Machine intelligence is the study of the principles, foundations, and designs of adaptive systems that have the ability to learn, predict, optimize, and make decisions to accomplish goals through interaction with uncertain environments. This book advances the fundamental understanding of self-adaptive intelligent systems, helping readers move toward the long-term goal of replicating certain levels of brain-like intelligence, and bringing such a level of intelligence closer to reality across many of today’s complex systems.

Self-Adaptive Systems for Machine Intelligence consists of four major sections:

- **Section 1** introduces self-adaptive systems for machine intelligence research, identifying the research significances and major differences between traditional computation and brain-like intelligence;
- **Section 2** presents data-driven approaches for machine intelligence research, emphasizing incremental learning, imbalanced learning, and ensemble learning;
- **Section 3** focuses on biologically inspired machine intelligence research, with adaptive dynamic programming, associative learning, and sequence learning discussed in detail;
- **Section 4** offers suggestions about critical hardware design considerations—such as power consumption, design density, memory, and speed—for potentially building complex and integrated self-adaptive systems into real hardware.

Different application problems such as pattern recognition, data classification, adaptive control, and image recovery are presented to show the capability of the proposed systems in learning, prediction, and optimization. The presented principles, architectures, algorithms, and featured case studies not only offer fresh insights into machine intelligence research, but also provide new techniques and solutions across a wide range of real-world applications. All the issues discussed herein are active research topics in the field, making this a valuable resource for graduate students to motivate their research toward Master and Ph.D. levels. The book is also intended for academic researchers and professionals in the field of computational intelligence/machine learning, industrial researchers and R&D engineers who are interested in adaptive systems, and undergraduates majoring in science or engineering.

**HAIBO HE, PhD.** is Assistant Professor in the Department of Electrical, Computer, and Biomedical Engineering at the University of Rhode Island. His primary research interest is computational intelligence and self-adaptive systems, including optimization and prediction, biologically inspired machine intelligence, machine learning and data mining, hardware design (VLSI/FPGA) for machine intelligence, as well as various application fields such as smart grid, sensor networks, and cognitive radio networks.