

Research Article

Study on Optimization of Marketing Communication Strategies in the Era of Artificial Intelligence

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This paper starts from the research of computational advertising and scene theory, based on the background of artificial intelligence technology application, and studies the communication strategy of the computational advertising scene. It studies the three major strategies of computing advertising scene communication and deeply analyzes the principles and applications of scene insight strategy, content selection strategy, and community operation strategy. Results show the following: (1) under the background that the era of artificial intelligence has arrived, computing advertising uses artificial intelligence algorithms to complete breakthrough upgrades. Through the combination of algorithms and data, its intelligent upgrades are mainly manifested in three aspects: First, to achieve higher matching accuracy communication, the second is efficient customized communication, and the third is to realize the contextual interaction between advertisements and users; (2) the “intelligent” performance characteristics of intelligent scene dissemination of computing advertising are mainly in the application of scene intelligence technology, the intelligence of the data platform, and the intelligent construction of user portraits; (3) in the era of artificial intelligence, the communication strategies for computing advertising scenarios mainly include intelligent scenario insight strategies, content selection strategies, and community operation strategies. First, the intelligent scene insight strategy is mainly analyzed from two levels. On the one hand, it is a scene mining based on intelligent data and an in-depth analysis of the user tag system centered on intelligent algorithms. On the other hand, through the research on keyword search, the impact of intelligent upgrade on scenario insight is analyzed. Secondly, in terms of content selection strategy, the application of artificial intelligence technology has brought a new upgrade to the creation and recommendation mechanism of computational advertisements.

1. Introduction

With the development and popularization of Internet technology, computational advertising plays an increasingly important role in the advertising industry. Since the development of the Internet, it has experienced four evolutions: the era of fixed networks, the era of big data, the era of mobile Internet, and the era of artificial intelligence [1]. In this process, computational advertising has developed from the initial contract advertising, bidding advertising, search advertising, and other basic forms to the stage of data-driven programmatic advertising and the current stage of artificial intelligence. Based on the national strategic guidance plan and industry development trend, it is of importance to gain

an in-depth understanding of the application of artificial intelligence technology in the Internet field, and explore the intelligent optimization path of the scene matching strategy of computing advertising, conduct a comprehensive analysis of real-time positioning scenarios, fragmented scenarios, and full-scenario matching modes, and summarize industry experience to provide a practical reference for the development of computational advertising. It provides a contemporary reference and reference value for the theoretical research of computational advertising [2].

Regarding the literature review of computational advertising, the author started from the concept of computational advertising that was first proposed by Andrei Broder, a senior researcher at Yahoo Research, at the 19th

ACM-SIAM Symposium in 2008 [3]. Scholars Wu and Hu [4] proposed at the IEEE conference to use a computational model to reconstruct the spread of advertisements in social networks and used this computational model to conduct a series of virtual experiments to obtain information on how to select an initial set of people to maximize observations and experimental implications of advertising communication effects. Since then, scholars' research on computational advertising has focused on the exploration of computational logic. The rapid update of Internet technology has continuously promoted the development of computing advertising in the direction of intelligence, especially the practical application of new theories and technologies such as cloud computing and artificial intelligence in the field of computing advertising [5]. It seems that computing advertising is about to usher in subversive changes. It can be seen that computational advertising is gradually becoming the most important part of the advertising industry in the Internet era. With the popularization of smart devices, traditional advertising has shown signs of fatigue, and computational advertising based on big data and artificial intelligence algorithm models has shown strong vitality [6]. The machine can quickly gain insight into the needs of consumers in real-time through accurate user portraits, and combine itself with the user's usage scenarios when computing advertisements are automatically pushed, effectively coping with the famous problem raised by advertising master John Wanamaker: "I know that half of my advertising dollars are wasted, but the problem is I don't know which half."

Scene theory has produced many fruitful research results in the fields of culture, urban space, film art, and media [7]. In the literature review section, this paper mainly focuses on the literature review and elaboration of scene research in the fields of advertising, marketing, communication, and the Internet [8]. In the 1980s, when television media was popularized and covered in developed countries in Europe and America, McLuhan put forward the media scene theory based on his profound insight into the relationship between media and human behavior. In this theory, famous viewpoints such as "media is the extension of man" are included, which believe that the media changes the relationship of time and space so that people's perception ability is strengthened or extended. Merowitz's research on scenes is different from the material scenes that show space and believes that it is not the material site itself that determines the nature of people's interactions, but the pattern of information flow [9–11]. Extend the definition of the scene to the virtual space created by electronic media. In the physical space under the traditional concept and under the influence of the flow of media information, the virtual scenes created by the electronic media have gradually attracted the attention and research of scholars. The current society has entered the mobile Internet era, and the boundaries between real and virtual scenes have become more ambiguous.

In the context of the Internet and big data, a new advertising method driven by the industry, namely, computing advertising has come into vogue. According to public information on the Internet, Andrei Broder, who proposed the

concept of computational advertising, pointed out the problems that computational advertising needs to solve from the perspective of the industry, and defined "computational advertising is to find a suitable advertisement for a user U under a given scenario C , in order to achieve" Optimal "match" [12]. Computational advertising has its unique characteristics in the selection of target groups, content production and delivery, advertising matching, and effective monitoring [13]. Different from traditional advertising, computational advertising is based on Internet technology to achieve process-based and efficient operation, and accurately convey it to target user groups [14]. The application of computational advertising to big data technology and artificial intelligence algorithms has formed an industrial scale. Internet giants at home and abroad have taken advantage of the huge traffic advantages of their platforms to obtain large-scale revenue from the advertising business every year. In China, Internet giants such as BAT have accumulated a large amount of user data after long-term development, and the application of artificial intelligence technology is constantly being strengthened [15].

Driven by artificial intelligence technology, big data, intelligent algorithms, and communication scenarios are deeply integrated through machine learning technology, and important breakthroughs have been made in product insights and consumer dynamics [16]. In the digital age, streaming media platforms focus more on data analysis to find the target audience that best meets product needs. Traditional algorithms draw user portraits by analyzing demographic attributes such as regional factors, age, and occupation, which traditional advertising relies on, as well as user behavior, but there are inevitably some unsolvable drawbacks [17]. For example, by optimizing the click-through rate of the target audience, media buyers can attract a lot of audiences that match the user's label to the traffic platform, but for the advertiser, these users are not necessarily the potential consumption of the product [18]. In contrast, digital advertising strategies that use artificial intelligence to identify and target potential customers without prejudice have a greater chance of finding real consumption, which is different from the segmented audience given by big data.

Artificial intelligence technology has brought disruptive changes to the creation of advertising content. For a long time, the creative thinking of advertisers is the only way to complete the creation of advertising content [19]. Due to the limitations of human thinking and energy, the creativity and creative content of advertisements are relatively limited [20]. At present, the demand for advertising creativity in China is increasing day by day, and the contradiction between supply and demand that advertisers create is low in quantity and quality. At present, the potential of artificial intelligence advertising content creation is far from being fully exploited and is currently only used to accomplish some simple goals [21]. For example, in terms of copywriting creation, the artificial intelligence copywriting recommendation system can automatically recommend the use of titles and description texts through a certain number of titles and description texts given by advertisers, which can not only help

advertisers achieve the highest ROI but also save a lot of money, test time, and effort.

The traditional way of advertising can only be done by buying media and “casting a wide net,” which is not only expensive but also difficult to grasp the accuracy of advertising [22]. Even in the Web 2.0 stage, programmatic advertising has greatly improved the accuracy of delivery, but computational advertising based on traditional algorithms, still has many shortcomings, such as the processing of true and false information from data sources, transparency of advertising, and false traffic, advertising effect evaluation, etc. [23]. The basis for intelligent recommendation of computational advertisements is to accurately divide the Internet population and create user portraits based on data management. The needs of Internet users are showing a trend of personalization and autonomy. Traditional algorithms are difficult to adapt to the development of the times, and they are increasingly unable to capture the purchasing habits of Internet users [24]. The number of Internet advertisements is extremely large, and the effect of advertisements needs to be monitored dynamically in real time. This link involves the technical application of various roles in the advertising chain, such as the real-time bidding technology related to DSP, the inquiry optimization technology related to the advertising exchange platform (ADX), and the network optimization technology related to the supply side platform (SSP). Online advertisements frequently require hundreds of millions of data requests every day, as well as high requirements for timeliness [25]. User portraits need to be updated in real time according to changes in each user’s characteristics, and advertising creatives need to be adjusted. Artificial intelligence machine learning technology guarantees real-time updates of data, makes adjustments to user portraits, and formulates advertising strategies in real time to maintain optimal advertising effects.

With the advent of the mobile Internet era, the combination of people and scenes has become the development trend of computing advertising. The application of digital technology has always been the driving force for the development of computing advertising. The artificial intelligence algorithm intelligently upgrades the construction of user portraits, and promotes computing advertising into a scene-based communication mode. Based on the application of artificial intelligence technology, this paper studies the scenario communication strategy of computational advertising. First of all, based on the application of artificial intelligence technology, using “scenario five forces” and scenario theory to build an intelligent scenario communication strategy model. Then, it discusses the scenario communication strategy, and analyzes the three strategies of scenario insight, content selection, and community operation. At the same time, by analyzing relevant typical intelligent computing advertising communication cases, the practical application of scenario communication strategies in user usage scenarios is summarized and analyzed. Finally, the problems and deficiencies of the current computing advertising scene dissemination are sorted out and analyzed.

The research method of this paper mainly adopts the case analysis method, takes computational advertising as the research object, and focuses on the operation mechanism of the communication strategy of computational advertising in the era of artificial intelligence. Based on the field of computational advertising, this paper summarizes the four elements of scene communication, and studies the dimensions of scene time and space, communication content, scene connection medium, and user network behavior.

2. Research Ideas, Methods, and Technology Support

2.1. Research Ideas. The research of this paper begins with the author’s personal experience of the rapid development of Internet advertising in recent years. After more than 20 years of development, domestic Internet advertising has rapidly become a new force in the advertising industry. The application practice of Internet advertising in programmatic marketing and big data marketing involves a lot of technical and theoretical knowledge of algorithms and machine learning. By collecting and sorting out relevant literature on the development of various Internet advertisements, the research object is preliminarily determined as computational advertising [26].

Computational advertising requires accurate personalized recommendations, and its core essence is to recommend the right advertisement to the right target group at the right time. The most effective way to realize this recommendation process is to combine people and scenes. The application of artificial intelligence technology allows the machine to place the most suitable advertisements through the user portrait model based on big data and real-time user mobile scene positioning. Therefore, the author determines the core of the research as the scene-based communication strategy of computational advertising [27].

Combining the previous research methods and research results, the research idea of this paper is roughly as follows: firstly, the domestic and foreign-related researches on computational advertising and scene theory are organized into a literature review; secondly, the basic concepts of computational advertising are sorted out and analyzed, and artificial intelligence technology is determined [28]. It clearly describes the role and impact of artificial intelligence on computational advertising; furthermore, it establishes a model for the principle of scene matching between computational advertising and audiences, and analyzes the elements of scene communication and the modeling mechanism. Then, combined with the theoretical basis of the previous article, the scene communication strategy of computing advertising is cut into three dimensions, namely, scene insight, content selection, and community operation, and the principle of the strategy is deeply analyzed [29]. At the same time, the practical application of the strategy is analyzed. Finally, it summarizes the existing problems of the current development of computational advertising and looks forward to its future.

2.2. Research Methods. Case study. This paper conducts a case study on the scenarios of computing advertising reach, focusing on the relevant cases of domestic Internet companies using scenario communication strategies for advertising communication. For different strategies, the author selects the cases of computing advertising communication of typical Internet companies such as BAT, as well as advertising communication cases based on artificial intelligence algorithms such as Toutiao Information Streaming Advertising and Google Advertising, and analyzes the specific strategy application and communication rules of computing advertising scene communication [30]. In addition, based on the “Five Forces of Scenarios” proposed by Robert Scober and Shell Israel and relevant domestic and foreign scenario theory research, the author constructs a model of computational advertising scenario communication strategies in the era of artificial intelligence. The calculated advertising communication data, communication paths, and industry-related scene communication strategies, etc., are used to further verify whether the selected cases conform to the model.

2.3. Technology Support. A user portrait is a labeled user model abstracted from information such as using social attributes, living habits, and consumption behavior. In the dissemination system of computational advertisements, user portraits are abstracted as the characteristic attributes of real users, which help the platform to realize the precise delivery and personalized recommendation of computational advertisements according to user characteristics and their preferences. This paper starts from the communication dimension of computational advertising, discusses the model construction of user portraits and its relationship with advertising communication, and deeply understands the important role that user portraits play in computational advertising. The concept of user portrait (persona) was first proposed by “Father of Interaction Design” Alan Cooper. Alan Cooper believes that user portraits are virtual representations of real users and target user models based on a series of attribute data [31].

With the development of the Internet, user portraits have been given new connotations based on information such as user demographics, online browsing content, online social activities, and consumption behaviors. The author sorts out and summarizes relevant literature and research, and summarizes the basic elements of user portraits into three: basic data, algorithm models, and user tags. The collection of basic data is the premise of depicting user portraits. In the current Internet environment, the establishment of a massive user database requires the use of big data technology to obtain user data. The algorithm model is the main tool to realize the full-link propagation of computational advertisements [32]. In fact, user portrait modeling is only one of the tasks that algorithm models need to complete, but process that describe user portraits, from the cleaning and filtering of massive raw data to data statistics and classification, and then to machine learning and text analysis, this process

requires algorithmic models to complete. User tags are the core elements of user portrait construction. As a highly refined feature identifier specified by humans, tags are the most important output of user portraits, which make the user portrait model have practical significance.

In terms of computing advertising, the core work of constructing user portraits is mainly to use massive logs stored on the server and a large amount of data in the database for analysis and mining to create a “tag system,” each tag can represent the ID of the dimension feature for the user. The process of user portrait modeling is mainly divided into three processes: basic data collection, behavior modeling, and portrait construction, as shown in Figure 1.

Through the application of artificial intelligence technology, the data value density of user portraits and the accuracy of personalized recommendations can be improved. AI systems perform cognitive functions, using machine learning techniques, to train how to act or react to an outcome and know to take the same action in the future.

The process of scene dissemination of computational advertisements needs to be supported by the underlying architecture such as technical foundation and data foundation [33]. In this process, multiple scene elements need to be coordinated to complete propagation at the same time. In the context of the application of artificial intelligence technology, the construction elements of the scene communication of computational advertising should include scene time and space, a scene connection medium, scene communication content, and user network behavior. On this basis, other factors will be introduced in the dissemination scenarios of computing advertisements, such as AR, VR glasses, smart wearable devices, etc., that enhance the scene experience. Based on the above analysis, we constructed a computational advertising scenario propagation model based on artificial intelligence technology (see Figure 2).

From this model, with the support of artificial intelligence technology, computing advertising is based on the current user network behavior, connects with users through smart devices, and finally disseminates content and user scenarios through scenarios such as scene insight, content selection, or community operations. Space-time to achieve the best match. From the user’s point of view, the reach of the advertisement content is perfectly combined with the current user network behavior, which effectively reduces the user’s rejection of advertisements [34]. At a deeper level, the delivery of advertising content is based on the labeling system of user portraits, and the depiction of user portraits is based on intelligent algorithms cleaning and filtering invalid raw data, and at the same time receiving current user network behavior data for analysis. As a result, the communication value of advertisements has been greatly improved, and the effect of triggering user resonance has been created to the greatest extent.

Disseminate content. This mode helps to advertise content creators to gain a deep insight into user needs and achieve precise matching with users from the content ontology.

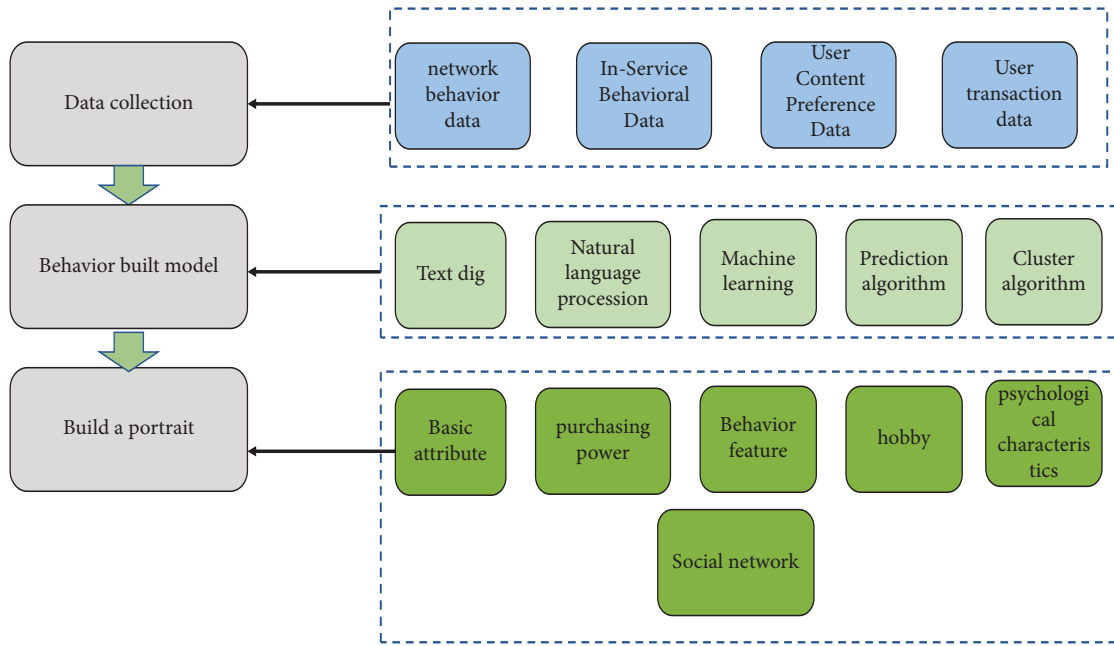


FIGURE 1: User portrait model.

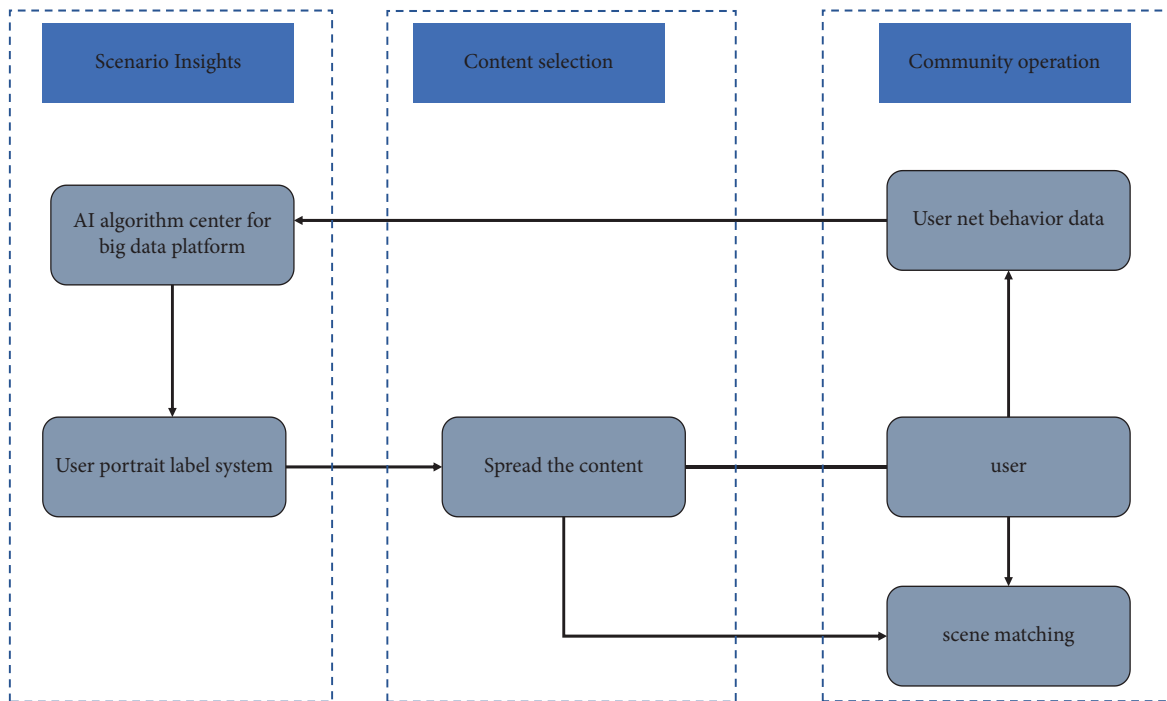


FIGURE 2: Propagation strategy model for computing advertising scenarios in the era of artificial intelligence.

From the perspective of scene connection media, with the help of the natural immediacy and interactivity of mobile devices, advertising content can quickly reach advertising users, break the limitations of time and space, and realize the combination of users and virtual scenes. When a user browses the current target content, it becomes a natural process for the user to accept the advertisement due to the seamless integration of the advertisement into the scene.

3. Results and Discussion

3.1. Intelligent Scene Insight Strategy. In the era of the mobile Internet, user scenario insight has become scientific and efficient. Through the user’s authorization agreement on the smart terminal, the user’s daily network behavior data are obtained and the user portrait is depicted. On this basis, users are analyzed according to their basic attributes, short-

term behaviors, and long-term interests, and user interest tags are extracted. Take Twitter for example. According to public information, more than 15 billion articles and videos are displayed in the daily information flow of the Toutiao app, and the amount of data processed per day exceeds 8.2 PB. The Toutiao series of products generate 6 billion server requests per day. At the same time, Toutiao AI Lab continues to accumulate a large number of training samples and data based on rich and diverse application scenarios and massive users, train algorithm models, and establish a unified data warehouse to continuously train and improve artificial intelligence. When a user uses the Toutiao app, the algorithm center begins to interpret the content of the user's browsing and forms a preliminary user portrait in a few seconds. As the data generated by the reading behavior increases, the user portrait is continuously optimized. In this process, Toutiao tags users' interests and sets primary tags, secondary tags, and underlying interest tags, so as to optimize the selection of recommended content and information flow advertisements.

At present, the fusion of Twitter advertising and news has achieved an optimal balance. Toutiao adheres to the operating philosophy of "advertising is news, the news is advertising," and has made deep insights into the needs of consumers. On its official advertising website, it bluntly says, "No one likes advertising. At times, these contents happen to be advertisements." Therefore, Toutiao has launched three ways of advertising, namely, application startup fullscreen advertising, information flow large image advertisement, and information flow small image advertisement. We organize them as shown in Table 1.

Smart algorithms bring many fruitful advantages to Toutiao ads. According to official statistics from Toutiao, as of September 2020, Twitter had been installed by 450 million people, used by at least 90 million people every day, and users used it for an average of 100 minutes a day. Based on advanced machine hardware equipment and technology, Toutiao calculates user interests and intelligently recommends news based on interests within 5 seconds. At the same time, based on big data mining, multi-latitude targeted advertisements such as gender, age, interest, mobile phone, time, and region can be realized. According to the real-time data report, advertisers can check the data at any time, and click the user portrait of the advertisement, and directly formulate the advertisement delivery strategy on the advertisement delivery background. Using random sampling becomes infeasible because the total number of headline ads is not known. Therefore, this article adopts the method of convenience sampling for information flow advertisements in the "recommended" section of the Twitter App, and sorts out 18 advertisements, and records are shown in Table 2.

Before collecting and recording the advertisement push traces, the author registered the Toutiao account by binding the personal WeChat account. According to the default selection of the App system, I followed 19 tags in the personal channel, namely, Hotspot, Guangzhou, Video, New Era, Pictures, entertainment, Q&A, technology, car emperor, finance, military, sports, live broadcast, international, health,

real estate, small video, NBA, and value points. Among the 18 information flow advertisements sorted out, except for one advertisement recommended by Toutiaohao and 2 random advertisements, the other 15 advertisements are related to the author's account information, browsing history, or festivals. On the one hand, the Toutiao algorithm pushes relevant information flow advertisements in fragmented scenarios according to the user's reading interest tags, reading history, and other data, and on the other hand, pushes according to the user's geographic location information. Based on the collection of user data, artificial intelligence algorithms update user portraits in real time, gain insight into users' reading scenarios, and allow advertisers to adjust advertising strategies promptly.

The core of computational advertising is to target users by keywords and terms, and people's online purchasing decisions depend on keywords and search results pages. It can be said that understanding keyword search is crucial to understanding user needs. From the perspective of scenario-based communication, keywords still have a strong guiding effect on advertising. For example, in terms of Google AdWords, keywords are the key to the success of AdWords campaigns, so PPC advertising (Pay Per Click, pay-per-click advertising) is also known as "keyword-driven" advertising. Keyword search is one of the important factors for calculating insights into advertising scenarios. Judging from industry practices such as the current Baidu series of products, Google Search, and Toutiao's recently launched "Toutiao Search" product, artificial intelligence has been applied to keyword search. In terms of search query words, it has broken through the results display of traditional algorithms, and the search algorithm has been upgraded intelligently.

The core of keyword search is to put users first, searchers convert their thoughts into words, search engines understand these words as keywords, and calculation advertisements will be displayed on the search results page. At present, keyword matching can be roughly expressed in three forms. In this paper, based on industry practice and related viewpoints, it is summarized as broad match, phrase match, and exact match. When broad matching is selected to be placed on a keyword, users searching for the keyword, or related variants of the keyword, such as singular and plural forms, synonyms, etc., may trigger the placement of the advertisement. In the phrase matching mode, the advertisement will be triggered when the user's search term contains the keywords preset by the advertiser. Precise matching requires that the user's search term and the keyword set by the advertiser are exactly the same before the ad can be triggered. The DNN model uses deep learning methods to train the model with 10 billion user click data and has more than 100 million parameters. In simple terms, artificial intelligence gives the system a large amount of training data and finds patterns from it. Finding patterns from massive data is what artificial intelligence is good at. It can quickly find possible ranking factors, adjust the weights of ranking factors, automatically iteratively calculate, and fit the calculation formula between ranking factors and user-satisfied search results.

TABLE 1: Formats and features of Twitter advertisement.

	Feature	Scope of use
Fullscreen ad	Huge user base, at least 10 million people see ads every day	Suitable for strengthening brand display; can be delivered by the province
Information flow big picture advertisement	Displays advertisements in news information flow and the advertisement picture is larger than the size of the news picture; attracts attention and is the first to be noticed by users	Gets high attention; precise targeted advertising; can be placed according to city districts\interests
Information flow thumbnail advertisement	A style consistent with the font size of the news picture, displaying advertisements in the news information stream; reduces the users' rejection of advertisements	Gets high attention; precise targeted advertising; can be placed according to city districts\interests

TABLE 2: In-feed ad records in the "Recommended" section of the Twitter app.

Serial number	Title of the ad.	Forms of the ad.	Source of the ad.
1	Guangzhou household registration quota development	Big picture of information flow	Geo-targeting
2	Medical advertisement	Big picture of information flow	Follow the label
3	Top oldies app downloads	Big picture of information flow	Random
4	Wework office space	Big picture of information flow	Age
5	Book shopping guide	Big picture of information flow	Random
6	Bazaar fair	Big picture of information flow	Time is approaching Children's day
7	Lighter ad	Big picture of information flow	Gender
8	New ad on Huawei P20	Big picture of information flow	Mobile phone brands
9	Kindergarten decoration	Big picture of information flow	Age
10	Men's shopping guide	Big picture of information flow	Gender
11	Classic arcade game app	Big picture of information flow	Age
12	Tea ads	Big picture of information flow	Papers
13	A school EMBA admissions advertisement	Small picture of information flow	Personal information
14	Lottery app	Big picture of information flow	Papers
15	Football mobile game	Big picture of information flow	Papers
16	Takeout	Small picture of information flow	Recommendation from APP
17	Mercedes Benz Guangzhou dealer	Small picture of information flow	Geographical location
18	Caivln Kioln bags	Big picture of information flow	Gender

3.2. *Content Selection Strategy Based on Artificial Intelligence Technology.* In the era of mobile Internet, it is easier for advertisers and brand owners to obtain big data portraits of current users or potential users than before, and to achieve accurate scene matching by using the tag body to select the most suitable advertising channels. It can be seen from the scenario communication model of computational advertising that the data platform can learn the user's behavior data before placing the advertisement and push the advertisement that is more in line with the user's preference. This article still uses Toutiao as an example. Toutiao's personalized recommendation mechanism has two basic recommendation logics in practical applications. First, when the user uses the app, the more types of actions the user takes, such as through human-computer interaction, the amount of reading content, the reading speed, the reading scene, etc., in action collection, the Toutiao algorithm center will begin to draw user portraits. When the detailed

description is formed into a structured table, the Toutiao algorithm system determines that it "knows" everyone. Then, after "recognizing" each article and each keyword by the same technical means, the system algorithm center matches the user with the scene in real time. The higher the matching degree, the system determines that the information is the information that the user most wants to obtain, and then pushes it.

In addition, for users who do not have enough historical information in the database, the Toutiao system will interpret similar groups and push the information that users are most likely to be interested in. Therefore, everyone's headlines are different, that is, "what you care about is the headlines." According to the above two logics, the Toutiao system splits the matching and connection objects between articles and users in more detail. Its recommendation engine first divides articles into specific feature vectors according to keywords and categories and then locates users, and assigns

them to a specific feature vector. Finally, the two are matched, and different information is pushed to each user according to the algorithm learned by the recommendation engine. Computational advertising identifies interest tags based on user portraits, uses Toutiao's personalized recommendation engine to match the most relevant creative materials, recommends multiple creatives at the same time, and completes targeted advertising.

The basis of Toutiao's personalized recommendation of news feed advertisements is the intelligent recommendation mechanism of its content. In order to achieve integration with information and reduce the psychological rejection of users, advertisements need to be consistent with the presentation of information. At present, based on the literature and product experience of the Toutiao App, we summarize Toutiao's article personalized recommendation mechanism as follows: recommendation of articles with similar themes, recommendation of news in the same city, a recommendation based on article keyword characteristics, recommendation of popular articles, and long-term selection of interests by users. Mechanisms such as tag recommendation and site source recommendation. In addition, recommendations may also be made based on basic user information, such as user interests, age, occupation, reading habits, and geographic location. The information flow advertisement is based on the tag system of the article and is allocated to the corresponding content area for display.

Scenario-based communication in the Internet era has the attributes of immediacy and dynamics, and artificial intelligence advertising creation is applied to the field of computational advertising along with the development of scenario-based thinking. Although artificial intelligence cannot currently perform advanced advertising creative work like professional advertising creators, in some special scenarios, artificial intelligence will come in handy promptly when a large number of advertising works cannot be provided by manpower alone. For example, since 2016, the intelligent design platform "Luban" developed by the Alibaba Cloud team has designed advertising posters with billions of dollars for the "Double Eleven" shopping festival and placed them in the specific scenes of users' shopping on that day. At present, artificial intelligence advertising creation mainly focuses on advertising design and copywriting design. In terms of advertising design, taking the "Luban" intelligent design platform as an example, the system can complete the work volume of 8,000 banner images per second through artificial intelligence algorithms and a large amount of data training, machine learning design, and output design capabilities. Customers provide four functions: one-click generation, intelligent typesetting, design expansion, and intelligent creation. In terms of AI copywriting design, the artificial intelligence advertising creation system has developed a "neuron" function similar to human memory. The system automatically "stores the memory" for the copy finally selected by the user during the use process. The copy selected by the user will be ranked at the top of the machine in the next similar search; the copy not selected by the user will be ranked in the next similar search by the machine. The latter position is no longer recommended; the

system will also "remember" the annotation modification made by the user to improve the quality of the copy generated next time. In other words, the AI copywriting system can realize the automatic optimization algorithm of the machine according to the user behavior correction algorithm model.

3.3. Scenario Communication Strategy Based on Community Operation. Community connection is based on the user's social relationship chain. People with common interests and hobbies gather together spontaneously or under the subtle guidance of the media content platform to form a fixed community. Based on common values and aesthetic standards, it is easy to establish emotional relationships between users, thereby enhancing the user's community stickiness. With the development of the mobile Internet, mobile apps have become the entrance of scene dissemination, and various sub-scenarios such as beauty, fitness, taxi, travel, photography, etc., have rapidly formed a community form, providing users with a personalized scene service experience. Under the guidance of Internet thinking, the user-centered product concept is gradually recognized. When users join the community, they will perceive the community through behaviors such as observation, experience, and participation. The first step in retaining users is whether the community can bring the value expected by users. Secondly, if the community creates a contagious community social culture on the basis of the value it brings to users, and the community brings a sense of warmth to users, and it is possible to gain user loyalty and make it the spokesperson of the community.

Strong scene connections can bring better communication and conversion effects to computational advertising. In the e-commerce industry, content e-commerce has become a breakthrough in a new round of competition. Internet e-commerce companies such as Taobao, Netease Koala, and Xiaohongshu are already building a "scenario + community" e-commerce model. The headline product "Douyin" has opened the "commodity window" function on the video creator's personal homepage to try to get into the competition of e-commerce giants, and take the initiative in another way. It has become a trend in the industry that major platforms provide users with scene experience and emotional appeal through community connections, so as to use intelligent algorithms to seamlessly recommend advertisements or product information to users' usage scenarios.

With the change of users' online behavior habits, the focus of computing advertising has gradually shifted from the PC side to the mobile side, showing the characteristics of scene-based and community-based communication. Cai Qi believes that the changes in reading in online community communication are mainly manifested in four aspects, including the production revolution under cognitive surplus, the hybrid text in aggregation and differentiation, the shared reading driven by content and relationship, and the multi-terminal. Internet products need to deal with fierce market competition, compete with users, and begin to focus on

network community operations. The core of the community operation strategy is to build an online community culture, provide users with high-quality content services, and meet the needs of users for individual value creation. Creating a community culture and establishing community-specific cultural symbols and community rituals are the basis for maintaining user participation and activity. High-quality content services include setting high-quality interactive themes for community members, providing differentiated content reading, and improving user retention time. In the interaction of topics of interest, users complete the expression and presentation of self-values, obtain value recognition from other users with the same interests, and find a spiritual sense of belonging in the virtual community.

The former artificial intelligence technology is still in the initial stage of application, and at the same time, limited by domestic economic and technological levels and other development factors, computational advertising also shows many problems and limitations. For example, at the data management and application level, the data on the data platforms of major companies is uneven, and there is a lack of effective communication between platforms due to factors such as competition and games. Transparency between platform data and advertisers and agencies still needs to be improved. At the technical level, the higher the level of artificial intelligence, the stricter the requirements for the complexity of the algorithm model.

The “Island” phenomenon of computational advertising monitoring data. With the advent of the information society, people realize that the value of data is becoming more and more important, and data are increasingly becoming an important part of the core assets and competitiveness of enterprises. At the same time, the multi-interest game in the data market has caused the phenomenon of data segmentation, which has caused the phenomenon of data silos to become more and more obvious. The interesting structure of all parties in the data transaction is unbalanced. In the data industry, the interesting relationship among users, owners, and users is unbalanced, especially the unequal rights and agreements between users and platforms, which has led to the aggravation of the phenomenon of isolated islands. Much of China’s data are collected in the databases of industry giants, telecommunications operators, and government agencies. On the other hand, without obtaining any data benefits, data producers also risk data misuse and damage to personal privacy and data security. In the long run, neither party in the data industry ecology will be the ultimate winner. Data silos aggravate the closure of data and the imbalance of all parties in the data chain. The collapse of the system will only damage the interests of all participants. The practice of data sharing lacks momentum. Data sharing has great practical difficulties, which is an important reason for the intensification of the phenomenon of data silos. China currently lacks laws and regulations that strictly regulate data sharing and openness. Relevant personnel are worried that the openness of government data sharing will cause information security problems, data leakage and loss of control, fear of data sharing and openness, and they dare not share their own data resources with others. Share openly.

At the same time, the big data industry also has a low degree of resource openness and sharing, and the value of data is difficult to be effectively exploited and utilized.

The lack of interoperability and sharing of data is caused by various reasons. For example, in the concept of many enterprises or institutions, data resources are treated in the same way as other resources, and they believe that possession and private ownership are corporate wealth, resulting in the phenomenon of “data islands.” To break this phenomenon, this article provides several countermeasures. First of all, major companies or institutions need to establish and strengthen cooperative relationships and open up data sharing permissions. Here, agreements can be made through a third-party data platform, or data can be shared directly between enterprises in a mutually beneficial way, so that the most accurate data can be obtained for the calculation of advertising scenarios and accurate access can be achieved. Secondly, all parties involved in sharing data should establish a standardized data construction system and integrate big data resources. At the same time, the scope of data sharing can be extended through cross-business cooperation. Finally, establish an information protection system and improve the legal system. In the era of artificial intelligence, government agencies and enterprises work together to build a credit-sharing environment for big data.

4. Conclusions

This paper focuses on the three major strategies of computing advertising scene communication, and deeply analyzes the principles and applications of scene insight strategy, content selection strategy, and community operation strategy. Meanwhile, in view of the current problems in the communication of computational advertising scenarios, we analyzed the three aspects of the phenomenon of “data island,” traffic cheating and traffic hijacking, and brand safety in the propagation of computational advertising scenarios, and proposed some feasible improvements. This paper also discussed the intelligent upgrade of computing advertising, how to realize the scene-based communication of computing advertising and related communication strategies. The findings of this study can be roughly divided into the following points.

- (1) The development of computational advertising enables smart upgrades. Under the background that the era of artificial intelligence has arrived, computing advertising uses artificial intelligence algorithms to complete breakthrough upgrades. Through the combination of algorithms and data, its intelligent upgrades are mainly manifested in three aspects. First, to achieve higher matching accuracy communication, the second is efficient customized communication, and the third is to realize the contextual interaction between advertisements and users. The key to the upgrade of the accurate dissemination of computing advertising lies in the combination of artificial intelligence algorithms and big data, intensive processing through data mining and analysis, and advertising based on the intelligent

user portrait tag system. Through intelligent user portraits, computing advertisements can achieve the intelligent push of “thousands of people and thousands of faces.” The application of artificial intelligence technology enables the automatic push of computing advertisements to make intelligent decisions based on data analysis of users’ real-time usage scenarios and to achieve contextual interaction between advertisements and users.

- (2) The intelligent scene dissemination of computing advertising requires multiple conditions to be satisfied at the same time. The “intelligent” performance characteristics of intelligent scene dissemination of computing advertisements are mainly in the application of scene intelligence technology, the intelligence of the data platform, and the intelligent construction of user portraits. This paper summarizes and analyzes the role of three basic technologies on scene dissemination, including scene connection technology, data processing technology, and scene experience technology. With the advent of the era of mobile Internet and the gradual deepening of domestic research on scene theory, the connection between scenes, the connection between scenes and people, and the connection between people and people have become the focus of research on computational advertising scene dissemination. The realization of scene dissemination puts more stringent requirements on data processing technology. The key point is the degree to which artificial intelligence algorithms can process big data. Finally, the user’s scene experience is realized through various types of intelligent terminal devices. In the entire scene dissemination of computing advertisements, the data management service provided by the data platform and the intelligent labeling system of user portraits plays a key role in the dissemination of the scene.
- (3) Intelligent computing advertising scenario communication strategy. This paper believes that in the era of artificial intelligence, the communication strategy of the computing advertising scene mainly includes three aspects: intelligent scene insight strategy, content selection strategy, and community operation strategy. First, the intelligent scene insight strategy is mainly analyzed from two levels. On the one hand, it is a scene mining based on intelligent data and an in-depth analysis of the user tag system centered on intelligent algorithms. Secondly, in terms of content selection strategy, the application of artificial intelligence technology has brought a new upgrade to the creation and recommendation mechanism of computational advertisements. Smart user portraits are updated with real-time data to push advertisements that are more in line with user preferences. In addition, artificial intelligence content creation has been realized in poster design and advertising copywriting, which can meet the needs of large-scale advertising in specific scenarios, and

provide new options for the content selection strategy of computing advertising scenarios. Finally, this paper argues that community is an important strategy for establishing strong connections in the scene. The strong connection of the scene can give a better communication effect to the calculation of the advertising code. The establishment of a community needs to establish an emotional relationship with each other based on the user’s social relationship chain. At the same time, it is necessary to create a high-quality community culture based on intelligent data, integrate users with scenes, and effectively improve the reach of advertisements.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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