

**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 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:**

Wenjie Liu, Ph.D., Associate Prof., Nanjing University of Information Science and Technology, China

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He is now an associate professor of Computer Science and Technology at Nanjing University of Information Science and Technology, China. He received his Bachelor (HZAU, China, 1997), Master (WHU, China, 2004), Ph.D. (SEU, 2011). His research interests include quantum machine learning, quantum secure multi-party computation, quantum cryptography communication, etc. In recent five years, he has published 20 SCI-indexed Articles, one teaching material, and received China NSF Grant, Jiangsu NSF Grant, and Jiangsu “Six Peak project” Grant.

Tao Shang, Ph.D., Associate Prof., Beihang University, China

He received his Ph.D. degree in System Engineering from Kochi University of Technology, Japan, in 2006. From September 2007 to September 2009, he worked as a postdoctoral in the School of Computer Science at Beihang University, Beijing, China. Now he is the dean of department of information security of School of Cyber Science and Technology at Beihang University, Beijing, China. His current research interests include quantum network coding and quantum cryptography. In recent five years, he has published more than 40 research papers in international conferences and journals, one teaching material, one monograph, and received one second prize of Beijing Higher Education Teaching Achievement Award, one National Natural Science Foundation of China, one National Key Research and Development Program of China.

Lianhua Chi, Dr., Lecturer, La Trobe University, Australia

Dr. Chi is a lecturer in the Department of Computer Science and Information Technology at La Trobe University, Australia. She completed her dual Ph.D. in Machine Learning and Data Mining at University of Technology Sydney (UTS), Australia, and Huazhong University of Science and Technology (HUST), China in 2015. She joined La Trobe after almost three years at IBM Research Australia where she was working as a Postdoc on Watson Education and Health. Before she joined IBM Research Australia, she was a Data Specialist at University of New South Wales (UNSW) and a Visiting Researcher at University of Technology Sydney (UTS). Her main research interest is in making sense of big data with effective, agile and interactive data analytics, especially in Health Care area. Currently, she is working on AI in Precision Medicine. She has received several awards due to her research contribution, such as "Best Paper Award", "Top 200 Young Researchers Globally", “Young Global Changer”, "IBM External Honors" and “Romberg Grant Award”. She has published more than 20 Research papers in International Conferences and Journals and also filed 3 patents in these or related areas..



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