The Application of Artificial Intelligence in Electronic Commerce

Xia Song¹, Shiqi Yang¹, Ziqing Huang² and Tao Huang³

¹Shandong agriculture and engineering university, jinan, shandong, China
²Shandong normal university, jinan, shangdong, China
³Sinopec lubricating oil co. LTD, jinan, shangdong, China
E-mail: song@sdaeu.edu.cn

Abstract. With the rapid development of science and technology and economic society, the application of artificial intelligence(AI) is more and more common, its development has a profound impact on our work and lifestyle. In the field of e-commerce, AI technology has also been well applied and achieved good results. AI has become an important driving force for the development of e-commerce. This paper simply described the e-commerce development situation and prospects of AI technology, analyzes the present situation of the application of AI technology in the field of e-commerce, mainly study and discuss in detail from the aspect of assistant of AI, intelligent logistics, recommendation engine and the optimal pricing application through the research of e-commerce intelligent operation instance - Baidu take-away, probes into the important impact and great significance on the e-commerce development of artificial intelligence.

1. Introduction

Artificial intelligence has been developed for more than 60 years, and its research results have penetrated into every aspect of our economy and society, and many outstanding achievements have been made. In 1997, for example, IBM's dark blue computer beat the human world chess champion, marking the official arrival of the AI era. In 2016, Google Alpha G beat the top human professional go player lee se-dol, making artificial intelligence almost synonymous with the future. In 2017, the state council issued the development plan for the new generation of artificial intelligence, formally establishing the national strategic goal for the development of the new generation of AI in China. AI which has already shown its value in industries such as marketing, healthcare, finance and education, is now making its presence in e-commerce.

In recent years, e-commerce has made remarkable achievements. While enjoying the convenience brought by e-commerce, people also put forward higher and higher requirements for it. The emergence of artificial intelligence technology opens up new ideas and patterns for the development of e-commerce. According to market research firm Gartner, by 2020, more than 80% of customer service jobs will be replaced by artificial intelligence. Alibaba, Rakuten, Amazon and other companies will use artificial intelligence technology to conduct comment mining, develop chatbots, make product recommendations and process big data. Ubisend report provides some interesting statistics: one in five consumers buys goods and services from chatbots; Consumers spend more than 317.74 through chatbots; 40% of consumers use chatbots to find deals; Google paid 400 million pounds for DeepMind, an artificial intelligence firm.
2. Electronic Commerce and Artificial Intelligence

E-commerce has developed strongly in recent years, in 2018 China's online retail market scale continues to expand, the online retail sales reached 9 trillion yuan. Among them, online retail sales of physical goods totaled 7 trillion yuan, increase 25.4% from a year earlier, contributed to 45.2% of total retail sales of social consumer goods increase, a 7.3% increase in 2017. The rapid development of e-commerce, brings convenience to consumers. In order to optimize operational efficiency, improve the quality of service, the electronic commerce platform continuously explore new ways to meet more demands of consumers. The emergence of artificial intelligence has opened up new ideas and patterns for the development of e-commerce and patterns, Its value to electronic commerce industry will be omni-directional.

2.1. Electronic Commerce

Electronic Commerce (EC) refers to the use of the Internet and modern communication technology for any form of business operation management or information exchange. The core of E-commerce is business model based on electronic equipment and network technology. E-commerce electronize the business processes of all business activities, including not only the externally oriented business processes in business activities of enterprises, such as network marketing, electronic payment, logistics and distribution, but also the internal business processes of enterprises, such as Supply Chain Management (SCM), Enterprise Resource Planning (ERP), Management Information System (MIS), Customer Relationship Management (CRM), Human Resource Management (HRM). The main technology foundation of e-commerce includes: Electronic Data Interchange (EDI), Internet, Extranet, Intranet, E-mail, database, Web development technology, etc.

E-commerce is an economic and technological revolution, it is the product of economic, scientific, technological and cultural development. It is based on the Internet, with the support of computer network technology, Realize the close integration of business technology, information technology and management technology with strong comprehensive characteristics. The development of e-commerce change the mode of business activities of enterprises and people's consumption behavior, and makes great contributions to global economic progress.

2.2. Artificial Intelligence

Artificial Intelligence (AI) is a new technology science that develops theoretical methods, technologies and applications to simulate and extend human Intelligence. In the summer of 1956, a group of visionary young scientists led by McCarthy minsky rochester and shennong came together to study and discuss some related issues of using machine to simulate intelligence, and proposed the term of artificial intelligence for the first time. It marks the formal birth of the emerging artificial intelligence discipline, and has become a broad interdisciplinary frontier science.

Artificial intelligence is a technical subject, which can realize the automatic operation of mental work by simulating and extending human intelligence. Artificial intelligence technology takes intelligent technology as the core, and on this basis, intelligent machines similar to human mental work are developed, such as robot, voice world, image recognition, etc., which can make immediate response after receiving control commands. AI technology are closely related to computer psychology, biology, linguistics, medicine and other disciplines. With the continuous improvement of the level of modern social science and technology, artificial intelligence involves in a broader field, the mechanical products also has a higher level of intelligence that can performe human control commands. The development of artificial intelligence technology and computer technology are closely related to each other and mutual influence and common progress. At present, the mainstream technology of artificial intelligence mainly involved in machine learning and interactive learning. Machine learning is a branch of computer science, which can also be considered as an interdisciplinary subject of pattern recognition or artificial intelligence, data mining, probability theory, statistics and other disciplines. Machine learning and numerical optimization have a high coincidence degree.
3. The Application of Artificial Intelligence Technology in Electronic Commerce

Along with the development of science and technology, Artificial intelligence technology is becoming more and more mature and is dramatically changing the way people work and live, especially in the field of electronic commerce, artificial intelligence technology has gradually developed into a powerful tool to boost sales growth and optimize e-commerce operations. At present, the application of artificial intelligence in the field of e-commerce is mainly reflected in the following aspects:

3.1. Artificial Intelligence Assistant

An artificial intelligence assistant (chatbot) whose primary function is to automatically respond to customer questions, respond to simple voice commands, and provide product recommendations using a natural language processing system. Chat dialogs on e-commerce sites and mobile pages are based on machine learning algorithms programmed to communicate with customers in a personalized manner. Chatbots can help consumers find suitable products, check the supply situation of products, compare various products, and finally help consumers to pay. If there are any complaints or questions, the chatbot can also help customers contact the corresponding service personnel. Consumers can talk to the robots through text, voice and even pictures. In March 2017, alibaba launched Shop Xiaomi, an artificial intelligence service robot, a chatbot for taobao merchants. After authorization and debugging by merchants, chatbots can replace some customer services, effectively reduce labor costs, optimize user experience, improve service quality, and Maximize night traffic recovery, as well as help customer service to solve repeated consultation problems.

3.2. Recommendation Engine

Recommendation engine is a complete recommendation system based on machine learning algorithm framework. Using AI algorithm can realize deep learning, statistical programming, prediction and analysis of customer behavior, of massive data sets, and predict which products are likely to attract customers. First, based on recent searches by potential customers, the machine learning algorithm in the recommendation engine is able to record key details of the searched product based on the calculation results, The recommendation engine then generates appropriate Suggestions for the browser and lists them on a personal page, ultimately helping consumers find the product quickly. The application of dimensionality reduction algorithm opens the transformation of recommendation system by artificial intelligence, The most profound change of the recommendation system by artificial intelligence is that the recommendation system is no longer regarded as an independent combination of recommendation results, but the whole human-computer interaction behavior. The dynamic dimension of the system and the user can be realized by introducing the time dimension, Many e-commerce companies, such as amazon, alibaba, taobao and jd.com, use recommendation engines to identify the target audience for their products.

3.3. Intelligent Logistics

Intelligent logistics refers to a logistics development mode in which equipment and control are made intelligent by using information technology, so as to replace people with technical equipment. Compared with traditional logistics mode, intelligent logistics can greatly improve service quality and operation efficiency. The concept of Intelligent logistics was first proposed by IBM in 2009. Initially, IBM proposed a smart supply chain that would generate real-time information through sensors, RFID tag, brakes, GPS and other devices and systems. The most immediate impact of AI is on the rear-end supply chain and logistics links. Forecasting inventory is not simple in the face of rapidly changing demand and competitive markets, However, artificial intelligence and deep learning algorithm can determine the key factors of order cycle and calculate the influence of these factors on turnover and inventory through the model. The advantage of machine learning systems is that they can become smarter over time, making it more accurate for businesses to predict inventory demand. At present, in the field of intelligent logistics and warehousing, Alibaba and JD have released unattended automated intelligent storage systems.
3.4. Optimal Pricing
The current e-commerce industry is booming. Even for small inventory online retailers, this kind of long-term continuous price adjustment is a big challenge. Artificial intelligence technology, which can process big data quickly, has basically solved the problem of automatic pricing of a large number of products. Product rating, logistics price and service quality will affect the final comprehensive ranking results. For merchants, optimal pricing is very difficult, and this kind of pricing problem needs to be studied in depth is what artificial intelligence is good at. With advanced deep machine learning algorithms, AI technology can continuously evaluate market dynamics and change the competitive environment to solve the problem of optimal pricing.

4. Practice Case Analysis of Electronic Commerce Intelligent System
As artificial intelligence technology becomes more mature, more and more commercial applications of artificial intelligence are implemented. This paper takes Baidu takeout system as an example to discuss the importance of intelligent technology of e-commerce system. Baidu takeout is a domestic e-commerce model based on O2O (Online TO Offline). Relying on the platform to link merchants and users, the platform provides services such as delivery, new retail, medicine, running errands, etc. Based on localized intra-city logistics mode, delivery service that meets timeliness and security is provided.

The basic process of take-out business mainly includes the following three steps: the user places an order, dispatches, courier delivery. The main purpose of system flow is to facilitate users to place orders, and timely delivery of orders. The key is to improve the efficiency of allocation, while creating more value for users and merchants, smart technology is its core competitiveness.

Baidu takeout system is the first takeout system built with streaming computing and intelligent scheduling algorithm in China. Baidu takeout is mainly composed of two systems: recommendation system and scheduling system. Through the recommendation and scheduling system, dynamic data such as order log, courier status, real-time scene and click log are analyzed to complete real-time and effective delivery. At the same time, through the combination of static data such as user portrait, food information, merchant portrait and scene preference and real-time scene to achieve accurate recommendation. Through intelligent scheduling and recommendation, the average waiting time of users can be reduced by 28%, and the efficiency of order delivery can be improved by 100%.

4.1. Intelligent Scheduling System
The most important part of the delivery system is the intelligent scheduling system, which mainly includes intelligent dispatching and path planning. In the traditional e-commerce time, scheduling is mainly completed by the dispatcher. It is assumed that a dispatcher can manage about a thousand orders a day. If one million orders are to be realized every day, there will be a thousand dispatchers, which is a very large operation system. In the era of OTO, the system needs to deal with a large number of orders and data, which requires an intelligent and fully automatic scheduling system. It needs to select the right courier, and take into account LBS location information and order combination and other information to achieve the optimal distribution route.

The architecture of baidu takeout system is shown in figure 1. Constraint variables under real-time scenario are built by collecting GIS service of courier, orders and relevant data of users, etc., and real-time scheduling is realized by algorithms such as flow calculation, prediction model, correlation ordering and dynamic planning, etc., including route planning, intelligent navigation, order automatic allocation, etc.

In order to achieve better real-time scheduling, the system also implements the off-line monitoring forecast and distribution functions. Among them, the off-line prediction uses intelligent means to realize the prediction of hot spots and transport capacity, these prediction information can be combined with scheduling system, based on the offline scenario analysis to achieve the optimal distribution route. In addition, it can realize automatic business layer functions such as courier management, merchant management, scheduling detection and distribution monitoring, and can also be used to monitor and adjust the distribution network in real time.
Through the intelligent scheduling and distribution system, the average empty driving mileage of each order of the courier is greatly reduced, and the accurate real-time courier status data can reach tens of millions of times of calls a day. The estimated accuracy of the time of meal delivery of the merchants can reach 80%, and the estimated error rate of the orders is less than 3%.

4.2. Intelligent Recommendation System
Baidu take-out can realize data and scenarios analysis and user portrait through intelligent recommendation system. For complex scenarios such as different user, regions and time periods, different orders of merchants and dishes are presented to meet the needs and interests of all participants in the business take-out platform provides a fairly benign competition environment, meet the needs of users for multi-scenario, personalization and taste, provide new opportunities for businesses, set up good business growth system, increase the user viscosity, significantly improve user conversion rates.

The recommendation system of baidu takeout mainly consists of six parts: data processing layer, merchant modeling layer, algorithm layer, strategy layer, user modeling layer and application layer, as shown in figure 2.

---

**Figure 1.** Architecture diagram of delivery system

---

**Figure 2.** Schematic diagram of intelligent recommendation system

Merchant and user modelling includes offline and real-time parts. The offline data of merchant model includes merchant rating, appropriate scene, merchant label mining and merchant attributes. Real-time data includes real-time capacity, real-time inventory, merchant behavior and operational data, etc. The off-line data of the user modeling layer includes the user's long-term portrait and its short-term portrait. Real-time data includes purchase scenario analysis and real-time user portraits, etc. Through the efficient real-time computing system, the recommendation system analyzes the massive data of merchants and their users on baidu, depicts merchants and user models, and realizes the precise ordering of merchant, merchant recommendations and dish recommendations by diversified strategies to improve the click rate.
5. Conclusion
At present, e-commerce giants are actively applying artificial intelligence technology and optimizing their own e-commerce platforms to increase the competitiveness. Alibaba, Jingdong, and Amazon launched the intelligent service robot. In the field of logistics, e-commerce giants have also launched their own products. In terms of recommendation engines, Alibaba has a visual artificial intelligence platform DT PAI, Jingdong introduced image information platform Zhong Kui system and the character recognition system, so to speak, on the specific application of artificial intelligence, E-commerce enterprises have their own merits.

With the rapid development and continuous progress of research technology, deep learning platform, voice analysis technology, biometrics technology, image recognition technology, video analysis technology, robot automatic processing system, text analysis and natural language processing (NLP) and other mainstream artificial intelligence technologies will develop steadily, and AI will continue to promote the development and reform of e-commerce in the future.

Artificial intelligence techniques have stepped into the fast lane, with mature technology, is becoming more and more widely applied. It is having a growing impact on aspects such as customer retention and customer satisfaction in e-commerce transactions. As time goes on, Artificial intelligence will become an important driving force for the transformation of e-commerce. With the support of artificial intelligence technology, e-commerce will have a broader development prospect, which is conducive to the establishment of better customer relationship management and the promotion of sales to bridge the gap between personalization and privacy.

6. References
[1] Peng Mianzhu. Research progress and application overview of artificial intelligence [J]. Science and technology square, 2017 (10).
[2] David2AI. 5 ways artificial intelligence is shaping the future of e-commerce [EB/OL]. CSDN, 2018-03
[3] Chen Shangyi, jiang xiaolin, qin weijun. Intelligent practice of mobile e-commerce [J]. Information and communication technology, 2015,9 (04):9-14.
[4] Zhou Xiaoyuan. Artificial intelligence: ushering in the era of subversive intelligence [M]. Beijing: taihai press, 2018.
[5] Lin Jianhong. Application of artificial intelligence technology in e-commerce [J]. China business review, 2019(02):19-20.
[6] Sun Liang, Huang Qian. Practical machine learning [M]. Beijing: posts and telecommunications press, 2017.
[7] Wang Tianyi. Artificial intelligence revolution: history, present and future [M]. Beijing: Beijing times Chinese book company, 2017.
[8] Yang aixi, bu xianghong, yan jiaxiang. Artificial intelligence era: the future has come [M]. Beijing: posts and telecommunications press, 2018.
[9] analysis: what is ai doing for e-commerce? [EB/OL]. Net economy agency, 2017-04-16.
[10] inventory: top 10 ai e-commerce solutions in 2018 [EB/OL]. Web.com, 2018-06-26.