CS Seminar

Quantum algorithms: Learning, Communication and Verification

Dr Nengkun Yu
University of Technology Sydney

Date:
December 3, 2018
Monday
2:15 pm

Venue:
Room 308
Chow Yei Ching Building
The University of Hong Kong

Abstract:

Quantum algorithms are central themes of the current quantum computing research, and crucial for practical applications of future quantum computers. I will talk about my recent works of quantum algorithms from three perspectives, namely, learning, communication and verification. Firstly, I will review my work on quantum learning, in which I closed a long-standing gap between the upper and lower bounds for quantum state tomography. This is a fundamental problem of quantum learning initiated by Alexander Holevo in the early 1970s. In the second part, I will demonstrate a quantum algorithm which shows that quantum communication complexity is robust in the low noise regime. This is of great importance because, while quantum communication advantages are achieved by accessing to noiseless communication channels, quantum channel in real world are inevitable imperfect. Thirdly, I will present my recent contribution of the formal method verification of quantum algorithms. By combining the celebrated idea of Birkhoff-von Neumann quantum logic and Ying's quantum Hoare logic, I derive a logic and apply it to verify two sophisticated quantum algorithms: HHL for solving systems of linear equations and qPCA (quantum Principal Component Analysis). I will conclude my talk with some challenges and opportunities.

About the Speaker:

Nengkun Yu is a senior lecturer of University of Technology Sydney. He received the B.S. and Ph.D. degrees in Computer Science from the Department of Computer Science and Technology, Tsinghua University, Beijing, China, in July of 2008 and 2013, respectively. In January 2014, he became a Postdoctoral in the Institute for Quantum Computing of University of Waterloo, Canada. In July 2016, he moved to University of Technology Sydney (UTS), Australia. He was awarded the Australian Research Council Discovery Early Career Research Award (DECRA) and Australian Academy of Science's J G Russell Award in 2018.

All are welcome!
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