

RESEARCH SEMINAR

Towards Efficient AI: Data, Capability, and Applications



Dr Jingcai GUO

Research Assistant Professor
Department of Computing
The Hong Kong Polytechnic University
Hong Kong

Date : 21 Feb 2025 (Fri)
Time : 10:00 am - 11:00 am
Venue : PQ703 / Online via Zoom

Abstract

Efficiency AI plays a crucial role in scenarios where learning/modeling must be accomplished with limited resources, such as insufficient training data, constrained computing capabilities, or both. It further enables and facilitates resource-efficient and low-latency solutions across a wide range of applications. In this talk, the speaker will focus on the data aspect, presenting a series of highly efficient and robust fine-grained zero-shot learning (ZSL) techniques. The talk will start with decomposing the vision components from low to high levels, thereby refactoring ZSL learning from both feature and network perspectives. Then, it will delve into semantic expansion, which enriches ZSL side information by virtue of generative models, prompts, and LLMs. Additionally, it explores cross-modal interaction as a means to narrow the domain gap between seen and unseen compositions, enhancing the overall robustness and applicability of ZSL. Some applications will also be sketched out.

About the Speaker

Dr Guo is currently a research assistant professor with the Department of Computing, The Hong Kong Polytechnic University. He obtained his PhD, MEng, and BEng from The Hong Kong Polytechnic University, Waseda University, and Sichuan University, respectively, all in computer science. He is generally interested in resource-efficient computing and Edge AI, which target learning/modeling with limited resources in terms of data, computing capability, as well as exploring their derivative applications on wide spectrums. Some specific topics include zero/few-shot learning, federated learning, representation learning, model compression, and lightweight solutions for foundation/large models. He is currently the PI of two Hong Kong RGC-GRF projects, one NSFC project, and one Huawei gifted fund. Dr Guo is currently serving as Associate Editor for IEEE Open Journal of the Computer Society and Guest Editor for IEEE Transactions on Computational Social Systems. He regularly serves as Area Chair / Senior PC for prestigious conferences like ICML, AAAI, IJCAI, and ACM-MM. He has been the Publicity Chair for SRDS 2022 and Track Chair for VTC 2024 Fall. He is a panel reviewer (big data) for the General Program and the Young Scientists Fund of the National Natural Science Foundation of China. He was the recipient of the Hong Kong PhD Fellowship in 2017.

RESEARCH SEMINAR

Machine Learning Based Applications For Geoscience



Dr Haoqing Li

Postdoctoral Research Associate
Department of Geomatics Engineering
University of Calgary
Canada

Date : 21 Feb 2025 (Fri)
Time : 11:00 am - 12:00 pm
Venue : PQ703 / Online via Zoom

Abstract

Global Navigation Satellite System (GNSS) positioning and satellite imaging play a central role in various fields as two of the main fields in geoscience, such as autonomous navigation, smartphone positioning, flooding prediction and earthquake detection. The GNSS positioning and satellite imaging technologies are widely applied and closely related to our daily life and therefore trigger the study of mitigating various threats to those two areas. Thanks to decades of research, the conventional methods in GNSS and satellite imaging technologies can achieve optimality under normal conditions. However, their performances will degrade due to the model mismatches in challenging environments. To solve this problem, machine learning approaches have been applied to model the complex environments in geoscience. This talk will focus on the presenter's currently proposed and potential future approaches, which can improve the robustness of geoscience in harsh conditions. Specifically, algorithms leveraging machine learning and Bayesian filtering will be discussed to solve complex problems for GNSS positioning and satellite imaging in challenging environment. For example, techniques based on deep learning, variational inference, robust Bayesian filtering, and their distributed implementations are introduced to mitigate the influence of various threats due to the harsh conditions. The ultimate goal of this research is to improve the accuracy and reliability of techniques used in different geoscience contexts, particularly in challenging environments where current approaches cannot operate, all this aiming for a relatively low computational cost.

About the Speaker

Dr Haoqing LI received his BS degree in electrical engineering from Wuhan University, China, in 2016 and an MS and PhD in electrical and computer engineering from Northeastern University, Boston, MA, in 2018 and 2023, respectively. Currently he is a postdoctoral associate in the Position, Location and Navigation (PLAN) Group at the University of Calgary. His research of interest includes Bayesian filtering, deep learning, and robust statistics with applications in Global Navigation Satellite System (GNSS) signal processing and positioning, interference mitigation techniques, and satellite image processing.