Research on Application of Artificial Intelligence Technology Based on Computer Network Technology in Numerical Control System

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Keywords: Computer Network, Artificial Intelligence, Numerical Control System

Abstract: with the Rapid Development of Economy and Society, the Standard of People's Demand for Computer Network is Constantly Improving. Computers Are Everywhere in Production and Life. Computer Network Technology is Gradually Developing from the Traditional Computer Era to Artificial Intelligence. Artificial Intelligence Technology Has a Unique Effect When Dealing with Highly Nonlinear, Time-Varying and Uncertain Objects That Traditional Methods Based on Accurate Mathematical Models Cannot Be Very Effective. Based on Computer Network Technology, This Paper Proposes Several New Strategies and Models for Applying Artificial Intelligence Technology to Computer Numerical Control System . the Method Specifically Comprises the Following Steps: Adopting a Fuzzy Control Strategy to Control the Software Gain of the Position Loop of the Numerical Control System; Bp Neural Network is Used to Realize Interpolation Calculation of Non-Circular Curve Profile. Based on the Frame Concept of Expert System, an Expert System Model for Cnc Machine Tool (System) Maintenance Guidance is Constructed.

1. Introduction

With the Development of Artificial Intelligence Technology, Numerical Control Technology Has Continuously Adopted the Latest Technologies in the Fields of Computer and Control Theory, and is Developing in the Direction of High Speed, Intelligence, High Flexibility and Information Networking [1]. the Intelligent Numerical Control System Has the Characteristic of Personification Intelligence, and Has the Knowledge Processing Activities of Simulating, Extending and Expanding Intelligent Behaviors in the Numerical Control System. Artificial Intelligence Technology Has a Unique Effect When Dealing with Highly Nonlinear, Time-Varying and Uncertain Objects That Traditional Methods Based on Accurate Mathematical Models Cannot Be Very Effective [2]. Artificial Intelligence Can Work According to the Basic Production Objectives and Management Tasks of Production Engineering to Formulate Technical Design Schemes, Editing Procedures, Operating Sequences and Steps, Thus Greatly Replacing Manual Operation and Supervision. Computer Network Technology Has Been Involved in Various Fields of Social Development and People's Life and Production [3]. the Application of Artificial Intelligence Technology in Computer Network Technology Has Greatly Improved the Operating Environment. through the Effective Combination of the Two, Many Problems in Computer Network Can Be Solved. for This Reason, This Paper Uses Artificial Intelligence Technology to Realize a Certain Function Module of the Numerical Control System, in Order to Replace or Improve the System Performance.

2. Development of Artificial Intelligence Technology

Artificial Intelligence Was First Proposed in 1956. in Order to Develop More Theories and Principles, the Concept of Artificial Intelligence is Constantly Changing. Artificial Intelligence is a New Science to Research and Develop Theories, Technologies, Methods and Applications for Modeling, Extending and Expanding Human Intelligence [4]. At the Same Time, Computer Network Technology is Being Used More and More in All Walks of Life, Which, to a Certain Extent, Also

  DOI: 10.25236/ISMHI.2019.056

Promotes the Development of Network Structure in a More Complicated Form. Artificial Intelligence Can Just Fill This Vacancy. in Order to Enrich the Information Expression Ability and Mode of the Computer Network, It Relies on Its Own Unique Editing, Processing, Operation and Rational Analysis Ability to Automatically and Sequentially Work on Information Translation, Information Management, Information Processing and Other Aspects, Thus Successfully Completing a Work Content That Requires Manual Monitoring and Management of the Computer Network [5]. Artificial Intelligence Can Simulate People's Thinking, Consciousness and Other Information, and Can Think Like People's Thinking. There is a Large Amount of Data and Information in the Computer Network, Which Are Mainly Displayed in the Form of Characters, Symbols, Etc. in the Process of Displaying, It is Necessary to Achieve a Higher Expression Ability [6]. the Application of Artificial Intelligence to the Computer Internet Technology Process Can Give Full Play to the Characteristics of Artificial Intelligence and Improve the Hierarchical Management and Control Efficiency of the Network. through the Use of Hierarchical Management and Control Mode, the Upper Layer Can Control the Lower Layer's Network Operation.

3. Characteristics and Advantages of Artificial Intelligence Technology

3.1 Uncertainty and Even Unexecutable Processing Power

In the process of network management, various network resources need to be monitored, controlled and managed, so as to ensure the operation efficiency of the network system. In the process of network management, it is necessary to ensure its understanding of the state of system resources, mainly the partial and full state of the system [7]. It is not necessary to accurately describe the data model in application. In the computer network, the amount of fuzzy information is very large, making people at a loss. Through the application of artificial intelligence technology, the function of network management in information processing can be optimized to the greatest extent. Applying the anti-spam system under artificial intelligence to computer network technology can achieve the effect of information protection. On the one hand, it can effectively supervise users' e-mails, and on the other hand, it can also realize the processing of spam and virus mails. The network system is transient, and the accuracy of information can be ensured only by knowing all the states of the network system [8]. It broadens the space and path of the computer network when processing information, creates a centralized control center, integrates all engineering information involved in the computer network, and is uniformly processed by the centralized control center to realize “intelligent” operation. By applying artificial intelligence technology to computer network technology, the security of the network is well improved, and the number of times a user's computer is invaded by malicious viruses is effectively reduced.

3.2 Ability to Learn, Interpret and Reason

At present, many network managers need to use network management protocols in the process of management, but these protocols can only manage some information base information. Although the methods of network management and control can be determined by using these information, they have not been well implemented, and most of them are only for network monitoring. Artificial intelligence technology has a very strong cooperative effect. At present, computer networks have spread to all fields of people's production and life. The number of computer users is increasing. This demand has promoted the great changes in computer structure and brought great difficulties to computer network management. Under the computer network technology using artificial intelligence technology, users can completely control the computer network. For computer network management and system evaluation, it is often affected by network changes and other factors [9]. However, using artificial intelligence network management can learn, synthesize and interpret low-level information so as to obtain high-level information. Moreover, these high-level information can be used for network management and control. The classical control theory is used to implement the control, but there are many links that cannot be modeled, and the information is mostly fuzzy, such as the

description of the process and the processing process. At this time, the idea of fuzzy control can be introduced to achieve the effect that classical control methods cannot achieve. However, in the absence of an overall plan in advance, it will take a long time to realize complete and highly artificial intelligence if the technical structure is to be rationally matched. At least it is not realistic now.

3.3 Ability to Deal with Nonlinearity

The complex topological structure of the network, transient network load, unpredictable user behavior and other characteristics make it impossible to ensure the high linearity of the control objects in network management control. The amount of fuzzy information generated is very large, making people at a loss. Through the application of artificial intelligence technology, the functions of network management in information processing can be optimized to the maximum extent. Artificial intelligence is also more and more used in computer network security management. By combining artificial intelligence with computer network technology, the characteristics of artificial intelligence can be better brought into play, and the anti-spam system under artificial intelligence can be used in computer network technology to achieve the effect of information protection. The main feature of artificial intelligence technology is that it can carry out calculation well and consumes less resources in the calculation process. By selecting control algorithm to carry out calculation, it can effectively improve the calculation speed. Artificial intelligence technology has very high calculation efficiency and is relatively simple and convenient to use. Therefore, the traditional network control theory cannot well realize the security management of the computer network. In the artificial intelligence system, through the simulation of human intelligence, the non-linear problem can be well handled, and the artificial intelligence technology has a very successful application in the computer network.

4. Application of Artificial Intelligence Based on Computer Network Technology in Numerical Control System

4.1 Application of Fuzzy Control in Numerical Control System

Computer numerical control machine tool is a complex controlled object with mechatronics. Some functional modules can establish mathematical models and use classical control theory to implement control, but there are also many links that cannot be modeled, and most of the information is fuzzy, such as descriptions of relevant processes and processing processes [10]. At this time, the idea of fuzzy control can be introduced to achieve the effect that classical control methods cannot achieve. For numerical control machine tools, fuzzy control can be used in the following aspects: using fuzzy control strategy to realize optimal control of machining process. Using fuzzy inference rules to realize fault diagnosis of numerically controlled machine tools. Fuzzy set theory is used to realize fuzzy adjustment and setting of some parameters in numerical control system. Artificial intelligence is the embodiment of the application list of artificial intelligence. The higher the degree of automation, the richer the functions of artificial intelligence and the stronger the operation precision. This also shows that the integration and mechanization of computer network are completed and assisted by information processing. The process designer perceives all kinds of information inside and outside the manufacturing system through sensory organs to provide the basis for the initial process design of parts and subsequent process specification modification. The structural block diagram is shown in Figure 1. The fuzzy look up table of FPD in the figure can be obtained by membership function and rule reasoning, and can also adopt simple and practical rule self-adjusting control strategy.

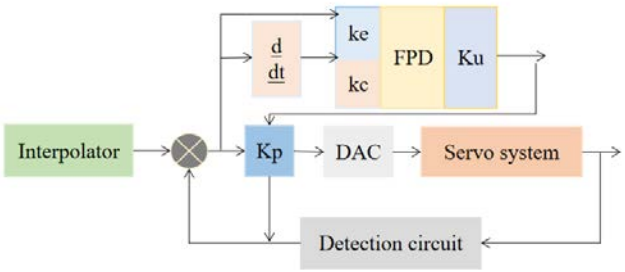

Fig.1 Principle Block Diagram of Position Loop Gain Fuzzy Control

4.2 Application of Artificial Neural Network in Numerical Control System

The research of artificial neural network (ANN) has a long history and once set off a research upsurge in the 1960s. However, after a decade of low ebb, it began to revive in the 1980s and attracted great interest from researchers. ANN has the following remarkable characteristics: distributed storage of information, even if some part of the network is damaged, the original information can be restored by associative memory. Parallel processing of information greatly speeds up the running speed. Continuous learning is simple. A network of many neurons can approximate any nonlinear system. Receiving the influence of the external environment, sensing the change of the environment, processing data internally, and returning the result information to the outside. The computer uses CIMS integrated system to sense information about process design, processes the acquired information, and then transmits it to process designers. Through human-computer interaction perception, the system can obtain more accurate and reliable process design information. In the computer numerical control system, the artificial neural network model can also be introduced to realize a certain numerical control function, which is embodied in the following aspects: using adaptive neurons to realize the adjustment and control of the software gain of the position loop of the numerical control system. Using ANN to Realize Fault Diagnosis of Numerical Control System. Using ANN to Realize Interpolation Calculation of Numerical Control System.

4.3 Application of Expert System in Numerical Control System

The research of expert system started in 1960s and has been applied with great value. The so-called expert system is a computer program system that provides a specialized level of human beings to solve important problems within a specialized scope. The main ways of knowledge acquisition are artificial knowledge acquisition, semi-automatic knowledge acquisition and automatic knowledge acquisition. Some process knowledge is more complicated, such as process selection, special process arrangement, positioning and clamping scheme, etc. Because of its strong fuzziness, the principle of “people first, machines second” is adopted to realize knowledge acquisition.

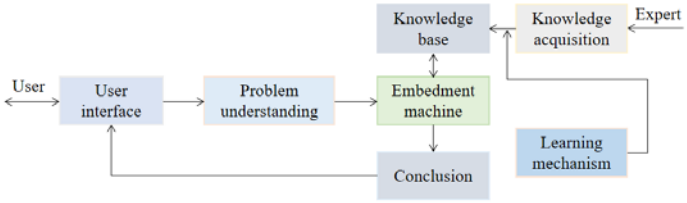

Fig.2 Structural Block Diagram of Expert System

In the ICADI system of numerical control machine tools, knowledge itself is a product. The function of the system is to convert new knowledge and other related knowledge into new products or services. When the product is finally used by users, the knowledge process completes the cycle and update by meeting the needs of end users. Computer numerical control system is a technology-intensive mechatronic complex system that integrates computer technology, automatic control, detection technology and other multidisciplinary knowledge. It not only requires on-the-job

training for operating programmers, but also is especially difficult to maintain in case of failure. It can solve the problem of knowledge reasoning in those specialized fields where the structure is unclear or the algorithm is difficult to determine. Generally speaking, an ES with perfect functions consists of seven parts: knowledge base, reasoning mechanism, problem understanding, user interface, conclusion, learning mechanism and knowledge acquisition, as shown in Figure 2.

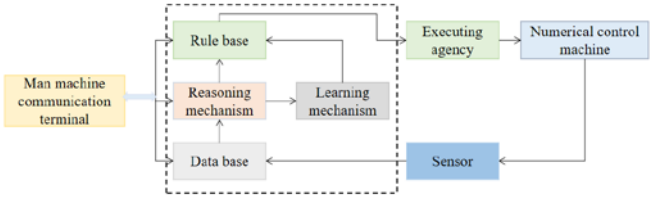

Fig.3 Expert System Model for Maintenance Guidance of Cnc Machine Tools

Computer numerical control system (machine tool) is a technology-intensive mechatronic complex system that integrates computer technology, automatic control, detection technology and other multidisciplinary knowledge. Intelligent decision-making module is the core module of the system, which needs artificial intelligence technology to make decisions and complete the allocation of various tasks. The basic idea is that man and computer are equal and cooperative relations, and their decisions have both division of labor and cooperation. The goal of knowledge management is to have the right knowledge at the right time and in the right place. Having knowledge at the right time means that knowledge must be fully prepared before it needs to be used. Having knowledge in the right place means that knowledge must be in the right place in the system. The ES part in the dashed box in fig. 3 is completed by a computer software, and then the control and monitoring of the NC machine tool are realized by DAC and ADC respectively. the essence of the whole system is the process of knowledge acquisition, knowledge representation, knowledge use and self-learning.

5. Summary

In the 21st century, with the rapid development of science and technology and more intelligent artificial intelligence, the traditional life and work patterns have been constantly changed. Especially after artificial intelligence is used in computer network technology, our life and work are more convenient. The aim of artificial intelligence technology research is to endow a part of human intelligence to machines so that machines can be competent for complex tasks requiring human mental work. Its research object is human's unique intelligence such as human perception ability, behavior ability, thinking ability, etc. Based on computer network technology, this paper elaborates how to apply the concepts of fuzzy set theory, artificial neural network and expert system to computer numerical control system from three aspects of artificial intelligence technology. According to their respective characteristics, can achieve the purpose of replacing a certain function of the numerical control system or improving the system performance. The concepts of artificial neural network and expert system are applied to computer numerical control system. According to their respective characteristics, can achieve the purpose of replacing a certain function of the numerical control system or improving the system performance, the details of various strategies and application results will be introduced in another article, and we have carried out in-depth research on “intelligent numerical control system”, which will have great theoretical and application value.

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