

The Application and Effect of Intelligent Marketing Technology and Personalized Recommendation System in E-commerce

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Abstract: Intelligent marketing technology and personalized recommendation systems play an important role in e-commerce, which has a significant impact on improving user experience and promoting sales growth. This article mainly explores the application and effectiveness of intelligent marketing technology and personalized recommendation systems, as well as their value and impact on e-commerce. In the future, with the continuous progress of technology, intelligent marketing technology and personalized recommendation systems will play a broader and deeper role in the field of e-commerce. Intelligent marketing technology and personalized recommendation systems have shown widespread application and significant effects in e-commerce. They enhance user experience and promote sales growth, which is of great significance for the development and promotion of e-commerce.

Keywords: Intelligent Marketing Technology; Personalized Recommendation System; E-commerce; Business Applications.

1. Introduction

With the rapid development of the Internet and the rise of e-commerce, intelligent marketing technology and personalized recommendation systems have gradually become important tools in the field of e-commerce. In a fiercely competitive market environment, businesses need to attract users' attention and facilitate purchasing behavior through effective marketing methods. Intelligent marketing technology and personalized recommendation systems provide merchants with the ability to accurately locate and personalized recommendations, thereby improving users' shopping experience, increasing sales revenue, and establishing good customer relationships. This article will focus on exploring the application and effectiveness of intelligent marketing technology and personalized recommendation systems in e-commerce. In addition, we will also discuss the challenges and future development prospects of intelligent marketing technology and personalized recommendation systems. By deeply understanding the application of intelligent marketing technology and personalized recommendation systems, enterprises can better utilize these technologies, enhance competitiveness and market share [1].

2. Overview of Intelligent Marketing Technology in the E-commerce Environment

2.1. Development and Characteristics of E-commerce

E-commerce refers to the process of utilizing internet technology for commercial activities and transactions. With the popularization of the Internet and the continuous progress of technology, we can see that e-commerce has made rapid development in the past few decades. Now, we can purchase various goods and services through online shopping, without being limited by geographical location. The characteristics of

globalization enable businesses to conduct transactions and cooperate across national borders, allowing consumers to purchase what they need from any corner of the world. The rapid transmission and interactive characteristics of the Internet have also brought about the real-time nature of e-commerce. Merchants and consumers can access information, communicate, and complete transactions in a timely manner through the internet. Consumers can stay informed of product information and prices at any time, and quickly complete transactions through online purchases. This real-time nature makes the entire shopping process more convenient and efficient. E-commerce also provides personalized services and recommendations. By collecting user data and behavioral information, merchants can understand their preferences and needs, and provide personalized product recommendations and marketing strategies for different users. Personalized services and recommendations provide consumers with a more thoughtful and customized experience. E-commerce has also brought diverse trading methods. In addition to traditional online shopping, e-commerce also includes various transaction methods such as online payment, auction, reservation, and electronic ticketing. This diverse choice provides consumers with more convenience and flexibility. The development of e-commerce has brought about global business activities, real-time communication and transactions, personalized services and recommendations, and diverse trading methods. These characteristics have made e-commerce an indispensable part of modern commerce[2].

2.2. Concept and Classification of Intelligent Marketing Technology

Intelligent marketing technology is a method and tool that utilizes technologies such as artificial intelligence, big data, and machine learning to analyze and mine user behavior and data, in order to achieve precise marketing and personalized recommendations. Firstly, data analysis and mining are an application method of intelligent marketing technology. By analyzing and mining a large amount of user data, users'

preferences, purchasing behavior, and consumption habits can be revealed, in order to provide more accurate recommendations and marketing strategies for users. Secondly, user behavior analysis is also an important aspect of intelligent marketing technology[3]. By analyzing users' browsing, searching, and purchasing behavior on websites or mobile applications, we can understand their interests and needs, and conduct personalized recommendations and targeted marketing. Predictive analysis and machine learning are also key components of intelligent marketing technology. By utilizing machine learning and prediction algorithms, user behavior and trends can be predicted and analyzed, and potential purchasing intentions and target customers can be identified in advance. In addition, natural language processing and emotional analysis also play an important role in intelligent marketing technology. Through natural language processing and sentiment analysis techniques, users' emotional tendencies and attitudes in text data such as social media, comments, and evaluations can be analyzed, providing users with feedback and improvement suggestions for enterprises, see Figure 1.

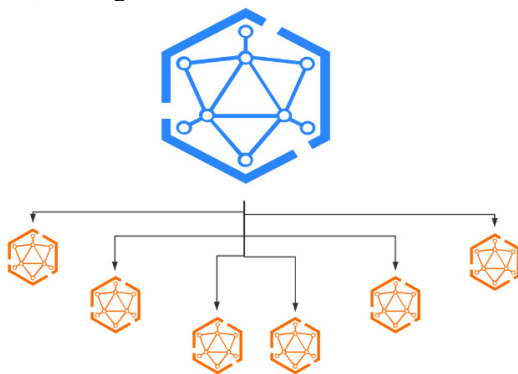


Figure 1. Intelligent marketing technology

2.3. The Role and Advantages of Intelligent Marketing Technology in E-commerce

Intelligent marketing technology has many advantages and roles in e-commerce. It can achieve precise positioning and personalized recommendations, provide personalized recommendations and discount plans based on users' needs and interests, and improve their shopping experience and satisfaction. Intelligent marketing technology can improve sales conversion rates. By analyzing users' purchasing behavior and historical data, predicting their purchasing intentions, and adopting corresponding marketing strategies and push notifications, sales conversion rates and order value can be effectively improved[4]. Intelligent marketing technology can also reduce customer acquisition costs. Through precise positioning and personalized recommendations, businesses can better attract potential customers, reduce the cost of customer acquisition, and improve market competitiveness. Intelligent marketing technology can help businesses establish good customer relationships. Through personalized marketing and care, businesses can improve customer loyalty and repurchase rates, achieving long-term stable business growth.

3. Principles and Algorithms of Personalized Recommendation Systems

3.1. Definition and Function of Personalized Recommendation System

Personalized recommendation system is a system that utilizes users' historical behavior data, preferences, and other related information to provide personalized recommendation content to users[5]. Its main function is to recommend items, content, or services that may be of interest to users based on their interests and needs, providing a better user experience and enhancing user engagement, see Table 1.

Table 1. Personalized recommendation function

Aspects of Personalized Recommendation System	Description
Utilizes user data	The system collects and analyzes users' historical behavior data, preferences, and other related information to understand their interests and needs.
Recommends relevant items	Based on the user data analysis, the system recommends items, content, or services that align with the user's interests and preferences, increasing the chances of a successful recommendation.
Enhances user experience	By providing tailored recommendations, the system enhances the user's browsing or shopping experience, making it more personalized and enjoyable.
Increases user engagement	Personalized recommendations increase user engagement by offering content or products that are more likely to capture the user's interest and encourage further interaction.

3.2. Content based Recommendation Algorithm

Content based recommendation algorithms utilize the feature information of items (such as products, articles, music, etc.) to match user preferences and recommend similar types of items to users. The basic idea of the algorithm is to analyze the attributes and features of an item, construct a description model of the item, and then match similar items for recommendation based on user preferences and historical behavior. This algorithm is suitable for scenarios where items have clear features and descriptions, such as movie classification, product labeling, etc. [6].

3.3. Collaborative Filtering Recommendation Algorithm

Collaborative filtering is a commonly used recommendation algorithm based on user behavior. Its basic principle is to find similarities between users or items, and recommend other users or items with similar interests to users. Collaborative filtering algorithms are mainly divided into two categories: user based collaborative filtering and item based collaborative filtering. Based on user collaborative filtering, identify other users with similar interests to the target user and recommend their favorite items; Collaborative filtering based on items identifies other items that are similar to the items the

user likes and recommends them to the user.

3.4. Hybrid Recommendation Algorithm

The hybrid recommendation algorithm combines various types of recommendation algorithms, comprehensively utilizing their advantages to improve recommendation effectiveness and accuracy. Hybrid recommendation algorithms can be combined through weighted fusion, parallel operation, or serial operation. For example, content-based recommendation algorithms and collaborative filtering algorithms can be combined, while utilizing item feature information and user behavior data for recommendation.

4. Application of Personalized Recommendation System in E-commerce

4.1. Personalized Product Recommendation Personalization

Product recommendation is one of the most common applications in e-commerce. By analyzing users' historical purchase records, browsing behavior, preferences, and other information, personalized recommendation systems can recommend products that users may be interested in. Such recommendations can improve users' shopping experience, increase user satisfaction, and help increase the sales and conversion rate of e-commerce platforms.

4.2. Personalized Coupons and Promotional Activity Recommendations

The personalized recommendation system can customize personalized coupons and promotional activities for users based on their purchase history, preferences, and needs. By pushing coupons and promotional information tailored to users' preferences and needs, e-commerce platforms can increase their engagement and loyalty, and promote their purchases.

4.3. Personalized Search and Browsing Experience

The personalized recommendation system can also be applied to the search and browsing functions of e-commerce platforms to provide better search results and browsing experience. By analyzing users' search keywords, click behavior, and browsing paths, personalized recommendation systems can understand their intentions and preferences, and present relevant products and recommended content to users in a targeted manner. This can improve the accuracy and efficiency of user searches, and provide a more personalized and customized browsing experience. The application of personalized recommendation systems can bring various benefits to e-commerce platforms, including increasing sales, improving user satisfaction, promoting user participation and loyalty, and so on. By utilizing user data and intelligent algorithms, personalized recommendation systems can achieve precise recommendations, meet users' personalized needs, provide a better user experience, and promote the development of e-commerce.

5. Challenges and Prospects of Intelligent Marketing Technology and Personalized Recommendation Systems

5.1. Data Privacy and Security Issues

As personalized recommendation systems need to handle a large amount of user data, data privacy and security have become important issues. Protecting the privacy and security of user data, complying with the use and storage of user data, and establishing reliable data processing mechanisms are one of the challenges faced by intelligent marketing technology and personalized recommendation systems.

5.2. Integrated Marketing Across Platforms and Channels

In today's e-commerce environment, consumers often shop and interact on multiple platforms and channels. How to achieve integrated marketing across platforms and channels, apply personalized recommendation systems to different platforms and channels, and provide consistent recommendation services is a challenging task for enterprises.

5.3. Future Development Trends of Intelligent Marketing Technology and Personalized Recommendation Systems

In the future, intelligent marketing technology and personalized recommendation systems will continue to develop and innovate. Combining artificial intelligence and machine learning technology to improve the accuracy and predictive ability of recommendations. Utilize technologies such as deep learning and natural language processing to achieve comprehensive recommendation of multimodal data such as text, images, and videos. Emphasize user participation and personalized control, allowing users to participate more actively in the recommendation process. Combining social media and user generated content to obtain more user feedback and trust information. Promote the interpretability and transparency of personalized recommendation systems, and enhance users' understanding and trust in recommendation results. Integrating virtual reality (VR) and augmented reality (AR) technologies to provide users with a more immersive and personalized shopping experience.

6. Conclusion

Intelligent marketing technology and personalized recommendation systems have broad prospects in the field of e-commerce. However, achieving this goal requires addressing data privacy and security issues, optimizing algorithms to enhance user experience, and achieving integrated marketing across platforms and channels. The future development trends include combining artificial intelligence and machine learning technologies, utilizing multimodal data, emphasizing user participation and personalized control, combining social media and user generated content, improving interpretability and transparency, and integrating virtual reality and augmented reality technologies. Overall, intelligent marketing technology and personalized recommendation systems will continue to develop, bringing greater business value and user experience to e-commerce enterprises.

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