Guest Editorial
Special Issue on "Advanced Artificial Intelligence for Industrial Internet of Things"

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Smart devices, sensors, and machines generate a wealth of valuable data with suitable connectivity from Industrial Internet of Things (IIoT) across manufacturing environments or supply chain. Artificial intelligence (AI) technologies (e.g. deep learning, reinforcement learning, and machine vision) can create new value chain through gathering, processing, and learning these data. The integration of AI and IIoT have an exciting promise. Machine learning-powered rapid testing during the industrial design process can enable greater program and cost certainty than previously realizable. Data analytics tools can now not only predict when and where machinery and equipment is going to need maintenance with a high degree of accuracy, but act on that need. Machine vision and deep learning help the self-drive vehicle to enhance accuracy of recognizing traffic signs. Meanwhile, connected equipment across the supply-chain provides real time data which can be utilized by machine learning and predictive analytics technologies.

There are still some challenges, which hinder the large-scale application. Specially, some of these data sources are structured (such as sensor signals), some are semi-structured (such as records of manual operations), and some are completely unstructured (such as image files). However, most of the unstructured data is either unused or used only for very specific, tactical purposes. Lots of industrial data is generally not utilized strategically, and is poor interoperability across incompatible technologies, systems, and data types, so it is unable to effectively extract value from them. Furthermore, the transmission of mass industrial data with different priorities also is a hard job for industrial heterogeneous networks, AI-enabled analytic technologies will help to optimize networks and realize intelligent data transmission. In addition, AI-powered applications usually run on the remote cloud, and the service delay is uncontrollable, but in industrial process, the service delay is constrained strictly. Fortunately, the emerging of edge computing at the edge of network can further propel the integration AI and IIoT.

The article entitled "Key technologies of real-time visualization system for intelligent manufacturing equipment operating state under IIOT environment", is authored by Lin Shan, et al. The key technologies of realizing equipment electrocardiogram (ECG) were studied. The proposed device ECG method provides a more intuitive means for monitoring the health status of intelligent manufacturing equipment. Compared with the existing approaches, the monitoring cost of new method is lower because of no additional sensors.

The second article entitled "A heuristic method for two-sided assembly lines reconfiguration in IoT environment", is authored by Xiaofeng Hu, et al. A heuristic method based on the position-oriented enumerative procedure is developed to deal with the two-sided assembly line rebalancing problem to compute the reassigned tasks among the workstations with the objective of minimizing the tasks reassignment. Then, the proposed IoT based framework is used to support the collaborative reconfiguration of the workers, tools and parts logistic.

The third article entitled "Hybrid Sensor Network with Edge Computing for AI Applications of Connected Vehicles", is authored by Maoqiang Wu, et al. The proposed system combines hybrid sensor network and edge computing to enhance the sensing quality of data collection and shorten the latency of AI model inference. The proposed task assignment scheme based on hybrid sensor network outperforms the schemes based on pure vehicular nodes or sensor nodes.

The last article entitled "Robotic Relocalization Algorithm Assisted by Industrial Internet of Things and Artificial Intelligence", is authored by Bi Zeng et al. A pose derivation model based on the acquired landmark information is presented to correct the position of the actuator, and the reinforcement learning is employed to dynamically select the optimal motion information during the relocalization process.

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Guest Editors

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