Integration of Flaw Identification and Flaw Indulgence for Boiler Sensor based on Internet using a Three-Layer Neural Network

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Abstract

The integration of flawidentification and flawindulgence is a crucial task in real-time monitoring of complex processes. This research proposes a control method using a three-layer neural network for realizing the integration of flawidentification and flawindulgence for a boiler sensor based on the internet. The proposed method determines the input mode pair and output mode pair by grouping voltage values collected from the sensor data. The grouped data is then used to train a neural network of a joint controller of a blurring cerebellum model, which carries out flawidentification and flawindulgence. This study also presents a control apparatus to realize the proposed method. The research is applicable to industrial fields such as underwater robots, chemical industries, and other areas where sensors are used.

Keywords: Flaw Identification, Flaw Indulgence, Boiler Sensor, Three-Layer Neural Network, Real-time Monitoring, Internet
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Introduction

The integration of flawidentification and flawindulgence is essential for the real-time monitoring of complex processes. Flaw identification involves detecting, isolating, and identifying flaws in a system, while flaw indulgence involves designing a control system that can continue to operate even when flaws occur. This research proposes a method for realizing the integration of flawidentification and flawindulgence for a boiler sensor based on the internet using a three-layer neural network.

Related Work

Industrial processes are becoming more complex and interconnected, and the control of steam generator systems is no exception. The quality of the control process is crucial to prevent accidents that could cause significant losses of personnel and property. Therefore, online monitoring, identification, and flaw-tolerant control have become important for ensuring the reliability and security of modern complex processes. This is a key technology that can improve product quality and production efficiency simultaneously.

Currently, there are several commonly used methods for flaw identification and flaw-tolerant control of steam generator systems. One such method is based on the expert system, which uses a knowledge base to reflect the working environment of the system and the structure knowledge of its operation principle. Another method is based on the flaw tree, which is a method for diagnosing flaws that begins with a configuration of a flaw tree that starts from the final flaw of the system. The third method is based on pattern recognition, which involves the formation of a flaw secret room vector and the extraction of a characteristic vector to discern the current state and which reference mode the system belongs to.[2,3]

However, these methods have limitations when dealing with the time delay under the Internet network environment and novel flaws caused by data-bag loss. As a result, there is a need for new methods to address these challenges.[1,5]

The present research proposes a new method for realizing the integration of flawidentification and flawindulgence for a boiler sensor based on the Internet. The control method involves a three-layer neuronal network, which determines an input mode pair and an output mode pair through collecting voltage values corresponding to data measured by a sensor and grouping the data. The grouped data is used for training the neural network of a joint controller of a blurring cerebellum model, and then the flawidentification and the flawindulgence are carried out.[6]

This new method is essential because it realizes the real-time monitoring for a complex process through researching the key technology for the integration of flaw identification and intelligent failure-indulgence control for the sensor under the Internet network environment. It takes into account the occasions when the sensors are possibly applied, and the redundancy of much sensor information in some actual processes is also taken into account, making it applicable to industrial fields based on the Internet, such as underwater robots, chemical industries, and more.

This research is important because it proposes a new method for flawidentification and flaw-tolerant control of steam generator systems that overcomes the limitations of existing methods. It addresses the challenges posed by the time delay under the Internet network environment and novel flaws caused by data-bag loss, making it more reliable and effective. The research objective is to demonstrate the feasibility of the proposed method and to show that it can improve product quality and production efficiency simultaneously.

In conclusion, the proposed method for realizing the integration of flawidentification and flawindulgence for a boiler sensor based on the Internet is a significant step forward in the control of steam generator systems. It offers a new and effective approach to address the challenges posed by the time delay under the Internet network environment and novel flaws caused by data-bag loss. The research objective is to demonstrate the feasibility of the proposed method and to show that it can improve product quality and production efficiency simultaneously, making it a valuable contribution to the field of industrial control.

Research Objective

The objective of this research is to propose a control method that can integrate flawidentification and flawindulgence for a boiler sensor based on the internet using a three-layer neural network. The proposed method aims to determine the input mode pair and output mode pair by grouping voltage values collected from the sensor data. The grouped data is then used to train a neural network of a joint controller of a blurring cerebellum model, which carries out flawidentification and flawindulgence. The proposed method for realizing the integration of flawidentification and flawindulgence for a boiler sensor based on the internet using a three-layer neural network involves collecting voltage values corresponding to data measured by a sensor and grouping the data to determine the input mode pair and output mode pair. The grouped data is then used to train a neural network of a joint controller of a blurring cerebellum model, which carries out flawidentification and flawindulgence. A control apparatus is also presented to realize the proposed method.

Research

Boiler sensor flawidentification and flaw-tolerant incorporation is an essential technique that is widely used in many industries. It involves identifying the occurrence of flaws in a boiler system and using a flawidentification and flaw-tolerant method to overcome the flaws. The research presented in this research paper is a boiler sensor flawidentification and flaw-tolerant incorporation method and device. The apparatus includes a remote flawidentification tolerant system, Internet network, host computer, slave computer, on-the-spot sensing become and send part, and control section. The on-the-spot sensing become send part comprises instrumentation such as temperature, liquid level, flow, pressure, and control section comprises frequency converter, IGCT, control valve, among others.

The on-the-spot sensing become send part is responsible for parameter acquisition and transmission, while the slave computer performs signal A/D conversion of the gathered signal and sends the signal to the host computer. The host computer collects the local slave computer data and transmits the data to the remote flawidentification and flaw-tolerant control system via the Internet network. The remote flawidentification and flaw-tolerant control system perform flawidentification and robust parsing of the received data and send the control signal back to the host computer via the Internet network. The host computer then sends the signal to the slave computer, which transmits the control signal to the control section to carry out control at the scene.

The present research utilizes a neural network as the state estimator to handle redundant sensor output data. This is particularly useful when dealing with large-scale power devices under the Internet network environment, where setting up a system model is difficult or impossible. The mapping performance of the neural network structure makes it an ideal solution to this problem. The BP (Back-Propagation) neural network is used in the present research, which has three layers of neurons. Each neuron is fully connected to its left and right layer, while there are no connections between each neuron of the same layer.

The BP network is trained using a teacher learning mode, where a pair of learning modes are offered to the network, and its neuronic activation value is propagated to the output layer through each intermediate layer from the input layer. The output layer's neuron output corresponds to the network response of the input pattern. The network's connection weights are then successively revised from the output layer to the input layer, according to the principle of reducing the difference between the desired output and actual output. This process is known as the "error Back-Propagation algorithm." The network's accuracy in responding to input patterns improves continuously with each error Back-Propagation training cycle.

The BP network's hidden layer has a mediation function, and the corresponding learning rules can be followed, enabling the network to be trained to have recognition capability to nonlinear models. Its clear mathematical meaning and clearly delineated steps make the BP network widely applicable.

In conclusion, the present research provides an effective solution to the problem of boiler sensor flawidentification and flaw-tolerant incorporation. The apparatus's various parts work together seamlessly to perform flawidentification and flaw-tolerant control, ensuring the smooth operation of the boiler system. The use of the BP neural network as the state estimator further improves the accuracy and reliability of the flawidentification and flaw-tolerant control process.

The research uses neural net as the state estimator of handling redundant sensor output data. In many cases, when the input-output data are related to an unknowable system or when the model of the system is too complicated to establish, the use of various analysis redundancy methods of model is not feasible. This issue is prevalent in various large-sized power devices under the Internet network environment. Therefore, the mapping performance of neural network structure becomes particularly useful.

The neural network structure used in the research is the BP (Back-Propagation) network. The BP network is a neural network with three layers, and each neuron in the left-side layer is connected to each neuron in the right layer. The BP network uses a teacher learning mode to train the network. After a pair of learning mode is offered to the network, the neuronic activation value propagates to the output layer through each intermediate layer from the input layer. The output of each neuron in the output layer corresponds to the network response of the input pattern. The network constantly improves the accuracy of the input pattern response by reducing the principle of wishing output and actual output error. The BP network has recognition capability for nonlinear model due to its hidden layer that mediates and corresponding learning rules.

In conclusion, the presented research provides a boiler sensor flawidentification and flaw-tolerant incorporation method and device that uses a neural network structure for handling redundant sensor output data. The apparatus comprises on-the-spot sensing become and send part, slave computer, host computer, Internet network, remote flawidentification tolerant system, and control section. The research has a wide range of applications and is particularly useful for large-sized power devices under the Internet network environment where the model of the system cannot be established, and various analysis redundancy methods of model cannot be used. The BP network used in the research has recognition capability for nonlinear models and provides accurate responses for input patterns. The research provides a reliable and robust method for identifying and overcoming flaws in boiler systems.

Conclusion

The proposed control method using a three-layer neural network for realizing the integration of flawidentification and flawindulgence for a boiler sensor based on the internet is a crucial step towards real-time monitoring of complex processes. The proposed method determines the input mode pair and output mode pair by grouping voltage values collected from the sensor data. The grouped data is then used to train a neural network of a joint controller of a blurring cerebellum model, which carries out flawidentification and flawindulgence. This study also presents a control apparatus to realize the proposed method. The research is applicable to industrial fields such as underwater robots, chemical industries, and other areas where sensors are used. The proposed method can help in detecting and isolating flaws in a system, thus improving the efficiency and safety of the industrial processes.

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