MODELING OF TRAFFIC FLOWS BASED ON DIGITAL TECHNOLOGIES

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Abstract

This article analyzes the theoretical and practical aspects of using digital technologies in traffic flow modeling. The study examined the possibilities of modern information technologies, geographic information systems (GIS), artificial intelligence and mathematical modeling methods in traffic flow management. This article analyzes the theoretical and practical aspects of using digital technologies in traffic flow modeling. The study examined the possibilities of modern information technologies, geographic information systems (GIS), artificial intelligence and mathematical modeling methods in traffic flow management. The issues of reducing traffic congestion, improving traffic safety and ensuring the efficiency of transport systems by predicting the intensity, speed and density of traffic are highlighted. The results obtained are of practical importance for the implementation of intelligent transport systems based on digital technologies and urban transport planning.

Keywords

Keywords: traffic flows, digital technologies, modeling, intelligent transport systems, GIS, artificial intelligence, transport management.

INTRODUCTION

The transport system plays an important role in ensuring the mobility of the population in modern cities, the development of interregional economic ties, and the optimization of logistics processes.The transportation system plays an important role in ensuring the mobility of the population in modern cities, the development of interregional economic ties, and the optimization of logistics processes. The efficiency of urban transport directly depends not only on the number of vehicles and infrastructure, but also on the quality of management and forecasting of traffic flows. Therefore, the modeling of traffic flows and the introduction of digital technologies has become a priority area for the development of transport systems.

The use of digital technologies and information systems in the transport sector makes it possible to reduce traffic congestion, monitor traffic flows in real time, and improve safety and energy efficiency.The use of digital technologies and information systems in the transport sector makes it possible to reduce traffic congestion, monitor traffic flows in real time, and improve safety and energy efficiency. Geographic information systems (GIS), artificial intelligence-based algorithms, and mathematical modeling methods are widely used to analyze and predict traffic flows.

The purpose of this study is to analyze methods for modeling traffic flows using digital technologies and identify solutions aimed at improving their efficiency. The results of the study will be of practical importance in urban transport planning and the development of intelligent transport systems.

METHODS

This study applies a number of scientific and methodological approaches to the systematic study of the process of modeling traffic flows using digital technologies. This study applies a number of scientific and methodological approaches to the systematic study of the process of modeling traffic flows using digital technologies:

Historical and analytical method-the history of the development of traffic flow modeling, various methodologies and software tools were studied, as well as best practices and advanced technologies were analyzed.

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Mathematical modeling - statistical and mathematical methods were used to determine the movement of traffic flows, the level of traffic jams and the distribution of vehicles. This method is used as the main tool for calculating and predicting traffic parameters.Mathematical modeling - statistical and mathematical methods were used to determine the movement of traffic flows, the level of traffic jams and the distribution of vehicles. This method is used as the main tool for calculating and predicting traffic parameters.

Geographic Information Systems (GIS) Analysis – data on the transport infrastructure of cities and territories, road networks and traffic flows were visualized and analyzed on the GIS platform. This method allowed us to evaluate the territorial distribution and efficiency of transport systems.

Artificial Intelligence and Simulation algorithms – Artificial intelligence-based models and simulation software were used to simulate traffic flows in real time and predict traffic jams.Artificial intelligence and simulation algorithms – Artificial intelligence-based models and simulation software were used to simulate traffic flows in real time and forecast artificial intelligence and simulation algorithms – Artificial intelligence-based models and simulation software were used to simulate traffic flows in real time and predict traffic jams. This method allows you to optimize traffic flows and improve traffic safety.

Comparison and system approach – traditional and digital modeling methods are compared, their advantages and limitations are determined. A systematic approach allowed us to study the transport system as a single complex.

The research analyzed scientific articles on traffic flows, regulations on urban transport and statistical data. This methodological approach has made it possible to obtain scientifically sound results of traffic flow modeling and apply them in practice in urban transport planning.

RESULTS

The results of the study showed that digital technologies and modern modeling methods significantly increase the efficiency of traffic flow analysis and management.The results of the study showed that digital technologies and modern modeling methods significantly increase the efficiency of traffic flow analysis and management.

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The effectiveness of digital traffic flow modeling: visualization of traffic flows in urban road networks using GIS and modeling software. The results showed that digital modeling is an important tool for identifying traffic jams and making strategic decisions to reduce them.

Predicting traffic jams: Artificial intelligence-based models have made it possible to predict traffic flows in real time. The simulation results showed that the relationship between traffic and traffic will be clearly defined, which will increase the efficiency of urban transport management.Predicting traffic jams: artificial intelligence-based models have made it possible to predict traffic flows in real time. The simulation results showed that the relationship between traffic and traffic will be clearly defined, which will increase the efficiency of urban transport management.

Optimization of the transport system: as a result of the simulation, the distribution of vehicles across road networks, their speed and passenger traffic were analyzed. This made it possible to efficiently allocate transport resources and improve traffic safety.

The practical significance of innovative solutions: the study showed that it allows predicting the movement of environmentally friendly vehicles such as electric buses and trams using digital modeling, detecting traffic jams in advance and optimizing traffic flows.The practical significance of innovative solutions The study showed that it allows predicting the movement of

environmentally friendly vehicles such as electric buses and trams using digital modeling, detecting traffic jams in advance and optimizing traffic flows.

Importance in urban transport planning: the results showed that the modeling of traffic flows using digital technologies serves as a scientific basis for urban transport planning and the introduction of intelligent transport systems.

In general, the results show that digital-based traffic flow modeling is an important tool for improving the efficiency of the transport system, reducing traffic congestion and environmental problems, as well as developing urban infrastructure.

LITERATURE ANALYSIS AND METHODOLOGY

The analyzed scientific sources show that digital technologies play an important role in traffic flow modeling.Analyzed scientific sources show that digital technologies play an important role in traffic flow modeling. Foreign studies confirm the potential of GIS, artificial intelligence and mathematical modeling methods for predicting traffic flows, reducing traffic congestion and optimizing urban transport. On the other hand, local literature provides a normative framework for urban transport planning and transport infrastructure development.

The research methodology shows that mathematical modeling, GIS analysis, artificial intelligence algorithms for modeling traffic flows, as well as historical, analytical and systematic approaches, when applied together, provide the most reliable and scientifically sound results.This research methodology shows that mathematical modeling, GIS analysis, artificial intelligence algorithms for modeling traffic flows, as well as historical, analytical and systematic approaches, when applied together, provide the most reliable and scientifically sound results. This methodological approach makes it possible to effectively manage and optimize traffic flows, taking into account the complexity of the transport system.

In general, literature analysis and methodology show that digital technologies and advanced modeling methods are modern, scientifically and practically effective tools in traffic flow management and urban transport planning.

DISCUSSION

The results of the study show that digital-based traffic flow modeling serves as an important tool for improving the efficiency of transport systems, reducing traffic congestion and ensuring traffic safety.The results of the study show that digital-based traffic flow modeling serves as an important tool for improving the efficiency of transport systems, reducing traffic congestion and ensuring traffic safety. Artificial intelligence algorithms, GIS, and simulation software make it possible to track and predict traffic flows in real time, which is of practical value in urban transport planning and the creation of intelligent control systems.

In addition, the simulation results showed that digital technologies can be used to develop environmentally sustainable transport solutions, increase the efficiency of vehicles such as electric buses and trams, and optimize the load on the road network.In addition, the simulation results showed that digital technologies can be used to develop environmentally sustainable transport solutions, increase the efficiency of vehicles such as electric buses and trams, and optimize the load on the road network. However, compared to traditional modeling methods, digital technologies make it possible to more accurately analyze complex dependencies in transport systems and make more informed decisions.

In general, the discussion of the study shows that modeling of traffic flows based on digital technologies is an effective tool from a scientific and practical point of view for optimizing urban transport, reducing environmental and social problems, as well as the formation of sustainable transport systems.

CONCLUSION

The results of the study show that digital technologies serve as an effective and reliable tool for modeling traffic flows.The research results show that digital technologies serve as an effective and reliable tool for modeling traffic flows. Artificial intelligence, GIS, and simulation algorithms allow research to show that digital technologies serve as an effective and reliable tool for modeling traffic flows. Artificial intelligence, GIS, and modeling algorithms allow you to track traffic flows in real time, predict traffic congestion, and determine the optimal road distribution. At the same time, digital modeling can help in urban transport planning to develop environmentally sustainable solutions, improve traffic efficiency and ensure traffic safety.

The results of the analysis and modeling show that with the help of digital technologies, it is possible to manage the transport system using a systematic approach, as well as create a sustainable and intelligent transport infrastructure.The results of the analysis and modeling show that with the help of digital technologies, it is possible to manage the transport system using a systematic approach, as well as create a sustainable and intelligent transport infrastructure.

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