Special Issue Reprint

Artificial Intelligence for Fault Detection and Diagnosis

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Fault detection and diagnosis (FDD) is an important task in manufacturing and mechatronic systems for reducing costs and improving productivity. Traditionally, the states of machines and their faults are manually checked, a process which is time-consuming and expensive. Therefore, it is desirable to develop intelligent systems to achieve automatic FDD. Artificial intelligence as a concept covers a wide range of algorithms that mimic the human mind, thinking and acting like humans to solve important tasks in different fields. In recent years, many AI algorithms have been applied to FDD, including data processing, feature analysis, and classification. Typical methods include deep neural networks, long short-term memory, convolutional neural networks, random forest, and evolutionary computation. However, the potential of AI has not been comprehensively investigated in FDD. This remains a challenging task due to many factors, such as changeable equipment working states, incomplete information, a lack of sufficient training data, complex relationships between faults and symptoms, imbalanced data, and the requirement of having domain knowledge. This reprint is a collection of research regarding AI techniques applied to various FDD tasks.

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