance in the information audience.

The use of artificial intelligence in advertising has increased significantly over the past few years. While artificial intelligence is not a new technology, its use in advertising is relatively new and is developing rapidly. Today, AI performs and automates various functions such as ad optimization, scheduling, media buying, automated ad creation, and personalization. With the explosion of new

technologies and digital media, advertising has evolved from traditional forms such as newspapers, billboards, radio, and television to a variety of new media and platforms. Advanced advertising media use AI to improve ad effectiveness and optimize ad delivery. AI is a set of disruptive technologies that allow machines to solve social problems, facilitate decision-making, and perform tasks associated with humans and their intelligence. Thus, many brands are deploying AI chatbots with Natural Language Understanding (NLU) and Machine Learning (ML) capabilities to understand consumer responses, assess consumer needs, enhance the interaction between the consumer and the AI, provide support to the consumer and deliver promotional content [2]. Improving return on advertising investment (ROI) is a major concern for advertisers, and AI advertising has the potential to play an important role in this regard [3]. By improving the targeting and personalization of ads, AI can make ads more effective and efficient, ultimately leading to higher ROI for advertisers [4].

2. Advertising Re-imaged: from Traditional to AI-driven

2.1. Digital Revolution

The development of communication technology has become the dominant communication force in social development. Digital marketing technology is a major challenge for research and practice worldwide. Digital media centered around digital technology has become a new carrier of advertising using digital media, inevitably changing the extension of advertising depth. With the emergence of digital advertising, it has also greatly driven more digital products to appear in the public eye. Some of these digital products are further improved through emerging technologies such as AI. Digital advertising can help digital products express their characteristics more clearly and better serve consumers. The main strategies of digital advertising are to attract consumers' interest and attention, expand consumer engagement, increase consumers' purchasing motivation, improve brand recall and consumer loyalty maintenance, and build selective subscription databases and viral marketing databases. AI has also recently become popular in digital advertising. By analyzing large data sets and identifying consumer behavior patterns, AI algorithms can accurately predict future trends and preferences. This enables information publishers to develop highly targeted advertising campaigns to arouse the audience's interest, thereby maximizing engagement and conversion rates. During COVID-19, people may pay more attention to advertisements that use emotional appeals. Therefore, it is necessary to study the role of emotions in advertising processing and the effectiveness of emotional appeals. It is also possible that artificial intelligence platforms can be tested in digital environments, which can be used to program a series of information based on consumer characteristics and behaviors [5]. It will also be of interest to investigate whether consumer attitudes towards privacy will change during the epidemic (perhaps requiring large-scale testing and/or vaccination) because concerns about data protection have increased before the epidemic, as reflected in the EU's General Data Protection Regulation and the California Consumer Privacy Act [6]. The changes and evolution of the nature of advertising in the digital age is also a key issue in advertising research. The characteristics of the new advertising audience in the digital age have brought new opportunities and challenges to the modern advertising industry.

The impact of the Internet on advertising has made internal marketing and advertising processes more effective and efficient by taking them online, thus cutting costs and saving time. Most business entities are increasingly adopting online advertising due to numerous benefits that derive from its essence. Internet technology has witnessed monumental growth across the world. Its popularity guarantees sustainable penetration into markets that are inaccessible through traditional media. One of the benefits of online advertising revolves around efficiency of information delivery [7]. Most people use the Internet to find information about current issues in a social context. Therefore, most business entities use the Internet for advertising as it guarantees exposure to potential buyers in the

market. The Internet is also strategic because it circumvents geographical barriers. In traditional advertising, there are numerous geographical barriers that prevent advertisers from achieving their goals in a timely manner. For example, they must identify suitable locations for erecting billboards. In contrast, online advertising provides a platform to facilitate advertising without such challenges [7].

2.2. Incorporating AI into Advertising

AI in the advertising industry can allocate advertising budgets across channels and audiences, automatically adjust advertising budgets to achieve KPIs, find new advertising audiences and conversion opportunities, build richer audience profiles, and gain in-depth understanding of competitors' advertising expenditures, creatives, and strategies. Create advertising copy, create visual advertising creative, provide individual consumers with hyper-personalized advertising messages and images and hyper-personalized ad targeting and predict advertising effectiveness.

AI uses natural language processing (NLP), image recognition (IR), speech recognition (SR), machine learning (ML), natural language generation (NLG), and image and speech generation to help advertisers achieve various advertising functions, including ad optimization, automatic ad generation, and personalization [8]. Computational and programmatic advertising uses AI to help formulate targeted promotions by facilitating automatic ad scheduling, delivery, and media planning and buying [9, 10]. The AI programmatic advertising market is expected to reach \$38.67 billion by 2028, with a compound annual growth rate of 29.71% from 2021 to 2028 [11]. AI advertising is growing rapidly, with huge industry potential and bright research prospects. The spread of new technologies through advertising will also solve many social problems [12].

However, the development of the advertising industry has not always been smooth sailing. Research indicates that during special periods such as the COVID-19 pandemic, the acceptance of advertising information varies across regions due to differences in scientific literacy. Some people will accept vaccines in special periods and think they are effective, while others will blindly reject them. In this context, AI plays a crucial role. AI can capture the emotions of different groups in special environments, helping people better understand advertising information. It can also deliver more targeted advertising during special periods, changing people's cognitive attitudes. And AI's targeted advertising delivery of accurate information can increase people's trust in the new era [13]. In special circumstances, advertising must effectively solve the social problems that affect people and make people trust the content of the advertisement. If the advertisement itself lacks people's trust, new technologies can support and change perceptions, enhancing the ad's persuasiveness and impact.

With AI, advertisements can be more accurately targeted, leveraging AI's data processing capabilities. This improves people's cognitive attitudes toward new information, making advertisements more effective and influential.

3. The Impact of Advertising on Various Groups and Entities in the AI Era

3.1. Social and Demographic Factors

3.1.1. Youth Participation

As digital natives, young people are more receptive to new technologies. The rise of AI advertising has further fueled their interest in and use of these technologies, making them more willing to try and accept new forms of advertising and consumption methods.

The core strength of AI advertising is its ability to personalize services. AI provides highly relevant product recommendations based on purchase history and browsing behavior by segmenting customer data, session information, shopping history, and third-party data. This process reinforces brand

impressions, filters preferences, and increases brand loyalty. Beyond responsiveness, AI can predict customer needs using historical data and browsing patterns, proactively offering solutions or information to boost customer loyalty. AI software also delivers quick answers to simple queries, freeing human agents to tackle complex issues. This capability to process large data sets quickly makes AI solutions crucial for effectively meeting consumer needs [14].

An example is Lancôme Pure Lipstick, which has utilized AI facial recognition and makeup trial technology on QQ Space, becoming the first brand to do so. Lancôme uses X-lab black technology and celebrity effect to recommend the color number that best suits their skin color to users, solving the two major pain points of users' difficulty in choosing offline color testing and hygienic issues of physical color testing, which immediately triggers interactive sharing. The advertisement relies on AI face recognition technology to accurately identify the user's skin color and eye color, and intelligently recommend the most matching color number; based on powerful machine learning capabilities, it restores the true coloring effect by analyzing the chemical composition and oil ratio of the lipstick, and implements it online click to try makeup to stimulate user experience and purchase interest. This AI facial recognition allows young consumers to try makeup, which will bring beneficial engagement to the brand and spread the brand culture. It also promotes the more diversified development and consumer acceptance of AI technology [15].

Thus, AI-driven advertising formats, such as interactive ads, virtual assistants, and chatbots, further enhance the interactivity between ads and users. Young people can engage with ads to receive instant feedback and personalized recommendations, which not only improves user experience but also increases engagement. Continuous personalized interactions and accurate recommendations from AI advertising effectively increase young people's loyalty to brands.

3.1.2. Inclusion for Elderly

Today, when the aging problem is prominent, AI can use advertising to vigorously publicize some noteworthy problems caused by aging in modern society, such as Alzheimer's disease. This symptom cannot be ignored. AI is an effective method for detecting attention deficit disorder as it can be used as a computer-aided decision support system method in medical procedures and plays a vital role in detecting changes in brain images to identify attention deficit disorder. The tool then uses AI and speech technology to analyze language and speech patterns, looking for signs of dementia, Alzheimer's disease, and other memory disorders. The disease is increasingly visible to the public, but the public may not be ready to deal with the symptoms. AI advertising can also help promote AI products that can help alleviate diseases and other problems in the elderly, provide medication reminders for the elderly, and help monitor their safety.

AI often plays an auxiliary role in advertisements, which can tell the elderly to use some products with clear instructions or provide options and functions, such as allowing users to adjust font size, color, and brightness, and providing multiple input and output modes (such as voice, touch, or gesture), allowing users to customize preferences and remember user history, which can make the user interface suitable for older adults.

3.2. Business Impact

The impact of advertising on businesses can be profound, as illustrated by the case of Being Patient, an online platform dedicated to serving individuals with Alzheimer's disease and their families. Being Patient is a trusted, editorially independent news, reporting and educational resource that aims to cut through the noise and clarify the complex issues of brain health and neurodegenerative diseases. Readers include patients, caregivers, people with a genetic predisposition to Alzheimer's and related dementias, healthcare providers, scientists, researchers, and pharmaceutical and biotech innovators.

When reporter Deborah Kan's mother was diagnosed with Alzheimer's in 2014, she realized there was no place to help her understand the research without bias. Soon after, she decided to leave her job as executive producer at The Wall Street Journal to reimagine brain health coverage. Three years later, she founded Being Patient as a platform for reliable news coverage of neurodegenerative diseases and brain health, as well as a community platform for all leading voices in the discussion about diseases like Alzheimer's from neurologists and researchers, to pharmaceutical and biotech innovators, to care experts, to patients and their loved ones to come together to share insights and advance the discussion about understanding, treating and living well with Alzheimer's [16]. This company has adeptly utilized advertising to not only promote its products aimed at relieving the symptoms of Alzheimer's but also to educate and engage the community about the disease. Through strategic use of social media advertising and advanced technological tools, Being Patient has successfully facilitated participation in online lectures and offline activities. Furthermore, by optimizing their website via Search Engine Optimization (SEO) techniques, they have enhanced the accessibility of valuable information, thereby providing more effective support to families affected by Alzheimer's.

Being Patient's approach to advertising has resulted in significant promotional success, elevating the brand's visibility and impact. Initially, the company faced challenges due to insufficient promotion of its philosophy and product offerings on its official website. However, by reorienting its advertising strategy to focus more on its core mission — to alleviate the conditions of Alzheimer's patients and improve their quality of life — the company managed to resonate deeply with its target audience. This shift underscores the importance of aligning advertising content with a company's fundamental objectives and values.

The effectiveness of Being Patient's advertising strategy is twofold. Firstly, it has significantly raised awareness about Alzheimer's disease, shedding light on the everyday challenges faced by patients and their caregivers. Secondly, the company's products, though not claiming to be ultimate cures, offer tangible benefits that help manage symptoms and enhance patient well-being. This honest and empathetic approach in advertising has cultivated trust and loyalty among consumers, demonstrating that effective advertising goes beyond mere promotion; it serves as a bridge connecting the company's mission with the needs and hopes of its customers. Thus, Being Patient's experience highlights the power of well-crafted advertising. It not only boosts business success but also plays a critical role in educating the public, fostering community engagement, and driving positive change in the healthcare landscape. Being Patient uses SEO technology to optimize page and web advertising content to help patients and their families understand the disease more intuitively and how to alleviate the disease's progression. Being Patient also uses AI technology to simulate the probability of disease occurrence and possible future changes in development direction, as well as simulate some treatment options. The efficiency of medical treatment has been improved to a great extent [17]. AI algorithms analyze medical imaging data, such as X-rays, MRIs, and CT scans, to assist medical professionals in making accurate and rapid diagnoses and developing targeted treatments to help patients solve their problems [17].

4. Ethical Implications and Challenges

4.1. Possible Challenges for AI Advertising

AI continues to revolutionize industries and reshape the way we live and work, the intersection of AI, privacy and cybersecurity has become a focus of technological innovation and regulatory scrutiny. While AI offers potential for efficiency and advancement, the growing reliance on intelligent systems raises serious concerns about data privacy, security, and potential cyber threats. AI is permeating every aspect of our daily lives, from smart home devices to self-driving cars and advanced healthcare

applications. As AI systems leverage large amounts of data to make informed decisions, protecting this data becomes critical to protect user privacy and maintain the integrity of the system. The core of this challenge lies in the data-driven nature of AI systems. This poses a privacy challenge as these datasets often contain personal information. Striking a balance between extracting valuable insights from data and protecting user privacy is a critical issue.

To address this challenge, several specific practices are being explored and implemented. Anonymity techniques, differential privacy, and federated learning are emerging as strategies to protect individual privacy while still allowing for meaningful AI analysis. Moreover, implementing strong cybersecurity measures is critical to mitigating risks associated with AI deployments. This includes securing data storage and transmission, implementing encryption technologies, and regularly updating AI systems to patch vulnerabilities. Cybersecurity best practices must be integrated into the entire AI development lifecycle, from data collection and model training to deployment and ongoing maintenance. In addition to legal regulations, ethical considerations are becoming increasingly important for the development and deployment of AI systems. Responsible AI practices involve transparency, fairness, accountability, and a commitment to avoiding bias. Ethical principles guide developers, organizations, and policymakers in creating AI solutions that are consistent with society's values and respect the rights of users.

As AI technology advances, the landscape of AI, privacy, and cybersecurity will continue to evolve. Innovations such as privacy-preserving AI technologies, decentralized AI models, and advanced cybersecurity measures will shape the future of this dynamic intersection. Collaboration between technology developers, regulators and the public will help address evolving challenges and opportunities.

To fully reap the benefits of AI while mitigating risks, a robust foundation of privacy and security must be established. Ongoing dialogue between technology experts, policymakers and the public are critical to shaping a future in which AI improves our lives while respecting individual privacy and protecting against cyber threats. Collaborative efforts in addressing these challenges are important in fostering an environment that is both secure and centered on privacy within the realm of AI.

4.2. Challenges for Consumers

AI-driven advertising innovation has increased significantly in recent years. Artificial intelligence is not limited to manual. Today, artificial intelligence has been applied to all major advertising functions, including ad generation, copywriting, image generation, ad auctions, ad placement, and optimization. However, consumer perceptions and attitudes towards these AI-delivered advertising features remain to be explored. Since AI has not yet been popularized among people in all regions, different groups may have different trust in AI. Many people may think that AI is too precise and will infringe on consumer privacy. These are all areas where AI needs to be improved. Future research should complement these advances by investigating how consumers perceive and respond to AI advertising innovations. The field is rapidly transforming with developments such as virtual universes and generative artificial intelligence. As these AI applications become smarter, more AI-driven advertising innovations will be identified, providing opportunities as well as challenges for industry and academia.

Since AI advertising has not yet been fully popularized, consumers still have certain fears and doubts about its advertising. For AI advertising at the forefront of technology, it will take some time for consumers to fully adapt, because consumers also belong to different age groups. Young consumers, having grown up in the digital age and being more accustomed to the internet, may exhibit greater receptivity towards artificial intelligence in advertising and could potentially act as early adopters, subsequently influencing their familial and peer circles. Conversely, older demographics may be more hesitant to embrace novel advertising formats, exhibiting a slower rate of acceptance.

To facilitate the widespread adoption of AI advertising, a concerted effort is warranted to disseminate knowledge and foster understanding through various channels, thereby assisting consumers in leveraging AI advertising optimally to meet their needs. A multipronged approach, tailored to the unique characteristics and preferences of different age groups, could prove valuable in mitigating apprehensions and cultivating trust in this emerging technology. Ultimately, as AI advertising matures and consumers become more familiarized with its applications and benefits, widespread acceptance and integration into mainstream advertising practices may ensue [18].

5. Conclusion

As technology and advertising continue to change, advertising has gone from traditional to a new paradigm that combines with technology to evolve with the times. This change also creates new challenges and opportunities, and the field of technology-driven or technology-enabled advertising research tends to be dominated by practitioner research driven by technical issues. Looking ahead, it is anticipated that AI in advertising will not only champion ethical and responsible advertising practices but also significantly contribute to societal well-being. There is an eager anticipation for a surge in inventive and insightful research endeavors that will not only enrich the theoretical foundations of advertising but also pragmatically guide advertising practices. Such developments promise to not only benefit society at large but also to bridge the gap between technology and humanity more closely than ever before.

As the average age is increasing in several developed nations, future research is required to evaluate the reception of AI-generated advertisements by the Silent Generation, baby boomers, and Gen X and how the adoption of these ads can be increased among them make AI ads trusted by more people.

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