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CONTROLLING ROAD AND PEDESTRIAN TRAFFIC AT INTERSECTIONS USING INTELLIGENT CONTROL SYSTEMS

The development of intelligent models for traffic management at intersections is currently in the focus of many scientific works.

The object of the study is an intelligent traffic control system at intersections using neural networks. The subject of the research is neural networks for motion control systems. The purpose of the work is to develop a neural network model for intelligent automatic detection of traffic jams.

The development and safe use of intelligent traffic lights has been discussed for a long time. The modern infrastructure of urban transport systems is overloaded with a large number of vehicles. Current traffic control systems are no longer adequate and, as a result, cars are often stuck in traffic jams for long periods. Road safety is steadily declining. Global urbanization is exacerbating these problems, and the prospect of traffic collapse threatens every major city in the world.

Effective traffic control systems at intersections should be able to adapt automatically to changing traffic conditions, and take into account the priority

of some types of transport, pedestrians with disabilities. Intelligent systems can predict the road situation based on historical data. Intelligent systems based on neural networks can be designed to be scalable and interoperable. Additionally, the use of standard data formats and communication protocols enables integration with existing traffic management systems, ensuring a smooth transition and compatibility with legacy infrastructure.

The creation and implementation of intelligent traffic control systems were theoretically researched in many studies. There are patents on intelligent systems and cases of experimental operation of such systems. However, successful systems are not yet available in real-world road conditions. What is more, no successful real-world road systems are there because a high level of safety requires:

1. a high level of recognition of all traffic objects;
2. a good prediction system;
3. scaling and integration with smart city systems.

Materials, methods, and technical means were as follows. A set of images of Cityscapes road scenes were used. The methods applied were adaptive control, machine learning, deep learning, forecasting, and modelling. There was also an AI system involved. Personal computers with MatLab add-on were used with Python programming language.

As a result, a neural network was developed for traffic analysis and control of traffic lights at the intersection. The dependence of model parameters and quality on learning conditions was investigated. The ability of the system to effectively adapt the traffic light to the traffic flow was shown.

The field of use is the road and transport infrastructure of cities and suburban highways.