



The Role of Artificial Intelligence in Personalizing Social Media Advertising: Benefits, Challenges, and Future Directions

Aisha Shaikh¹, Nosheen Fatima¹, Munaza Bibi (Ph.D)² & Atif Nazeer Awan¹

¹ Department of Business Administration, Bahria University Karachi Campus – Pakistan

² Business Studies Department, Bahria University Karachi Campus – Pakistan

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ABSTRACT

The analysis investigates how Artificial Intelligence operates through social media advertising to personalize marketing content while exploring beneficial aspects together with risks that appear today and the possible outcomes of the future. The social media platform has achieved a new level with AI technologies that have personalized ads to attract users for purchasing or engagement. The incorporation of an AI system creates essential problems because it affects consumer privacy exposes inherent algorithmic preferences and causes users to depend excessively on artificial solutions. The implementation of AI in developing countries lets businesses enhance advertising precision while managing costs effectively and encounters obstacles from privacy restrictions and minimal infrastructures and staffing problems. Research explores three main issues about AI ethics alongside data transparency requirements along with the essential combination of AI analytics and human creativity. Marketers need to address operational difficulties and control AI usage commitments to build an effective and inclusive digital marketing environment in which AI technology is developing.

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INTRODUCTION

Social media advertising has become a vital channel for businesses to source their clients through the growth of digital marketing (Peter & Dalla Vecchia, 2020). Artificial Intelligence (AI) integration in social media advertising has completely changed how businesses converse with the consumers (Huang & Rust, 2021). As AI gives great analysis of a huge amount of data and identifies patterns, marketers can make super targeted campaigns that resonate directly with an audience. This technological advantage of the social media advertising landscape is making it more efficient and more effective. Through AI, advertisers are able to increase

Author Biographies

Aisha Shaikh is a Lecturer at the Department of Business Administration, Bahria University Karachi Campus – Pakistan. She received her Master in Business Administration from Bahria University Karachi Campus – Pakistan.

Nosheen Fatima is a Lecturer at the Department of Business Administration, Bahria University Karachi Campus – Pakistan. She received her Master in Business Administration from Bahria University Karachi Campus – Pakistan.

Munaza Bibi (Ph.D) is an Assistant Professor at the Business Studies Department, Bahria University Karachi Campus – Pakistan. She obtained her Doctorate in Management Sciences from the Bahria University Karachi Campus – Pakistan.

Atif Nazeer Awan is a Lecturer at the Department of Business Administration, Bahria University Karachi Campus – Pakistan. He received his Master in Marketing/Supply Chain Management from Bahria University Karachi Campus – Pakistan.

*Corresponding author:

Aisha Shaikh | Department of Business Administration, Bahria University Karachi Campus – Pakistan
e-mail: aisharazzak25@gmail.com

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the experience of users by providing a personalized, pertinent content to capture the users' attention and engagement (Sadiku et al., 2021).

There is no other market world today that has more importance of AI than personalizing social media advertising. That makes AI's capability to personalize ads, drive engagement and increase ROI in regards to marketing a topic that is important today (Rodgers & Nguyen, 2022). By using AI in the development of hyper targeted advertising, businesses are now according to engagement rates as well as now conversion rates (Wijethilak et al., 2025). Through personalized ads users will be more likely to click and be satisfied with the customer experience. What's more, AI driven insights allow marketers to real-time optimize their strategies, eliminating the need for them to spend time looking for a new trend or campaign. Businesses to get the most out of their marketing efforts will be a game changer for businesses to deliver the right message to the right audience at the right time (Ologunbebi & Taiwo, 2024).

Moreover, when it comes to social media advertising it is not just about the improvement of marketing metrics, AI plays an important role in this process. On top of everything, it also takes part in improving the overall user experience on social media platforms. To make it more engaging and enjoyable, AI delivers the content in such a way that it is custom made to individual preferences or interests of the users. Consequently, a good relationship develops between consumers and brands and brands in turn are more likely to foster brand loyalty and long-term customer retention (Singh & Ahmed, 2024).

This paper is an exploratory attempt that aims at investigating the particular role of AI in the personalization of social media advertising through its extents, advantages, drawbacks and long-term significance. Unwrapping the greatest advantages of using AI in advertising reaches better targeting and higher efficiency will help businesses understand how this technology can serve in the attainment of marketing goals (Potla & Pottla, 2024). This paper seeks to summarize the advantages of how AI is changing social media advertising to both businesses and consumers in a holistic manner.

While it is also imperative to address the challenges of AI with social media advertising, it studies its effect on general people (Patil et al., 2021). There is much to consider when it comes to the issues of application of AI: privacy concerns, data security and algorithmic bias, for instance, to be used responsibly and ethically. In highlighting these challenges, this paper aims to present a balanced view of the use of AI in social media advertising and steps that can be taken to avert problems in the society. A thorough examination of AI-based social media personalization follows in the present paper together with analysis of both potential benefits and possible risks and future consequences.

Social media advertising has experienced substantial change through Artificial Intelligence since it introduced customizable advertisement methods which generate better user interaction and conversion results. The current dilemmas consisting of privacy items along with bias from algorithms continue to present substantial barriers. The integration of AI technology into social media advertising in developing nations entails multiple advantages together with several implementation obstacles. AI technology optimizes advertisement spending while boosting economic progress by making contact with markets which were previously unreachable. On the other hand, issues such as data privacy, lack of infrastructure, and potential job displacement pose significant threats. The article examines vital aspects which include proper AI ethical conduct as well as clear data transparency practices together with maintaining the right balance between AI-driven intellect and artistic creation. Marketers must confront emerging challenges during the advancement of AI technology to use this technology responsible for developing an effective digital marketing ecosystem that includes everyone.

AI in Social Media Advertising

The perceived difference between AI and other areas of computer science, as this name also implies, is the creation of systems capable of performing tasks typically requiring human intelligence. The tasks involve learning, reasoning, problem solving, perception, and understanding of language (Ford et al., 2023). With algorithms, brands use AI to process data and make decision or predictions that enable them to target certain same audiences with customized ads. In the context of social media marketing, AI is used to help marketers analyse colossal data, find out patterns, and deliver intended substance to clients.

Social media marketing is indeed AI driven. It allows you to automate following processes such as content creation, customer service, ad placement etc. Businesses can also use AI to learn insights about what their consumers' likes, likes and trends and develop more powerful marketing strategies based on

these into (Fan, 2023). These types of tools provide marketers with valuable feedback using data such as user interactions, tracking of social media conversations as well as engagement metrics. It provides us with this feedback and has a role to play in refining marketing campaigns so that they talk to their target audience.

Besides, AI helps in the efficiency of social media marketing since the latter allows you to automate repetitive tasks. For example, low level chatbots based on AI can perform customer support, product recommendations, transactions, etc. (Hayes et al., 2021). and enhance support other level human resources for greater effort matters. Real time optimization of ad campaigns is possible with AI and ads show at the appropriate time to the right people. With traditional marketing methods it is difficult to attain this degree of precision and efficiency, and modern marketers cannot do without help of AI (Nair & Gupta, 2021).

However, social media ads must be personalized by AI based on the data of the users as well as their interests, behaviours and demographics. Therefore, platforms like Facebook and Instagram utilize AI to track users' behaviour and display an ad that relates to the individual's interests or browsing behaviour. This process is about collecting data from all these sources like user profile, history, and the interaction with content. The data from this is then processed by AI algorithms that try to find patterns and predict what sort of content or products that are likely to be enticing for a particular user (Haleem et al., 2022).

Behavioural targeting is one of the things through which AI personalities the ads. AI can identify what a user is likely most interested in, which is on its basis of tracking user interaction with social media content. As an example, the interest of the user can be deduced from the fact that the user interacts with many posts related to fitness, therefore the user has an interest in health and wellness (Benabdelouahed & Dakouan, 2020). Therefore, the user will see the ads for fitness products, gym memberships, and healthy eating plans. Therefore, the chance of user engagement and conversion rises at this level of personalization. Demographic targeting is another method AI targets ads with through the use of personalization. Ads could be tailored to specific segment of the population base on the demographic information like, age, gender, location and income level (Krönke, 2019). To put it into an example, for instance, luxury brand can publish an AI ad targeting against the users with a certain income and who have explored high end products. In delivery of ads relevant to user's demographic profile, AI ensures that marketing processes are more effective and efficient.

Contextual targeting is also used by AI to give personalized ads. It consists in studying the context of how a user browses his way in social media, which might have been related to some time, the use of a specific device, their current location, etc (Nunavath & Goodwin, 2018). For instance, if a user is surfing through social media on a mobile device at lunch time, they would be displayed ads for nearby restaurants or food delivery services. AI is able to give out ads at the right time and in the right manner by taking into account the user context.

Key AI Technologies in Advertising

Machine learning, natural language processing (NLP), deep learning are some of the several key AI technologies on which social media advertising is being personalized. Working hand in hand, these techs fit into providing a personal experience based upon data and behaviour analysis (Li, 2019). AI is a subset of machine learning, and machine learning is a subset of AI. First, machine learning is a subset of AI, because, for instance, it does not require explicitly knowledge of the algorithm in order to function. In the field of social media advertising, machine learning algorithms make use of the data from user to identify the patterns and trends (Sharakhina et al., 2024). In fact, these algorithms can tell us which ads could win over the likes of certain users based on their previous activities. For instance, machine learning can detect that a user who spends much of his time on travel content most probably views ads about vacation packages as well as travel accessories.

Another such critical AI technology used in social media advertising is natural language processing (NLP). By utilizing NLP, AI systems can understand and interpret human language, which means they can use the text data from posts, comments and messages from social media (Gao et al., 2023). This is where NLP comes in; it can understand the sentiment and the context of user generated content to tell marketers about trends, whether there is hype in the industry or the public opinion and then create the relevant messaging for them (Qin & Jiang, 2019). For example, if users are discussing a product positively

through NLP analysis, marketers progress by promoting the product more aggressively.

Machine learning, in general, is where one trains neural networks to learn from data so that they observe the patterns in the data and perform a certain task, that is, a subset of machine learning called deep learning trains neural networks to attend to patterns in massive datasets (Martínez et al., 2022). Especially for complex data in simulation, e.g., images and videos, deep learning algorithms are very good. Deep learning is utilized to perform analysis of visual content in the social media advertising and determine user preferences. For instance, deep learning algorithms can study the images a user handles to discover whether she or he has a passion for something or some items, and provide ads full of same visual cues. As for visual personalization, this level can greatly improve user engagement and accuracy of ad effectiveness.

Benefits of AI in Social Media Advertising

Improved Customer Engagement

Artificial Intelligence (AI) adds significantly to customer engagement in social media advertising by giving very targeted and personalized ads that resonate with the consumers. One of the main ways in which AI accomplishes this is that it is able to analyse huge amounts of a user's data sourced from their browsing history, social media interactions and other demographic information (Argan et al., 2022). AI allows you to know what each individual likes and how they behave and show them advertisements right according to the individual preferences. It will increase the attention from users, and also will increase interaction with the ads. This is because when the ads match users' interests and needs, users are more prone to participate with the content: to like, to share, to comment, or even click through for more. As a result, this heightened level of engagement helps advertisers' campaigns in being seen by more people, but also improves the experience for users on social media platforms (Rodgers & Nguyen, 2022).

In addition, with AI driven personalization, the ads do not only include personalized content. This also includes timing and placement of advertisements in the most optimal way. The algorithms used in AI are able to tell which is the best time to show the ads when the users use the product most and are most likely to engage (Singh et al., 2023). Moreover, AI will also come to the rescue in identifying which channel and format would be the best suited to each user, so that the ads can be delivered with the maximum impact when it comes to engagement. Another way of using the current AI for customer engagement improvement is to develop dynamic, interactive ads. To be fit for purpose the AI powered tools generate the content in real time based on user interaction (Fan, 2023). For example, if you have already clicked on some products in the clothing brand ad, that ad would show you different products or styles if you reload it. The level of interactivity enables the user to maintain their engagement and the more time that user spends interacting with the ad also.

Along with this, AI can make the customer engagement better through more efficient retargeting strategies (Isler et al., 2023). Retargeting is ensuring you reach and show ads to users that have interacted with the brand, not converted, and are likely of interest to your brand. By analysing past interactions, AI can pick the top leads, those most likely to convert and make retargeting efforts about users that are far more likely to engage. The approach is targeted and this increases your chances of reengaging users as well as propelling them further down the sales funnel.

Higher Conversion Rates

AI in social media advertising has one of the most significant benefits of becoming an important factor in improving higher conversion rates. AI powered ads are more viable in converting users into customers as personalization comes in via preference and behaviour. AI makes it more likely that the users will take the desired action if the content delivered is relevant and engaging for each user and can be any action: buying, signing in to the newsletter or downloading an app (Purnomo, 2023).

There are several ways AI increases conversion rates. The first is that it is the AI algorithm, which analyses the data of the user, looking for patterns, and thus predicting what piece of product or service the user might be more interested in. Having this predictive capability helps, in fact, advertisers to come up with highly targeted campaigns that present themselves to their audience based entirely on its needs and aspirations (Rachmad, 2022). Ads that are more likely to be related to the interests of the users are more likely to encourage users to click and convert.

Secondly, AI provides real-time optimization of the ad campaigns. Continuous user interaction with AI grabs user insights for ad content, targeting and bidding strategies which AI changes on the fly. This real time optimization guarantees always ad related ads, thus increasing the chances of conversion (Nair & Gupta, 2021). Take for instance; if an ad is not performing well with a certain audience segment, the AI will be able to quickly pinpoint that point and adjust the targeting parameters to aim the targeting at more responsive audience.

Thirdly, AI increases the retargeting campaign effectiveness. This is termed retargeting where you will show the ads to the visitors that have been to your website and interacted with your brand but haven't converted. By analysing past interactions, AI can determine what the best leads were, and retargeting can then be done only to the best leads both as far as probability to convert and the likelihood that the deal would have been closed even without the intervention of AI (Halvadia & Menon, 2021). AI helps drive conversions by delivering personalized ads that show users what they were interested in related with the brand, and thus increasing the chances of making one.

Moreover, the use of AI can enhance conversion rate by making changes to the ad creative. AI facilitated tools can test and produce numerous variations of ad content images, headlines and the SEO'd calls to action to get the best combinations. The process of A/B testing, as it's known, allows advertisers to shave its creative to bits until it reaches as massive performance as attainable, by utilizing the data gathered about their ads in real time. Last, but certainly not least, the use of AI will help nurture social media platforms in practical ways and contribute to more conversions. AI delivers ads that are engaging and not intrusive to users and helps the same experience become enjoyable and a more exciting one. User positive interaction with ads is correlated to higher brand trust and user action taking (Bag et al., 2022).

Cost-Efficiency for Advertisers

This has been done by AI, and one of the additional benefits it offers advertisers is optimizing ad targeting, reducing wasted spending and rising CPM, improving the cost efficiency of the ad spend. One of the reasons why AI can be successful in this is that it can conduct analysis over huge data and discover the keenest demographic sections to concentrate on for each battle. AI allows advertisers to spend their budget on ads to the users that will most engage with or convert from ads (Lego, 2022).

The ads are served to people at the right time with the right people being targeted by AI powered targeting. By using the data obtained from users, whether it's their browsing history, social media interaction or their demographic information, AI can find the patterns and predict which users are most likely to show interest in the sale of a particular product or a provided service (Tsaltzkan et al., 2023). By reducing the likelihood of showing ads to users who are not likely to click on the ads thusly wasting ad spend, this level of precision targeting of ads is necessary.

AI ensures that real-time optimization of ad campaigns is possible, maximising the best strategies with budgets. AI monitors the performance metrics such as click through rates, conversion rates, engagement level etc and changes the bidding strategies, the targeting inputs based on that observation. With this real time optimization, chances are that the interested users will be reached via the most effective tactics for the more efficient spending to be performed by the advertisers so as to maximize the return on investment (Zhou et al., 2024).

One of the ways AI optimizes a Cost Effectiveness is by automating ad creation and management. Ad content generated by AI-powered tools can be iterated on several times, run through various tests and found out which combination generated the best performance (Everman et al., 2021). Through this automation, advertisers are able to save time and labour cost from those necessary for manual ad creation and management. Also, AI is capable of automating ads placement and scheduling to ensure that they are delivered to the customer when the most impact can be achieved.

In addition, with more effective retargeting campaigns, AI also helps in the reduction of costs. Retargeting or remarketing is an advertising method of reminding these users about a brand they were initially engaged with, and who have not yet converted into a customer yet. Past interactions can be analysed using AI to pick out the best leads, so the retargeting put in place will be onto the ones most likely to convert. AI helps push ads based upon the previous user's interactions with the brand and this makes it more likely to drive conversions and get its ad spend to work more effectively.

Challenges of AI in Personalizing Social Media Advertising

Privacy Concerns

The ethical problem of mass collection of user data for social media advertising is one of the most crucial issues of AI in the system of personalised ads. Since AI relies heavily on vast amounts of data to function, it's a goldmine of user behavioural, preference and demography and uses it to show targeted ads. This increased level of data collection is immensely troublesome when it comes to user privacy, as many users are oblivious to the sheer volume of data the harvest, requisition and subsequently abuse (Gao et al., 2023).

Uses of personal data for ad targeting can be propped up without explicit user consent in the service of transparency and the freedom of choice. Most people have a problem with the fact that their online behaviours are being observed and reviewed in order to construct personal advertisements. The fact that social media platforms do not clearly communicate the way in which the data they collect, store and use is compounded with this discomfort (Argan et al., 2022). Thus, users can feel their privacy is being invaded and lose confidence in both the platforms and the advertisers.

Additionally, there is a concern that the data may be breached or misused for personal data. Such data can be sensitive user data that if fell into the wrong hands, can result in identity theft, financial loss (Kshetri et al., 2024). To gain some ground on the privacy concerns above, it is essential to have strong data security measures and affirm the users' informed consent. To keep the trust of users, advertisers and social media platforms should adopt transparency and always ethical data practices towards the regulation of data protection.

Bias in AI Algorithms

A second important challenge in personalizing social media advertising based on AI algorithms is bias of these algorithms. Large datasets can contain inherent biases that can be learned by the AI system and then amplified in perpetuity in the manner it is designed. Such a bias can result in unfair targeting or discrimination, in that some ad groups are targeted unfairly or bored (Gichoya et al., 2023).

An example of this is that if the training data that is the result of an AI algorithm development example is based on a specific population, then the ads generated by the AI will have a bias and will not focus on the interests and needs of the other demographics (Mittermaier et al., 2023). This can result in a measly amount of diversity in ad targeting and set the tone for old fashioned stereotypes. Not only that, biased algorithms may also lead to necessary ads being offered to some and denied to others, excluding certain groups of people from relevant ads and rejecting them from information and opportunities.

The task of eliminating bias in AI algorithms will need to be approached in a multidimensional plane. This is about making sure that the training data is varied and has representation of all user groups, auditing and testing algorithms for bias and correcting the algorithm when the bias has been found. To make sure AI driven advertising is fair and inclusive it is up to advertisers and the social media platforms to watch out for and squander biases (Mensah, 2023).

Over-Reliance on AI

In personalising your social media advertising, AI supplies multiple benefits, but there is a danger to depend on this technology too much. There are concerns about the creativity and human touch that AI can cause a lack of, and if your ads lack the human touch during design, then the entire advertising campaign could suffer (Spatola, 2024). It is why AI is so good at analysing data and figuring out how to deliver the most efficient advertisement targeting but concepts of human emotions and creativity can be very much harder to capture for the purposes of creating strong advertisements.

Advertising creativity is to learn the cultural context, triggers emotion and elements that tell the story. AI can add value in bringing insights and automating the task of ad creation, but it cannot entirely substitute human intuition and creativity to generate new and emotions ads (Lee & Chew, 2023). This over reliance on AI might lead to high optimised ads, but the ones that haven't got the originality plus the emotional pulling that would resonate with the audiences.

In order to provide reasonable amount of balance, advertisers should treat AI as a facilitator to assist in creative processes instead of replacing them. Advertising Ad campaigns with a mix of AI driven insights

and creative brain of humans will be more effective. The AI must recognize how limiting it is, and then there must be human input in the advertising process, it is crucial. This way, advertisers can use the power of AI and still keep creative work and the emotion of an ad.

Future Directions of AI in Social Media Advertising

Advances in AI Technology

With the emergence of AI technologies, personalized advertising is set to change the future to a very great extent. Indeed, predictive analytics using AI to analyse historical data and predict future consumer behaviour is one of the most promising that the industry is currently seeing. This technology is that it allows advertisers to make better guesses at the sorts of things that users are on their minds about and anticipating when they browse the web, allowing them to deliver highly relevant ads to them at the very best time. Using predictive analytics can also help firms in finding possible market trends and stay ahead of the competition by tailoring their marketing strategy.

Augmented Reality (AR) along with AI can create a blend of immersive and interactive advertising experience and yet another one is emerging technology. The advantage that AR brings to adverts is that users can engage in a more alive interaction with them for example, to try on virtual clothes or to see how furniture would look in their home. The interactions of the users with this content are made more personal and interesting by AI by making the content more pertinent and interesting through user data. The combination of AR and AI is expected to mix magic and pave the way for more personalized and enjoyable experience for consumers with brands.

Ethical AI and Privacy

Since AI is becoming an integral part of social media advertising, privacy issues and ethical concerns will be addressed more clearly. It is expected that the industry will apply more stringent ethical AI practices to prevent consumer lack of privacy as well as transparency. Evolution of the regulations, one of which is the General Data Protection Regulation (GDPR) in Europe that sets very strict rules for data collection, storage and usage, will be the major driver of this shift.

In the future, we can expect stronger toolkits for users to consent to use and see which data is received from them, and get proper transparency data. There will be a need for the advertisers and the social media platforms to show how data of the users is collected and the way it is used so that the users will have control over their personal information. If this can be done, it will help building trust between consumers and brands, and build a more positive relationship between them.

In addition, such ethical concerns will be alleviated through new technologies of privacy, specifically differential privacy and federated learning. Federated learning takes advantage of the data stored in users' phones, and it doesn't require uploading their data, while differential privacy prevents individual user data from being traced back to a specific person. AI will be used by these technologies that will allow advertisers to use AI to personalize advertising and address the risks associated with data breach, misuse.

AI-Driven Hyper-Personalization

The future of AI in social media advertising will revolve around the hyper personalization, where ads will be as hyper personal as possible. Hyper personalization with AI is basically using advanced algorithms to analyse real time data and serve personalized ads related not only to user's interest, but also at a particular moment to the user's context and current emotional state. Real time ad delivery is a main aspect of hyper personalization. Real time user interactions and behaviours towards ads will be predicted and ads will be served by these AI systems. Say, a user is browsing social media and has a certain curiosity about the product; AI can supply an ad for the product, as soon as the user appears interested in it, which enhances the probability of engagement and conversion. Such immediateness guarantees that ads are always on topic, always current and always relevant for the user experience at large.

The hyper personalization, along with emotional responses, can also be used for another exciting development, which is, tailoring ads to emotional responses. Facial expressions, voice tones and other biometric data are the inputs from which AI can analyse and understand an emotional state of a user and then deliver the ad which would resonate on an emotional level. Take their user in a positive mood, and AI can help create ads, that fit with the mood, and make it a more impactful and memorable experience.

CONCLUSION

Through this paper, we have explored the transformative power of Artificial Intelligence (AI) towards personalizing social media advertising and why it makes a difference, provides benefits and challenges while pointing direction towards the future. Now, AI is going to social media advertising in a revolutionized scenario where you can run ads that are tailored to every single user. A proper use of AI is capable of analysing vast data and deliver relevant content that will help to boost engagement and more conversion rates for the users. Using AI for social media advertising brings so many benefits like improved customer engagement, higher conversion rate, and less expensive expenditure on advertising by advertisers. There is an ability via AI to read user data and optimize ad targeting in order to make marketing more effective and efficient.

Despite this, however, integration of the AI in social media advertisement is not without its challenges. The security of personal data is also of utmost importance, as the large amounts of personal info are unacceptable without confirmation of user consent. On top of that, the bias within AI algorithms can result in unfair targeting and bias discrimination and finally, it calls for the effort that will always be made to make sure that AI algorithms are trained on a diversified and representative dataset. Too much dependence on AI can also be a problem, as it might deprive ads from tips and creativity. Marketers, however, need to make sure that they don't overuse the advantages of artificial intelligence as while it allows marketers to do away with human touch, it also needs to retain the creative and emotional aspect that makes the ad powerful.

While it is easy to bring AI into a social media advertisement, there are a few challenges with the integration of AI in social media advertising. The large quantity of personal data that are collected and used calls for ethical questions on user consent and data security, which are the basis for a range of privacy concerns. Furthermore, AI algorithms can be biased and the unfair targeting and discrimination supported from bias in the AI algorithms making continuous efforts required for the AI system to be trained on diverse and representative datasets. Also, AI over reliance can be a problem in thinking that the AI will make all the ads and can thus deaden the human hand in in ad design. Marketers must not forget that advertisements are not just about using AI, but they also need the creative element as well as the emotional element that makes advertisement effective.

The key takeaway for marketers in the case of this paper is to use the AI to serve more relevant, more personal, more specific ads while also paying attention to privacy concerns and preventing biases from feeding in. To gain consumers' trust, marketers should opt for the transparency and ethical data practice. Additionally, they should keep watching, inspecting and auditing of AI algorithms to look out for, and correct any biases. Marketers combine AI-driven insights with creative human genius to come up with more effective, engaging and at same time resonating advertisements for their core audience.

Whenever it comes to social media advertising, AI is thereby poised for a dramatic makeover in the forthcoming years. In a scenario of evolving regulations to account for privacy and ethical concerns' issues, the industry will adopt more robust frameworks to safeguard consumers from any abuse in information, or indeed, violations to transparency. Real time ad delivery and emotional targeting will deliver real personalized experience because of the more sophisticated AI design that will be used for hyper personalization.

Competing Interests

The authors declared no competing interests.

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