Theory and Practice of Artificial Intelligence Recommendation System in Precision Marketing--Taking TikTok as an Example

Li Yingying

Liaoning University of International Business and Economics, Dalian Liaoning，116000；

Abstract: The artificial intelligence recommendation system has reconstructed the precision marketing paradigm by relying on big data models, and theTikTok e-commerce platform is a pioneer among them. TikTok's intelligent recommendation system drives four major innovations: intelligent product selection, intelligent marketing, intelligent shopping guide and intelligent customer service. However, the system faces problems such as increased information cocooning, algorithmic bias and user privacy anxiety. The optimization path needs to integrate technological improvement, institutional transparency and user empowerment, and promote the transformation of algorithms from "efficiency tools" to "value coordinators", so as to achieve a balance between commercial value and social well-being.

Keywords：AI recommendation system；precision marketing；TikTok；intelligent marketing

DOI:10.69979/3041-0843.25.02.004

1 Introduction

In the current rapid development of digital economy, artificial intelligence (AI) recommendation system has become the core driving force in the field of digital marketing. The 2025 AI Marketing New Paradigm Application Guide shows that the core market size of China's AIGC industry was 47.17 billion yuan in 2024, and the AI marketing industry is expected to reach a market size of 66.9 billion yuan in 2025.Behind this data is the complete reconstruction of the marketing ecosystem by AI. This technological innovation not only re-configures the marketing logic of "People-Goods-Place", but also gives birth to a new business ecology of "algorithm as channel". As a phenomenal platform in the field of short videos, TikTok relies on the recommendation algorithm that handles 20 billion user interactions per day, and successfully builds an accurate marketing network covering 600 million daily users.Therefore, the technical implementation and theoretical innovations behind it need to be systematically researched.

Nowadays, when algorithms increasingly dominate the digital business ecology, this research is valuable for promoting the sustainable development of intelligent marketing. At the theoretical level, this paper will deconstruct the coupling mechanism between intelligent recommendation system and precision marketing theory,and explore how to integrate the principles of user profiling and recommendation algorithm with consumer behavior theory and personalized marketing theory, so as to provide theoretical support for brands to establish precision marketing strategies based on the characteristics of recommendation system. At the practical level, this paper will provide a replicable application paradigm for the precision marketing practice of brands in the era of digital e-commerce by deconstructing the algorithmic operation mechanism and marketing cases of the Jitterbug platform. At the same time, it will provide methods for the optimization of AI recommendation system in precision marketing against the existing drawbacks.

2 Precision marketing characteristics in the era of AI

2.1 Multi-dimensional user profile

While traditional marketing relies on structured data such as purchase records and demographic attributes, AI era builds a holographic user profile by integrating unstructured data such as images, voice, and biometrics (e.g.heart rate

fluctuation), which improves the accuracy rate of user intent recognition. In addition, the basis of marketing decision-making for brands extends from “quantifiable indicators” to “unstructured emotional signals”, and the integration of multimodal data extends demand insights from “explicit expression” to “subconscious signals”. Besides, affective computing technology decodes the emotional implication of users' social media comments. This algorithm-driven market segmentation expands traditional demographic variables (age, gender) to multi-dimensional features such as behavioral trajectories (completion rate) and emotional tendencies (emoji recognition, comment semantics), and reconfigures the theoretical connotation of the “consumer profile”.

2.2 Dynamization of marketing strategies

AI algorithms break through the static framework of traditional theories and promote the evolution of marketing decisions to dynamic game. User behavior data is transmitted in real time through the AI system, so that its behavioral characteristics and model reasoning are updated in a very short time. Taking the dynamic pricing strategy as an example, the AI price optimization system can automatically adjust product prices based on historical data and real-time market conditions to achieve the optimal pricing strategy and improve the enterprise's market responsiveness and competitive advantage. Many e-commerce platforms use dynamic pricing systems, such as triggering exclusive discount pop-ups when a user is monitored repeatedly browsing a certain mobile page. This kind of dynamic pricing based on real-time behavior enables the customer unit price to be increased.

2.3 Efficient marketing results

AI recommendation system upgrades the traditional way of marketing reach. For example, Dialogue Status Tracking (DST) technology analyzes users' intentions and recommends them in real-time during customer service chat, which increases the conversion rate of consultation; the knowledge graph unifies the management of users' omni-channel interaction history (APP/Offline Stores) to ensure the cognitive consistency of the brand information in multi-touchpoints. For example, the user's offline trying on record will influence the next day's APP homepage recommendation in real time, which will increase the cross-channel conversion rate.

3 TikTok E-commerce Marketing Innovation Model Driven by AI Recommendation System

TikTok e-commerce has built a new paradigm of marketing centered on data through the deep integration of AI technology.

3.1 Intelligent product selection

The rise of AI recommendation systems has changed the history of product selection based on manual experience.AI tracks the correlation between content hotspots and search trends by integrating the transaction data of e-commerce platforms, the hotness of social media topics, and search keywords, utilizing the data to accurately predict the market trend and guiding sellers to accurately prejudge the hot-selling products and the outbreak cycle. A cross-border seller in Shenzhen captured the trend of TikTok's “intelligent beauty mirror” through AI, combined with the supply chain to quickly prepare goods, and sold out in 14 minutes, with average daily sales exceeding the traditional team by 50 times. In addition, AI analyzes historical sales data and keywords of bad reviews to successfully warn of the risk of slow-moving products and reduce business losses.

3.2 Intelligent Marketing

TikTok's marketing innovation is also reflected in its high-quality, efficient and low-cost intelligent content generation. In terms of content generation, TikTok develops the “Jichuang” platform, which realizes a closed loop of free automatic production-testing-iteration of materials. For example, 200+ creative solutions can be generated in 10 seconds by inputting the parameters of goods, and inefficient source materials can be eliminated in real time through the CTR estimation model; at the same time, the AIGC technology is used to generate the highest-quality live streaming videos and provide personalized copy for live streamers through data analysis. In addition, TikTok has also launched the “intelligent live streaming” function, which generates personalized pallets and speech plans for kol and reduces the threshold of the live

streaming of the new streamers and one-person team.Besides, TikTok has introduced digital human streamer. AI streamer breaks through the physical limitations of human streamers, supports all-weather live streaming, and does not need to create speech scripts, just with real-time automatic speech optimization system to improve conversion efficiency. The AI recommendation system helps sellers to significantly reduce the cost of content production and improve production efficiency, promoting the innovation of marketing content production paradigm.

3.3 Intelligent shopping guide

Virtual try-on technology breaks through physical limitations to realize online product experience. For example, a gold necklace brand, through customization services, using AR try-on function to make jewelry on the screen 360 degrees rotating display, successfully reduce will return rate. In addition, AI will be based on the current consumer preferences, through the cross-category recommendation engine to dig the commodity association rules, such as in the user to buy tents automatically match the moisture-proof pad and other peripheral goods, to enhance the customer unit price.Besides, AI shopping guide brings the strengthening and fission of consumers' social attributes. The user's virtual image can be shared and worn to the community, bringing fission traffic.

3.4 Intelligent Customer Service

The intelligent customer service system reshapes the service process through natural language processing technology. TikTok's e-commerce customer service system accurately analyzes fuzzy demand based on the multi-round dialogue comprehension model, and embeds active marketing mechanisms in the service, such as recommending similar new products when users inquire about returns, and issuing coupons before the dialogue window closes. The intelligent customer service system can reduce the comprehensive service costs of sellers and improve the consultation conversion rate compared with the purely manual mode.

4 Problems of precision marketing brought by AI recommendation systems

4.1 The dilemma of technical limitations

The information cocoon effect is amplified by the self-reinforcing mechanism of collaborative filtering algorithms. The user's historical behavioral data triggers the cyclic push of similar content, resulting in a narrowing of the interest dimension and a significant reduction in the diversity of cultural consumption. Second, the problem of data bias is particularly prominent in the long-tail market. The popularity-based recall strategy makes the head goods occupy too much traffic resources, while the failure rate of new product cold launch for small and medium-sized sellers is high.

4.2 Algorithmic trust crisis

Digital trust is the cornerstone of digital economic development and digital society construction. Consumer resistance to precision marketing presents a behavioral paradox. Although consumers enjoy personalized services, they are still worried about excessive data collection. On the one hand, the psychological mechanism manifests itself in the deprivation of a sense of control, when users find that “the product they just talked about immediately appears on the recommendation page”, they will have a sense of being monitored and anxiety; on the other hand, it manifests itself in the erosion of decision-making autonomy, as shown in the test of TikTok, some users take the initiative to click on “Reduce this type of recommendation” due to the recurring appearance of the same product. This kind of recommendation”. These resistances directly lead to higher interaction costs, and also build a bad shopping experience for consumers.

5 Optimizing countermeasures

5.1 Build an efficient and responsible algorithmic architecture

The core of optimization of the current intelligent recommendation system is to break the dichotomy between efficiency and fairness. At the technical level, it is necessary to integrate the dual mechanisms of cross-domain interest mining and privacy computing to complete the model training under the premise that user data does not go out of the domain to meet the requirements of the Personal Information Protection Law. For the problem of information cocoon, the

relevant technology can be improved while strengthening manual intervention, such as manually expanding the diversity content pool, forcing the recommendation system to break through the interest boundary.

5.2 Establish an open and transparent governance system

Platforms can establish a transparent mechanism to explain to users the working principle of their recommendation algorithms and recommendation logic to help users better understand the basis for selecting recommended content. For example, TikTok's “Recommendation Explanation” function makes algorithmic decision-making traceable; besides, platforms can improve flexible authorization and allow users to dynamically adjust the scope of data sharing; additionally, platforms can eliminate consumers' uneasiness by accepting three-party supervision.

5.3 Reinvent consumer's main position

The core trend of future marketing is to shift from “algorithm-led” to “human-machine symbiosis”. On the one hand, platforms should develop user empowerment tools to allow consumers to independently control the intensity of recommended diversity; on the other hand, they should explore two-way value creation modes to enable content producers to participate in feature engineering optimization to enhance the humanistic perceptiveness of the algorithms. Empowering users with algorithmic control can be conducive to the enhancement of purchase intention.

6 Conclusion

Artificial intelligence recommendation system has profoundly reconstructed the underlying logic and practice paradigm of precision marketing through data-driven and algorithmic optimization. The practice of platforms represented by TikTok shows that the system has realized a leap in marketing efficiency through dynamic modeling of user profiles, deep mining of interest links and real-time decision engine. However, the technological dividend is accompanied by challenges such as information cocoon, algorithmic bias and privacy erosion, the essence of which is the conflict between efficiency logic and humanistic values. In the future, we need to build a ternary synergy framework: at the technical level, the model should be optimized to balance accuracy and fairness; at the institutional level, algorithmic auditing and flexible authorization mechanisms should be established to guarantee compliance and transparency; and at the experiential level, the status of the subject should be reshaped through user empowerment tools. When the algorithm evolves from an “efficiency tool” to a “value coordinator”, precision marketing will go beyond the primary goal of transaction achievement, and move towards a new stage of creating resonance, empowering decision-making, and increasing social well-being, and ultimately realize a dynamic balance between commercial value and social rationality.

Reference

[1]China Academy of Information and Communications Technology,Digital Trust Development Report (2025),2025.
[2]Weiboyi, A Guide to the Application of the New AI Marketing Paradigm ,2025.
[3]Alibaba,Deep Interest Network for Click-Through Rate Prediction, 2017.