The Hong Kong Polytechnic University
Department of Applied Mathematics

Seminar

AI for science: two examples from spatial transcriptomics data analysis

By

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Abstract

Artificial intelligence (AI) is revolutionizing the way of doing science and making discovery. Here we present two examples from spatial transcriptomics (ST) data analysis to show the role of AI methods. On the one hand, current ST technologies cannot provide the spatial characterization at transcriptome-wide single-cell resolution, leading to limited usage in resolving detailed tissue structure and detecting cellular communications. To address this limitation, we develop SpatialScope, a unified approach to integrating scRNA-seq reference data and ST data by leveraging deep generative models. On the other hand, ST data analysis is often restricted to 2D space within a single tissue slice, limiting our capacity to understand biological processes that take place in 3D space. Here, we present STitch3D, a unified computational framework for 3D reconstruction of cellular structures from the tissue level to the whole organism level. While AI approaches greatly offer the computational efficiency, statistical principles and insights play an important role for the successful development of these methods. These are the joint work with my PhD students Xiaomeng Wan, Jiashun Xiao, Gefei Wang and Jia Zhao, as well as collaborators Angela Wu, Zhixiang Lin, Yan Yan and Yang Wang.

Biography

Prof. Yang Can is currently Dr Tai-chin Lo Associate Professor of Science, Department of Mathematics, The Hong Kong University of Science and Technology. His research focuses on data science with the development of novel statistical and computational methods for large-scale data analysis, including deep generative models, graph neural networks and adversarial domain translation. His research papers have appeared in high impact journals and prestigious machine learning conferences, such as *Nature Computational Science*, *Nature Communications*, *Proceedings of the National Academy of Sciences (PNAS)*, *Annals of Statistics*, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, *The American Journal of Human Genetics*, and *International Conference on Machine Learning*. Prof. Yang has also established industrial collaboration supported by the Innovation and Technology Fund of Hong Kong Government.

Date: 16 March 2023 (Thursday)
Time: 16:00-17:00 (Hong Kong Standard Time GMT +8)
Venue: Y306 (Hybrid mode)
Meeting ID: 965 8689 1609 (Passcode: 0316)
Speaker: Dr. Can Yang, The Hong Kong University of Science and Technology
Host: Prof. Jian Huang, The Hong Kong Polytechnic University
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