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RESEARCH AND APPLICATION OF FOREIGN BODY MONITORING ALGORITHM FOR TRANSMISSION LINES BASED ON IMPROVED YOLOV8

Li Yuanpeng, master's degree student, Kornienko A., Doctor of Sciences in Physics and Mathematics, professor, Biziuk A., senior lecturer

Vitebsk State Technological University,
Vitebsk, Republic of Belarus

The research I plan to carry out aims to improve the accuracy and efficiency of foreign object monitoring on transmission lines through deep learning technology, especially the improvement of target detection algorithms.

First, considering the data diversity and complexity faced by power line foreign object detection in practical applications, I plan to use data augmentation technology to expand the training dataset. By simulating various weather conditions, light changes, and foreign object types, we can effectively improve the generalization ability and robustness of the model while increasing the cost of data collection. Secondly, I will focus on improving the current advanced algorithm in the field of object detection, YOLOv8. Through guided analysis and adjustments to the YOLOv8 architecture, such as improving its feature extraction network, optimizing facility settings, and introducing attention mechanisms, we expect to significantly improve detection speed and accuracy. This is of great significance for real-time monitoring of foreign objects on transmission lines, such as brackets, bird nests and other potential risks. Finally, based on the above research results, I plan to design a set of output circuit foreign body detection software. The software includes not only a front-end interactive user interface that allows operators to easily configure and start inspection tasks, but also internal data processing and model reasoning modules. Our goal is to develop a system that is easy to use and can complete foreign body detection tasks efficiently and accurately.

The success of the entire project is of great significance to improving the reliability of safe operation of the power grid and reducing the risk of accidents caused by foreign objects.

References

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DEVELOPMENT OF THE VEHICLE PARKING MANAGEMENT SYSTEM

Liu Yang, master's degree student, Kornienko A., Doctor of Sciences in Physics and Mathematics, professor, Biziuk A., senior lecturer

Vitebsk State Technological University,
Vitebsk, Republic of Belarus

The project is a client-server web-application based on Spring Boot framework [1] and MySQL database [2]. Application is a parking lot management system that utilizes API interfaces for data interaction with external systems and 5G IoT modules for communication, in order to achieve efficient and real-time parking lot management. The system integrates computer network, image recognition and processing, as well as automatic control technology to automate vehicle management in the parking lot, including vehicle access control, automatic license plate recognition, parking space retrieval, guidance, image display, time calculation, fee collection and verification.

Specific work projects are as follows:

1. Admission: Vehicle detection and license plate recognition result in the display of parking information on the screen (license plate number and admission time), followed by data upload to the cloud server through the network.

2. Departure: Vehicle detection triggers license plate recognition which retrieves relevant information from the database before displaying it on the screen (license plate number, admission time, payment amount). This process also includes vehicle payment handling, lifting of barrier gates upon system approval for departure.

3. Platform Management: It involves managing vehicle information within the system (e.g., adding VIP vehicles' details or modifying parking unit prices), querying vehicle information and conducting statistics on parking lot usage.

The application system follows the JavaWeb architecture and utilizes a MySQL database. It adopts a front-end separation design, with the front-end responsible for user interaction, while the back-end handles business logic processing and data storage. The use of MySQL database ensures data stability and security. The API interface serves as the bridge for data exchange between the front and back ends, enabling modularization and reusability of system functions.

The control terminal utilizes a python language and OpenCV [3] architecture for license plate recognition, which involves image recognition, preprocessing, noise reduction, segmentation and matching. Upon successful recognition, the door is controlled and the data is sent to the cloud.

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4.6 Автоматизация производственных процессов

УДК 681.51.621.941

РАЗРАБОТКА СИСТЕМЫ АВТОМАТИЧЕСКОГО УПРАВЛЕНИЯ ТОКАРНОГО СТАНКА С ЧПУ

Рубик А. В., студ., Белов А. А., к.т.н., доц.

Витебский государственный технологический университет,
г. Витебск, Республика Беларусь

Разработка структуры системы управления токарного станка с ЧПУ является важной задачей, которая требует учета множества факторов, таких как тип станка, характеристики обрабатываемых деталей, требования к точности и качеству, а также экономическая целесообразность. Для разработки структуры системы управления токарного станка с ЧПУ необходимо провести анализ требований к системе, выбрать подходящие алгоритмы и методы управления, определить параметры и режимы работы системы, а также разработать схемы и аппаратное обеспечение системы.

В ходе дипломного проектирования мы будем модернизировать главный привод станка путем замены коробки скоростей другими исполнительными механизмами, с последующей разработкой новой системы управления для него, а также замены системы управления привода продольной и поперечной подачи инструмента для обеспечения безопасного начала работы.

Так как в новой системе управления будут использоваться асинхронные электродвигатели, то управление ими будет осуществляться с помощью частотных преобразователей, контроллера и датчиков обратной связи.