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# Innovative Research on Integrating Artificial Intelligence Technology into Urban Traffic Management

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**Abstract**: With the continuous progress of science and technology, the demand and application of artificial intelligence technology in the field of intelligent transportation are becoming higher and higher, especially with the increase in the number of urban vehicles, the corresponding urban traffic pressure is increasing. In some large cities, traffic is very congested, and traffic problems urgently need to be solved. The introduction of artificial intelligence technology can greatly improve urban transportation, fully utilize existing road facilities in the city, and make reasonable arrangements for urban transportation. This article first provides an overview of intelligent transportation and artificial intelligence, then discusses the current application status of artificial intelligence technology in urban intelligent transportation management. Finally, it analyzes the application trend of artificial intelligence technology in urban intelligent transportation management, hoping to provide reference for the development and research of intelligent transportation management.

**Keywords**: Information Technology , Translation Practice

## 1. INTRODUCTION

With the continuous development of China's economy, the transportation system is also constantly growing; Especially the transportation systems of aviation, highways, ports, public transportation, waterways, and rentals are developing faster and larger in scale, and their interconnections are becoming increasingly close. This requires higher requirements for transportation technology and information technology. In recent years, the country has invested heavily in urban construction (including transportation, security, urban management, etc.), but most of it has only spent more money on urban management, incorporating more high-tech equipment and electronic hardware. The actual data and information obtained are not considered as resources for urban management, but rather as so-called "technological tools". Such a city is like a city with well-developed limbs and a simple mind "vegetable", without a practical and flexible brain, the result is a large amount of data with few effects, a strong single point and a weak overall situation, and new technology with few implementations.

Smart transportation is an important application component of smart city construction, playing an important role in effectively solving urban transportation problems. In terms of smart transportation systems, it refers to a modern comprehensive transportation management system that effectively utilizes Internet of Things technology, cloud computing technology, big data technology, and artificial intelligence technology in the construction of urban transportation systems. Its efficient, real-time, and accurate management characteristics advantages enable it to effectively integrate various components of urban transportation, and on this basis, the improvement of transportation efficiency and the safety guarantee of people's travel should be achieved. When adverse situations occur, the traffic management or control system should call for appropriate intervention actions. The required system should be intelligent and able to operate dynamically based on driving dynamic data, which will be more interconnected than existing applications.

The goal of an integrated dynamic traffic management and information system (IDTMIS) is to develop a framework that includes all systems related to traffic management and control, thereby creating a multiuser, multidisciplinary traffic management system that integrates all applications and people involved in transportation. The purpose of this project is to understand the applicability of autonomy and distribution. Artificial intelligence systems in the field of transportation engineering. Improving the autonomy of intelligent systems in automation is a key factor, aimed at reducing the need for human intervention; Help people participate in other more complex programs and provide intelligent assistance in decision-making processes. At present, with the development of science and information technology, urban intelligent transportation has made significant progress and improvement compared to traditional transportation systems. In terms of urban public transportation, taxi systems, and long-distance passenger transportation, the level of intelligent informatization, passenger comfort, and supervision can meet most of the needs.

However, due to the continuous growth of urban population, increasingly complex transportation hubs, road networks, and route planning, as well as an increase in the number and types of public vehicles, many factors have led to pressure on urban transportation. So, in terms of the current situation, urban intelligent transportation cannot meet the needs of existing traffic management systems, enterprises, and urban populations. The main problems are as follows: the high-definition video monitoring system for urban intelligent transportation management refers to the use of internet technology to connect intelligent computers and road cameras together.

## 2. THE PROPOSED METHODOLOGY

### 2.1 The Application Status of Artificial Intelligence Technology in Urban Smart Traffic Management

This system is currently widely used in parking lots and high-speed toll stations, which can assist managers in effectively

managing and scheduling parking resources. It provides real-time information such as remaining parking spaces and guidance paths to drivers through electronic displays, reducing the time consumption of drivers searching for parking spaces, improving the convenience of drivers' use, and ensuring the standardization and simplicity of the charging process, At the same time, it can also reduce the emissions of car exhaust and noise pollution to a certain extent, and maintain good traffic management order. Expert systems are often used as decision-making systems for high-level management, while artificial neural networks, genetic algorithms, and artificial neural networks are often used as low-level control algorithms. These technologies can be used to optimize signal control, and they have significant advantages in studying the causes of congestion and formulating congestion plans.

However, due to the complexity of the transportation system, these AI technologies must be innovated and combined with the characteristics of the transportation system to improve AI technology and make it more suitable for the transportation system. Allowing the use of mainstream communication methods in ITS has certain benefits, as international standards open the way for a larger market, increase the competitive supply of interchangeable subsystems, and reduce communication costs. Since data transmission is not the main issue of this project, we have only provided some details regarding the requirements of the signal control system. These systems require regular, fast, and reliable transmission between different agents and small and frequent message subsystems, with high integrity. The communication type should be multicast (for a specified proxy group) or peer-to-peer (for a single proxy). An important concept of the object model is to strictly define the interfaces of objects. With this strict interface, runtime support can be obtained on different platforms.

At present, machine learning is the main exploration direction of artificial intelligence, which mainly includes the following three parts: large-scale machine learning, deep learning, and reinforcement learning. To cope with the increasing amount of data collection, transmission, storage, and processing in machine learning, it has become a necessary problem to extend existing algorithms to larger datasets. It is also the main application technology of intelligent transportation, which mainly uses machine learning algorithms, including clustering analysis, autoregressive models, maximum likelihood probability, and other technologies. Then, it scientifically classifies and calculates the traffic information of intelligent transportation, and effectively predicts short-term traffic conditions.

## 2.2 Road safety and accident prediction system

Statistical analysis mainly involves summarizing and ranking public transportation personnel and vehicles, while cluster analysis considers various situations and grasps the distribution of vehicle and passenger flow during different periods of public transportation, to facilitate transportation planning and operation scheduling. Only by doing well in machine learning and mastering various technologies and methods can we better serve urban intelligent transportation. The driverless car, also known as the autonomous vehicle, is an intelligent transportation tool that uses artificial intelligence technology and computer systems to achieve the purpose of driverless driving. Unmanned vehicles mainly utilize technologies such as computer vision, positioning, and intelligent path planning to achieve safe and autonomous operation under unmanned driving conditions. Currently, there are mainly two types of autonomous driving: semi-automatic driving and fully automatic driving. Semi-automatic driving has certain automation functions, but it also requires the driver to operate.

Fully automatic driving does not require the driver to operate and can achieve autonomous operation of various functions. In recent years, with the deepening development of artificial intelligence technology, the production of autonomous vehicles has also been increasing year by year. Some internet companies have utilized their technological and capital advantages to launch vehicle networking products based on internet thinking. While deepening the field of autonomous driving, it will also have a very good promoting effect on the orderly development of transportation for urban smart transportation construction, it can minimize the occurrence of road traffic and transportation safety accidents to the greatest extent possible. Finally, communication was also held with several other agents from nearby intersections, urban traffic control centers, and other control centers (such as bus route guidance). And the operator. The controller estimates states soon, calculates signal plans to support these states, checks with other agents, and plans signal operations if approved.

Single node controllers typically use constraint based mathematical programming methods to evaluate and optimize cycles. In arterial and network systems, this topic becomes more complex due to coordination and synchronization. Agents coordinate and choose between conflicting actions and synchronized actions. In addition, as decisions are not centrally controlled, agents independently choose the most efficient decision from the available options. With the continuous expansion of the urban transportation network, the application of artificial intelligence in traffic monitoring continues to be promoted. Intelligent traffic monitoring systems link cameras on various road sections of the city through intelligent computers and the Internet as a medium and analyze the road traffic operation in each region through image detection and recognition technology, Then, through the intelligent transportation system, significant traffic entrances and exits in the entire city can be scientifically detected and monitored in real time. The number of vehicles entering and exiting the city, as well as the traffic flow of each road in the city, the saturation of vehicles on the main, secondary, and branch roads, as well as the traffic communication lights on the road, can be monitored in real time, including the security situation.

And intelligently adjust the traffic lights to achieve intelligent traffic management and regulation, ultimately achieving the goal of alleviating traffic congestion. In addition, the intelligent traffic monitoring system is also applied to relatively simple monitoring facilities such as parking lots, urban public safety, high-speed intersection toll stations, and intersection vehicle capture. With the improvement of artificial intelligence technology, the intelligent monitoring system can better cooperate with traffic management and achieve the effect of dynamic congestion charging on urban roads.

# 3. CONCLUSION

With the rapid development of China's economy, the process of urbanization continues to accelerate, and urban traffic pressure continues to increase. Developing faster and more efficient intelligent transportation systems is an effective measure to adapt to China's economic and social development. To some extent, artificial intelligence has alleviated traffic

congestion and facilitated people's travel. However, there is still much room for improvement in the application of artificial intelligence technology in urban intelligent transportation, and it is necessary to conduct in-depth research and scientific application to better serve people. It has alleviated the pressure on transportation roads, shortened the travel time of citizens, and accelerated the development of social economy. However, artificial intelligence still needs continuous development and improvement, striving to improve problems such as insufficient transportation planning, insufficient adaptability of public transportation systems, and mismatched supply and demand of parking facilities in the field of intelligent transportation.

## 4. REFERENCES

[1] Shen Fang. Research on Innovative Application of Artificial Intelligence Technology and Tax Risk Management [J]. Economic Management Abstract, 2019, 000 (005): P.26-27

[2] Zhang Province, Wei Huimin. Research on the Construction of a Digital Emergency Management System for Public Health Emergencies Based on Artificial Intelligence [J]. Economic Journal, 2022 (3): 9

[3] Zhou Ruixin. Prospects for the Application of Artificial Intelligence Technology in Urban Smart Traffic Management [J]. Information Recording Materials, 2020, 21 (5): 3. DOI: CNKI: SUN: CXJL.20-20-05-001

[4] He Guoqiang. Exploration of the Application of Artificial Intelligence Technology in Air Traffic Management [J]. Photogeography, 2020

[5] Xu Wenqi, Li Dan, Yang Jinyu, et al. Application of Urban Transportation Knowledge Base Based on Data Mining - Road Network Operation Knowledge Base [C]//The 12th China Intelligent Transportation Annual Conference. [2023-08-21]

[6] Sun Cheng. Research and Application of Information Extraction Method for Knowledge Graph of Transportation Supervision Service [D]. Chongqing University of Posts and Telecommunications [2023-08-21]

[7] Tan Yiming. Development and Application of Artificial Intelligence and Intelligent Transportation [C]//2018 Academic Conference on Smart Education and Artificial Intelligence Development. 2018

[8] Liu Zhangrong. Research on Legal Issues of Artificial Intelligence in the Field of Urban Transportation [J]. Fujian Quality Management, 2019. DOI: 10.3969/j.issn.1673-9604.2019.08.138

[9] Su Shaoxiong. Research and Development of China's Urban Intelligent Traffic Management and Integrated Platform [D] 2004. DOI: http://dspace.xmu.edu.cn:8080/dspace/handle/2288/51880.

[10] Hao Yong, Zhao Jian. Research on Intelligent Stations in Rail Transit Based on Artificial Intelligence Technology [J] [2023 08 21]

[11] Qi Yong, Lai Zhiping, Xiang Weibin. Application of AI image recognition technology based intelligent display system for train congestion in urban rail transit operation management [J]. Transport Manager World, 2020

[12] Zhu Zhou. Research on Improving the Quality of Innovation and Entrepreneurship Courses in Universities Based on the Background of Artificial Intelligence [J]. Science and Technology and Innovation, 2023 (9): 160-162

[13] Wu Fen. Research on the Impact of Artificial Intelligence Technology on Enterprise Digital Innovation [J]. Communication World, 2023, 30 (1): 127-129

[14] Cheng Xin. Research on Intelligent Management Application of Comprehensive Transportation Hub Based on Intelligent Voice Technology [J]. Intelligent Building, 2018, 000 (003): 50-54