Design and Implementation of a High-precision Campus Intelligent Blackboard Inspection System Based on AI

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Abstract. At present, traditional campus smart blackboard detection generally uses manual detection as the main method and equipment detection as the auxiliary method to determine the fault information encountered, and it is still limited to relying on the experience of the campus smart blackboard management and maintenance personnel to judge the fault. Solve the problem. In this paper, aiming at the problems of low efficiency of traditional campus blackboard detection technology, high manual detection cost, and low classroom enthusiasm due to untimely detection, this paper proposes a campus intelligent blackboard monitoring system based on AI technology, and establishes a chain-type intelligent classroom education system. Smart classroom does not affect the development of social education level because of some advantages brought about by technological development.

1. Introduction

1.1. Research Status
In recent years, with the development of society, more and more science and technology have been integrated into our lives, and the use of smart blackboards on campus has become more and more popular. The smart blackboard incorporates advanced multi-point capacitive touch technology, intelligent office teaching software, and multimedia network. Communication technology, high-definition flat panel display technology and other technologies are integrated, integrating ordinary blackboards, teaching touch machines, electronic whiteboards, computers and other equipment into one smart interactive teaching equipment, which upgrades traditional blackboards and teaching touch machines to comprehensive functions Human-computer interaction equipment, through the smart blackboard, users can complete ordinary blackboard writing, electronic whiteboard writing, annotation, drawing, courseware presentation, multimedia entertainment and computer operations. Directly turn on the device to easily perform wonderful interactive classrooms. However, if the intelligent blackboard as a teaching tool fails to be used due to malfunctions during the teaching process, the quality of classroom teaching will be greatly reduced. At present, the smart blackboard is still a new type of product. The experience and technology of the smart blackboard management and maintenance personnel are limited. When the smart blackboard has a technical failure problem, the smart blackboard management and maintenance personnel need to perform a series of tedious troubleshooting to find the fault. Where, determine the fault information. It can be seen that the shortcomings of manual detection of fault information of smart blackboards are greatly revealed. For this reason, the task of developing intelligent detection of fault information of smart blackboards is of great significance.
1.2. Research Significance

1.2.1. Significance of social research
The campus smart blackboard fault detection system based on AI technology solves the social education problems, making the interactive smart classroom more unimpeded, and will not reduce the enthusiasm of the classroom due to the problem of the blackboard. The traditional Chinese classroom education tends to For intelligence and high efficiency. Establish a chain-type smart classroom education system so that smart classrooms will not affect the development of social education levels due to some drawbacks brought about by technological development.

1.2.2. Significance of economic research
At present, the traditional campus smart blackboard detection uses manual methods as the main and detection equipment to determine the fault information encountered, and also relies on the campus smart blackboard management and maintenance personnel to rely on experience to judge and solve multiple faults. The campus intelligent blackboard detection system based on AI technology does not require the traditional method of manual-based and testing equipment as the supplement, saves a series of manual testing costs and the cost of purchasing related testing machines, and achieves the goal of low cost and high efficiency.

2. Key Technology

2.1. Construction of Fault Classification Model
The intelligent blackboard detection system mainly detects the fault information and analyzes the output points of the fault and the general method to solve the fault. In order to analyze the fault type more accurately, the raw data without labels is first tagged, and the hardware fault is "1", Software failure "2", this section mainly uses the LSTM neural network supervised model, the specific process is shown in Figure 1.

![Diagram](image)

**Figure 1.** Collecting marked hardware and software information as a training set

Since the LSTM neural network is a supervised learning model, a large amount of sentence failure information is required for training to obtain word vectors with excellent predictive ability to predict unmarked sentence failure information. In order to ensure the correlation between the training set and the prediction set, the network and manually collected data are used for label training.
2.2. Results and Analysis of Fault Information Based on LSTM Algorithm
The model is trained under the training samples in the database, and the corresponding fault information and general fault solutions are obtained. Under the training of multiple fault information sentence sets, it can be seen that the automatic learning and classification results of the model are very good, and the accuracy rate is as high as 97.14%. Through the extraction of LSTM features, deeper semantic information can be mined to achieve better classification capabilities.

After the above steps, a trained model is obtained, and the preprocessed fault information and sentence data issued to solve the fault are substituted into the model, and finally the accuracy rate and the loss rate are obtained.

2.3. PLC Control System
PLC control system is a new generation control device formed by introducing microelectronic technology, computer technology, automatic control technology and communication technology on the basis of traditional sequence controller. The internal working mode of the PLC is cyclic scanning, which scans and monitors the internal system of the smart blackboard. The data obtained is transmitted to the established intelligent model that has been trained to obtain fault information and solutions. The schematic diagram of the PLC control system in the smart blackboard is shown in Figure 2.

Figure 2. Schematic diagram of PLC control system in smart blackboard

3. Implementation Process
Based on market research and interviews with current intelligent blackboard management and maintenance personnel, the following problems are summarized:

(1) The smart blackboard is still a new product, and the management and maintenance personnel of the smart blackboard have limited skills and experience;
(2) When the smart blackboard is in use, the screen and blue screen are as high as 80%;
(3) The fault problem of the smart blackboard is difficult to find out.

Based on the direction of the problem and the defects of existing products, this article proposes the following solutions:

(1) A PLC control system is installed in the smart blackboard to perform real-time scanning and monitoring of all conditions during the use of the smart blackboard;
(2) Establish an intelligent model by collecting and researching the faults of the intelligent blackboard, and importing the collected data into the model for training;
(3) Build host computer software and mobile phone APP, which can grasp the use data and fault information of the smart blackboard in real time.

The high-precision intelligent blackboard detection system based on AI technology is based on the data acquisition system for data modeling. The main steps are as follows:

(1) Perform data preprocessing in order to improve the modelability of data;
(2) Secondly, in order to display the fault information and repair methods more effectively and comprehensively, the combined model is used for the following data mining, namely, the long short memory neural network (LSTM) model is constructed based on the data analysis package such as sklearn in python to obtain the text corpus Two corpus documents of
(3) Reuse the ROSTCM6 system to construct a network model of two types of fault information. With the help of rebuilding valuable fault information, the fault information in the webpage and the information screening and checking of the solution method, to a certain extent, the information of common faults and The troubleshooting method is to install the PLC control system in the smart blackboard to cyclically scan the data signal generated during the work of the smart blackboard;

(4) Finally, build a fault theme model based on the idea of LDA theme model. The theme model extracts the data signals generated by the internal system scanned by the PLC control system, and clearly shows the solution to the fault information.

4. Summary

4.1. Scope of Application
The system design proposed in this paper is to install a detection system in an ordinary smart blackboard, scan and detect the use of the smart blackboard in real time, use the data generated by the collected fault information of the smart blackboard to establish an intelligent model, and perform repeated training and memory, Intelligent analysis and judgment can be realized when the usage data of the smart blackboard is imported. The campus blackboard detection system developed can improve the operating efficiency of campus smart blackboards, increase the service life, and enhance the quality and management level of campus school. The system can be used not only in campuses, but also in company machine management and large-scale mechanical plant management. Wait a minute. Equipment managers spend a lot of time checking equipment every day, which not only squeezes working time and affects the effectiveness of work and teaching, but also because of tedious and boring mostly manual processing, which is prone to errors. The construction of the system can perform real-time processing of machinery and equipment in various industries. Monitoring ensures real-time control of equipment failures, avoiding a series of other problems caused by undiscovered equipment problems.

4.2. Development Prospects
The smart classroom interactive blackboard uses capacitive touch technology to combine traditional handwriting blackboards and multimedia devices. It is easy to switch between chalk board writing and multimedia applications. The same area can be written like a normal blackboard, and can be written normally with chalk, or it can be written like a large blackboard. Like the Pad, you can watch various rich multimedia applications such as ppt videos, pictures, animations, etc. with your hand, to achieve a combination of tradition and modernity. However, the smart blackboard is still a new type of product in China. The management and maintenance personnel of the smart blackboard have limited skills and experience. The situation of sudden problems during the use of the smart blackboard still requires a cumbersome process, and sometimes even encounters some failures. Encountered an unsolvable problem. Therefore, the research and development of AI-based high-precision campus smart blackboard detection system is indispensable. The construction of this system can carry out real-time monitoring of machinery and equipment in various industries, ensuring real-time control of equipment failures, and avoiding undiscovered equipment problems. A series of other questions.

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