Title

Dealing with Spatial and Temporal Complexities in Cyber-Physical Systems: Simple solutions for complex problems

Speaker

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Abstract

The fast advances in information and communication technologies have made it possible to enable ambient data intelligence and situational awareness in large-scale Cyber-Physical Systems such as smart grids, logistic networks, and transportation, for optimal, reliable operations and management. However, it has also led to explosive growth of spatial and temporal information and computational complexity. An innovative way of thinking is required to tackle these large-scale complex network problems efficiently and effectively.

In this talk, we advocate a novel problem-solving approach, which embraces a philosophy of 'simple solutions for complex problems', to deal with the spatial and temporal complexities in order to deliver just-enough just-in-time reliable solutions. Key to the successful problem solving by this approach is to balance problem simplification and solution accuracy. Well-known nature-inspired methodologies such as AI, machine learning, neural networks, swarm intelligence, complex networks, will be examined. Several real-world problems we have tackled, such as money laundering network detection, spectrum occupancy prediction in wireless communications, autonomous microgrid networks, etc, will be used as case studies to inform the discussions.

Biography

Xinghuo Yu is an Associate Deputy Vice-Chancellor, a Vice-Chancellor's Professorial Fellow, and a Distinguished Professor at RMIT University (Royal Melbourne Institute of Technology), Melbourne, Australia. He received BEng and MEng degrees from the University of Science and Technology of China, Hefei, China, in 1982 and 1984, and PhD degree from Southeast University, Nanjing, China in 1988, respectively. His main research areas include control systems, intelligent and complex systems, and power and energy systems. He received many awards and honours for his contributions, including 2018 MA Sargent Medal from Engineers Australia, 2018 Australasian AI Distinguished Research Contribution Award from Australian Computer Society, and 2013 Dr.-Ing. Eugene Mittelmann Achievement Award from IEEE Industrial Electronics Society. He is a Fellow of Australian Academy of Science, an Honorary Fellow of Engineers Australia, and a Fellow of IEEE, Australian Computer Society and Australian Institute of Company Directors. He has been a Clarivate's Highly Cited Researcher in Engineering since 2015. He was the President of IEEE Industrial Electronics Society in 2018 and 2019.