

## Preface

With the in-depth integration of new-generation artificial intelligence (AI) and the high-end technologies such as the internet of things, cloud computing, and big data, AI in the industrial field shows great potential, and is attracting increasing attention all over the world. Industrial AI is a rigorous system science that focuses on the development, verification, and deployment of various machine learning algorithms to accomplish diverse industrial tasks with desired performance. Industrial AI is mainly used for quality analysis, equipment diagnosis, energy efficiency management, process management, manufacturing, and sales with the aid of several key technologies including analysis technology, big data technology, cloud or network technology, etc.

Industrial AI is a bridge that realizes the actual landing of extensive AI research in academia on practical applications in industry. However, at present, the application of industrial AI technology is still in the stage of exploration. Due to the complexity and particularity of industrial scenes, many prevalent AI technologies cannot be applied to the industrial field directly. Most technologies need to be customized or developed in accordance to specific industrial applications incurring real-time processing, high reliability, low computational cost, etc. The development of industrial AI contains many aspects. The actual landing of industrial AI is challenging and faces various practical issues including the interaction between machines, data quality, interpretability, environment uncertainty, and network integrity. The ultimate goal of AI is to realize automated and optimized industrial manufacturing. It is believed that industrial AI can enhance the quality of the labor force, improve work efficiency, and upgrade customer service, which promotes the next wave of industrial revolution bringing new-generation industrial manufacturing.

We wish to express our sincere gratitude to Prof. Tongyi Zhang for inviting us to organize this special issue on industrial AI. The special topic focuses on the state-of-the-art progress and achievements in this field. These articles cover a wide range of topics of AI under the context of industrial production processes including concepts of industrial AI, data processing methods, physical system analysis, platform construction, and potential applications. The proposed technologies in this special topic can realize innovation and applications in different industrial fields by improving the performance of existing systems and enabling digital and intelligent transformation. Finally, we sincerely appreciate all the authors for contributing their efforts and valuable time to this special topic.

DING Han & YUAN Ye  
Huazhong University of Science and Technology