Application of Artificial Intelligence Algorithm in Electrical Automation Control

Fei You\textsuperscript{1,*}

\textsuperscript{1}Chongqing College of Architecture and Technology, China, 401331

*Corresponding author e-mail: youfei@cqec.edu.cn

Abstract. With the development of computer tech, VR tech has made great progress. The application of VR tech makes oral experiment teaching better grasp the precautions, difficulties and key points of oral experiment work, and improve the overall effect of students' oral experiment learning, so it has high research value. On account of this, this paper first analyzes the connotation and typical characteristics of computer VR experiment, and then studies the design of oral experiment teaching system on account of computer VR tech.

Keywords: Computer, Virtual Reality, Oral Experiment, Teaching

1. Introduction

With the iterative development of computer tech represented by AI algorithm, AI algorithm has been widely used in many fields, especially in the domain of electric automatization, which greatly promotes the intelligent progress and development of electric automatization. The application of AI algorithm in electric automatization can not only improve the accuracy and level of control, but also ensure the perfect construction of electrical automation operation system and the improvement and upgrading of control mechanism in this field [1]. AI algorithm also helps to realize the expansion of multi-functional, high-precision and scientific electrical control, and reduce the dependence on human intervention, and reduce the adverse impact and intervention caused by human factors.

On the other hand, the application of AI algorithm in this field can better fulfill the needs of social production, better service and guarantee the expansion of social economy, and ensure the stable expansion of production process. The application of AI algorithm to electrical automation can combine the requirements and standards of electrical automation system, realize the coordination between manual control and system control, and better ensure the rationality and stability of production process. In addition, as an emerging tech, AI covers many aspects as shown in Figure 1 below. It can simulate people's consciousness and thinking. Therefore, its application in the field of electrical automation can make electrical equipment and various instruments operate efficiently, improve equipment operation efficiency and reduce operation cost.
In addition, with the socialization of mass production put forward higher requirements for automation control, in order to achieve the improvement of productivity, the application of AI algorithm to enterprise production links can achieve the improvement of production efficiency and reduce the production cost [2]. Moreover, the expansion of AI and automation plays a key role. The application of AI algorithm in electric automatization system can ensure image analysis and accurate calculation, and make the operation of electrical automation system more flexible and convenient. In the background of industrial society, in order to ensure the stable operation of electric automatization process and speed up the speed of information processing, it is urgent to make full use of computers. Fully using the function of AI algorithm will help to ensure the advantages of automatic control tech, save costs, improve work efficiency and adapt to the expansion of the times. Therefore, it is of practical value to study the application of AI algorithm in electric automatization.

2. The concept and connotation of electric automatization

2.1. Concept of electric automatization

Electric automatization refers to the process of realizing control by means of automation tech. In the whole control process, there is no need to achieve manual intervention, so it can achieve the purpose of reducing the dependence of manpower and reducing the cost. The application scenarios of electric automatization include not limited to equipment, logistics, information and management [3]. In addition, various process parameters in the production process are controlled by means of mechanical and electrical control to realize the automation of manufacturing process. AI tech is used to integrate design, production and engineering tech to realize various signals for the controller to analyze, judge and make decisions. Electric automatization equipment has many advantages and characteristics, such as safety and reliability, high production quality and efficiency, small size, light weight, easy to use and suitable for flexible production.

2.2. Basic principle of electric automatization

Electric automatization is to realize the control of the operation mode of electrical components to realize the automation of production process and meet the requirements of production process. The realization of electric automatization circuit can be relay + contactor logic control method, programmable logic control method and computer control method. The drawing of electric automatization principle, and the diagram of connection relationship between various electrical components in the circuit indicated by graphic symbols and item codes. On account of the electric automatization schematic diagram and the installation position of electrical components, install electrical equipment or check line fault, so as to ensure the stability of automatic control process.

2.3. Programmable electric automatization elements

Programmable electric automatization is an electronic system of digital operation, which is designed for industrial application [4]. On account of the programmable memory, it is used to store the
instructions of logic operation, sequence control, timing, counting and arithmetic operation in its internal, and control the production process of various types of machinery through digital and analog input and output. The programmable controller and its related peripheral equipment are designed according to the principle that it is easy to connect with the industrial system as a whole and to expand its functions. On account of the programmable control element, its application in electric automatization has the advantages of high reliability, strong anti-interference ability, strong universality, flexible combination, short design cycle, strong adaptability, convenient debugging and small maintenance workload.

3. Application of AI algorithm in electric automatization

3.1. AI adaptive fuzzy control algorithm
Thanks to the AI adaptive fuzzy control algorithm, the parameters of fuzzy logic system can be adjusted on account of reliable data information. AI adaptive fuzzy control algorithm can be composed of a single adaptive fuzzy system or several adaptive fuzzy systems. The advantage of AI adaptive fuzzy control algorithm is that it can use linguistic fuzzy information provided by operators.

3.1.1. AI direct adaptive fuzzy control
Direct fuzzy adaptive control and indirect adaptive fuzzy control adopt different rules. The indirect adaptive fuzzy control uses the knowledge of the controlled object, while the direct adaptive fuzzy control uses the control knowledge [5]. Consider the research object described by the following equation:

\[ x^{(n)} = f(x, \dot{x}, \cdots, x^{(n-1)}) + bu \]  \hspace{1cm} (1)

Where \( f \) is an unknown function and \( b \) is an unknown normal number. The equation of the closed-loop control system is obtained:

\[ e^{(n)} + k_1 e^{(n-1)} + \cdots + k_n e = 0 \]  \hspace{1cm} (2)

From the selection of \( k \), it could get that when \( t \to \infty \) \( t \) is \( e(t) \to 0 \), the output \( y \) of the system converges gradually to the ideal output \( y_{\text{in}} \).

3.1.2. Design of AI controller
The product inference engine, single valued fuzzy controller and center average defuzzifier are used to design the fuzzy controller:

\[ u_D(x|\theta) = \frac{\sum_{l_k=1}^{m_k} \cdots \sum_{l_1=1}^{m_1} \prod_{i=1}^{n} \mu_{A_l}(x_i)}{\sum_{l_k=1}^{m_k} \cdots \sum_{l_1=1}^{m_1} \prod_{i=1}^{n} \mu_{A_l}(x_i)} \]  \hspace{1cm} (3)

The fuzzy controller is embedded in the fuzzy controller. The structure of direct adaptive fuzzy control system is shown in Fig. 2 below.
3.2. **AI neural network learning algorithm**

AI neural network learning algorithm is an important symbol of the intelligent characteristics of neural network. Through learning algorithm, neural network realizes the ability of self-adaptive, self-organizing and self-learning. AI neural network has the typical characteristics of approaching any nonlinear function, parallel distributed processing and storage of information, multi input and multi output, easy to implement with VLSI or optical integrated circuit system, or implemented with existing computer tech, and can learn to adapt to the change of environment. The components of AI neural network include information processing unit, the form of interconnection between neurons topological structure and learning rules to improve performance to adapt to the environment. As the controller of real-time control system, neural network can effectively control the uncertain and uncertain systems and disturbances, so that the control system can achieve the required dynamic and static characteristics. A new intelligent control system can be designed by combining neural network with expert system, fuzzy logic and genetic algorithm.

3.3. **AI iterative learning control algorithm**

In electric automatization, there is a problem of trajectory tracking. It is necessary to find control laws to make the output of the controlled object follow the desired trajectory with zero error in finite time [6]. In the process of electrical automation application, when dealing with repeated operation tasks in practical situations, decision-making is often adjusted according to the gap between the repeatable dynamic behavior and the expected behavior of the object. Through repeated operations, the cooperation between the object behavior and the expected behavior can meet the requirements. AI iterative learning control algorithm is suitable for the electric automatizationled object with repetitive motion. The improvement of some control objectives can be achieved through iterative correction. The iterative learning control method does not depend on the precise mathematical model of the system, and can realize the control of the highly uncertain nonlinear strong coupling dynamic system with a very simple algorithm in a given time range.

4. **Application strategy of AI algorithm in electric automatization**

4.1. **Application of AI algorithm in electric automatization**

The application of artificial intelligence tech in electric automatization mainly includes electrical automation equipment, electrical control process, and electrical system accident and fault diagnosis. Among them, the application in electrical automation equipment can replace manpower, effectively improve the control quality, reduce the cost of system control, and ensure the environment of electric automatization. In the electrical control process application level, can effectively promote the improvement of work level, but also reduce the unnecessary cost. In the application level of electrical fault diagnosis, AI algorithm can effectively combine the operation characteristics of equipment to...
comprehensively diagnose electrical equipment fault problems. The fault nature and causes are analyzed in detail, and the troubleshooting scheme is formulated.

4.2 Application strategy of AI algorithm in electric automatization
The application of AI algorithm in electric automatization, as well as in the electrical system operation system, can promote the electrical control system to establish a complete management mode. The advantages of AI algorithm should be combined with the key points of tech application to ensure that the application process and the actual operation have a meeting point. On account of AI algorithm, the advantages of equipment operation in the management of electrical equipment are brought into play, and a complete fault maintenance mechanism of electrical equipment is established to ensure that the corresponding analysis framework can be established in combination with the actual situation. In addition, the information intelligent processing process is improved, and the simulation operation is completed with the aid of AI algorithm application system.

5. Conclusion
In summary, the application of AI algorithm to electrical automation can combine the requirements and standards of electrical automation system, realize the coordination between manual control and system control, and better ensure the rationality and stability of production process. The full application of AI algorithm will help to ensure the advantages of automatic control tech, save costs, improve work efficiency and adapt to the expansion trend of information tech. Through the research on the concept and connotation of electric automatization, this paper analyzes the concept and basic principle of electric automatization. By analyzing the application of AI algorithm in electric automatization, the programmable electric automatization components are studied. Through the research on the application strategy of AI algorithm in electric automatization, the application and optimization strategy of AI algorithm are analyzed.

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