Design and implementation path of intelligent transportation information system based on artificial intelligence technology

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Abstract: By using the concept, guiding ideology and design idea of artificial intelligence (AI) and Internet of Thing, this study puts forward the logistics intelligent transportation system (ITS) model, structure design and function design based on AI, focusing on the time value and information value of the intelligent logistics information system. The results show that the design of ITS model based on AI includes three modules: input, transformation and output of ITS. The ITS supply chain management platform and function design of freight vehicles with AI is feasible and prospective. The application of AI technology in ITS has great value and development prospect.

1 Introduction
With the popularisation and application of artificial intelligence (AI) technology in intelligent transportation system and supply chain logistics management, the industry clearly feels that the diversified resource elements are shared with others in the Internet and Internet of Thing (IOT) era, can optimise the allocation of resources more rationally, save social costs, create more social wealth. Modern enterprises attach great importance to the transformation efficiency of raw materials and products and the economic benefits of scale transportation in their production and operation activities, and at the same time improve the utilisation rate of information resources and avoid repeated waste in information collection, processing and resource management. Therefore, this paper proposes the design and implementation path of intelligent transportation information system based on AI technology. In order to ensure the efficiency of intelligent transportation information sharing under the condition of information security and confidentiality, it depends on the technical development of information system and the application and improvement of new AI technology. [Fund projects: 2017 Chongqing Social Science planning major key Application project "International Logistics Transport Collaborative Research of China (Chongqing) Pilot free trade zone reform" (2017ZDYF17).]

2 Literature review
At present, AI is at the forefront of technological innovation, in recent years, the relevant research has also shown a concentrated outbreak trend. In 2017, Pan Yunhe proposed the concept of AI2.0, the distinctive feature of which is that the future AI system has the intelligent perception ability that is similar to humans even beyond humans [1]. In the future, AI will change the computer itself, combining data-driven machine learning methods with human common sense priori and implicit intuition to fully interpret, better robust, and more versatile AI algorithms [2].

With AI as the representative of logistics technology, services used in transport logistics information, automation, intelligence, to achieve logistics (transport) operations of high efficiency, low cost, especially unmanned, unmanned warehousing, unmanned distribution and logistics robots and other intelligent equipment, focus on improving the technical level of intelligent transport logistics [3]. For example, Chenghao [4] set up the warehouse model and use the modified A* algorithm to realise the path planning of single-pick point selection of stand-alone robot, which provides a reliable basis for logistics transportation and distribution. The innovative application of AI technology in the field of logistics is undoubtedly a sharp tool for the leap-forward development of economy and society. In the whole process of social employment, Weiguo [5] and others believe that AI substitution and creation effect coexist, but can make the creation effect have a greater impact through education, training and other means. Since AI technology and network security are intersecting [6], there will be ethical, technical, security and other potential risks, so it is necessary to carry out risk prevention and control of AI and legal supervision [7], to avoid irreversible harm.

A large number of logistics technology is a breakthrough to solve the bottleneck of intelligent Logistics, Yahong [8] believes that we can start from the aspects of cloud computing, logistics information recognition and collection technology, to achieve the management of logistics information system, such as Amazon's use of unmanned warehouse management operation mode and large cloud warehouse information sharing platform has greatly enhanced the core competitiveness of enterprises. The informatisation and intelligentisation of logistics in the future will become the development trend of the whole logistics industry. The economic benefits generated by the intelligent logistics information system are also significant [9].

3 Design of intelligent transportation information system

3.1 General thought of intelligent transportation information system design
This paper puts forward that the intelligent transportation information system is mainly composed of its input, its transformation and its output three parts. Firstly, the service system parameters, operating system parameters and deviation correction system parameters of ITS + AI are fed into ITS; Secondly, the cargo network management system, truck transportation management system and parking information management system integrated operation, so as to achieve information conversion; Finally, the IOT system platform, ITS + AI cargo transport integrated information interaction platform, AI + IOT integrated control and monitoring to achieve the entire ITS output. The specific model is shown in Fig. 1. In this picture, the solid line refers to logistics and the dotted line refers to information flow.

J. Eng., 2020, Vol. 2020 Iss. 13, pp. 482-485
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eISSN 2051-3305
Received on 14th October 2019
Accepted on 19th November 2019
E-First on 12th May 2020
doi: 10.1049/joe.2019.1196
www.ietdl.org
3.2 Architecture of intelligent transportation information system

In order to improve the supply chain management (SCM) level of freight vehicles, the structure of integrated operation system based on AI + ITS + IOT is constructed, which mainly consists of three modules: logistics information collection, processing and service, as shown in Fig. 2. In this part, the solid line refers to logistics and the dotted line refers to information flow.

3.3 Function of ITS information system

The function design of ITS takes the intelligent logistics transportation information system of freight vehicle as an example, and it includes four modules of information collection, information display, information analysis and information emergency output. Integrated by ITS and GIS control centers, including freight vehicles based on GPS satellite navigation and mobile communication location services. Finally, the supply chain logistics system integration, implement synergistic operation and collaborative management. The flowchart is shown in Fig. 3. In this part, the solid line refers to information flow.

3.4 Application analysis

Taking the transportation cost calculation of AI algorithm in the whole ITS information system as an example. According to the definition of nested period, it is known that the order period obeys the rule of second power, and $T_1 \leq T_2 \leq T_n$. Under these conditions, the order period of customers with small numbers is short, so the combination of transportation routes in ITS information system is $\{1\}$, $\{1, 2\}$, $\{1, 2, \ldots, i\}$, $\{1, 2, \ldots, n\}$.

Using $M(\{1, 2, \ldots, i\})$ denotes the transport costs when the transport route is $\{1, 2, \ldots, i\}$. If $f_i = M(\{1, 2, \ldots, i\})$, then transport costs of the overall logistics system are available:

![Fig. 1 Design of intelligent transport information system model based on AI](image1)

![Fig. 2 Structure of ITS information system based on AI](image2)
clear that traditional logistics transportation cannot make a quick response to the external environment, and it is difficult to improve its transport efficiency to meet market demand. So in order to realise the intelligent, automatic and information management of logistics transportation system, we should focus on establishing three mechanisms of information sharing, integrity and benefit distribution.

4.1 Establish an efficient and agile information sharing mechanism
Information sharing mechanism is the basic driving force to ensure the operation of Agile logistics, and it is the rule, procedure and system. Through the establishment of an AI-based intelligent logistics information sharing platform, effectively connect suppliers, manufacturers, wholesalers, retailers and even consumers, sharing real-time information resources. For example, in the basic service layer for the operation of the entire shared platform to provide technical support and data integration, in the operational service layer to achieve intelligent transportation, warehousing and distribution management, in the public service layer to release basic logistics information and government, finance and other professional departments of internal information, so as to achieve the entire supply chain information platform management and control, improve the information management level of logistics enterprises.

4.2 Establish a reliable integrity mechanism
The first is to deeply tap the integrity of the capital and value benefits, and constantly develop the integrity of the industry chain. This is mainly manifested in two aspects: one is the formation of a group of operational norms, reasonable evaluation and high brand efficiency of credit institutions; Another is with the help of intelligent transportation technology, AI technology, all kinds of modern communication technology, identification technology, to create the Internet, IOT, letter networking ‘three networks in the same’ network system, all logistics, information flow, capital flow and so on into the ‘credit flow’, the establishment of market discredited early warning system etc. Also with the help of legal means to establish and improve the enterprise integrity evaluation system, with big data to achieve a full range of enterprise supervision and control. The second is to vigorously carry out honesty education, enhance personal integrity awareness. For example, using information engineering technology to expand the path and mode of traditional honesty education, so that virtual technology, emerging media and so on are involved in the integrity education, so as to enhance the educator's integrity cognition and choice.

4.3 Establishment of a sound benefit distribution mechanism
To realise the ITS based on AI and SCM, it first realises the value chain structure and function of the supply chain, and its core is to control the total cost of the supply chain. The theory of cost management originates from the emphasis on the idea of ‘income-cost-profit’ in accounting. To establish the benefit distribution mechanism of supply chain node enterprises is to strengthen the cooperation with upstream and downstream enterprises, make their own value chain and upstream and downstream customer value chain together, comprehensively coordinate and control suppliers, customers and their own costs, and take measures to correct deviations in a timely manner, so that the actual cost is limited to the target range. It is necessary to obtain the strategic cost advantage, establish the system view in the total cost management of the supply chain, and ensure that the supply chain node enterprise obtains the profit growth space while realising its own strategic goal.
5 Conclusion

Using the ideas and methods of AI, combined with logistics information system, this paper designs an intelligent logistics transportation information system oriented to AI and IOT, shortens the time to deal with problems, eliminates unnecessary obstacles, and greatly improves the efficiency of intelligent logistics transportation. The structure and function design of the system are completed, and the realisation path of the corresponding information sharing mechanism, good faith mechanism and benefit distribution mechanism is put forward. From the system level to ensure the effective operation of the system. The results show that the design and implementation path of the system has theoretical value and practical significance in engineering sense. The research conclusion fully shows that the flexible application of AI + IOT + ITS comprehensive application platform and design method can be considered in the future in order to realise the economic and social benefit goal of intelligent logistics transportation information system.

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