Title:

Workshop on Machine Learning and Quantum Computation

Abstract:

In the past few years, a rapid growth of interest in machine learning has emerged from academia to industry. We believe that machine learning will play a major role in all areas of future scientific research. On the other way, Quantum computation is another hot topic which brings a tremendous amount of impact and challenge to classic computing. How to combine quantum computing and machine learning to solve classic problems or quantum problem has recently becomes a new interesting research direction.

Scope and Topics:

This workshop brings together experts from a variety of backgrounds to discuss the present and future developments of machine learning and quantum computation, and welcomes to present the original papers among classical machine learning, quantum cryptography and algorithm, and the combination of quantum computation and machine learning. The topics includes but not limited to:

- ✧ New approaches and new applications for supervised learning, unsupervised Learning and reinforcement learning.
- ✧ The theory or application of deep learning, including deep neural networks (DNN), the restricted Boltzmann machine (RBM), etc.
- ✧ Quantum information theory, including quantum state/operation discrimination, quantum, quantum nonlocality, quantum entanglement and discord, etc.
- ✧ Quantum algorithms & complexity theory, quantum programming and verification, quantum experiments and hardware, etc.
- ✧ Quantum cryptography and quantum communication, including QKD, QSS, QKA, QSDC, etc.
- ✧ Quantum secure multiparty computation, such as private comparison, query, voting, set computation, etc.
- ✧ Applying machine learning techniques to study quantum physics problems, such as to classify phases of matter, to solve quantum many-body problems, and to design desired quantum material and quantum circuit.
- ✧ Applying the methods and theories developed in quantum physics to explore new machine learning paradigm, such as quantum-inspired learning algorithms, quantum machine learning, quantum deep learning, Quantum reinforcement learning, and the conversation among deep learning, renormalization group, and holographic duality; the theory of neural network dynamics and phase transitions.
- ✧ Other quantum or machine learning topics.

Program Committee Chairs:

Fei Gao, Ph.D., Prof., Beijing University of Posts and Telecommunications, China
He received his Ph.D. degree in Cryptography from Beijing University of Posts and Telecommunications (BUPT), China, in 2007. Now he is the director of Network Security Research Centre in State Key Laboratory of Networking and Switching Technology, youth working committee member of CACR and CIC, and Quantum information committee member of CIE. His current research interests include quantum cryptography, quantum algorithm, and network security. He has published more than 100 papers in international journals and conferences, and was selected as Chang Jiang Scholars (young scholar) in 2016.

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Wenjie Liu, Ph.D., Associate Prof., Nanjing University of Information Science and Technology, China
He received the bachelor's degree from HZAU, China, in 2001, the master's degree from WHU, China, in 2004, and the Ph.D. degree from SEU, China, in 2011. He is currently an Associate Professor of computer science with Nanjing University of Information Science and Technology, China. He was a visiting professor to the Centre for Quantum Computing and Intelligent Systems, University of Technology Sydney. In recent five years, he has published over 30 SCI-indexed articles. His research interests include quantum machine learning, quantum secure multi-party computation, quantum cryptography communication. He was a recipient of the China NSF Grant, the Jiangsu NSF Grant, and the Six talent peaks project in Jiangsu Province.

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He received his Ph.D. degrees from Fudan University, China and Kochi University of Technology (KUT), Japan in 2007. He was a post-doctoral research fellow at Ryukoku University, Japan from August 2007 to September 2010. He was a research scientist at Wave Engineering Laboratories, ATR Institute International, Japan from October 2010 to March 2014. He was an Assistant Professor at the Graduate School of Information Science, Nara Institute of Science and Technology, Japan from April 2014 to March 2017. He became an Assistant Professor at the Graduate School of Natural Science and Technology, Okayama University, Japan from April 2017. He is a guest research scientist at Wave Engineering Laboratories, ATR Institute International, Japan from October 2016. His research interest are communication systems, wireless networks, and signal processing. He received IEICE (the Institute of Electronics, Information and Communication Engineers) Communications Society Best Paper Award in 2016 and Best Tutorial Paper Award in 2017. Dr. Hou is a senior member of IEEE and member of IEICE.

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