Ruiqiang Xiao

Personal Webpage
MSc of Data-driven Modeling, School of Science
Hong Kong University of Science and Technology, Hong Kong SAR

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Education

•Southeast University, Nanjing, China *Sept. 2018-June. 2022*
B.E. in Highway and Bridge Engineering, School of Transportation GPA: 90/100

•National University of Singapore, Singapore *Sept. 2021-May. 2022*
A one-year joint training program between National University of Singapore and Southeast University

•The Hong Kong University of Science and Technology (HKUST), Hong Kong *Sept. 2022-Nov. 2023*
MSc in Data-driven Modeling, School of Science CGPA: 4.02/4.3 Percentage: 10%

•Main Courses: Statistical Machine Learning(A+), Stochastic Processes and Applications(A), Deep Learning for Modeling: Concepts, Tools, and Techniques(A+)

Publication and Preprints

- Xiao, R., Wan, Z., & Xiang, Y. (2023). *Gaei-unet: Global attention and elastic interaction u-net for vessel image segmentation.* (**link**)

Research Interest

- Prompt-based multimodal understanding
- Large-scale multi-modality biomedical image data integration for more precise medical analysis

Research Experience

•Multi-Task, Multi-Prompt Medical Image Inpainting with Transformer-Based Model *Remote intern*
Project Leader – Supervised by Prof. Yuankai Huo from ***Vanderbilt University*** Sept. 2023-Present
– Developed a cutting-edge transformer-based model for multi-task medical image analysis by image inpainting.
– Introduced a unique input paradigm – combining a query image with multiple support sets(multi-prompt) unlike traditional approaches that use a single input image and train a specific task model.
– Leveraged the patterns learned from the support set through in-context learning to inpaint the query image and generate the desired result.

•Medical Image Segmentation using Active Contour and Deep Learning Methods *Hong Kong SAR*
Project Leader – Supervised by Prof. Yang Xiang from ***HKUST*** Sept. 2022-June. 2023
– Designed and implemented a novel image segmentation approach by integrating unique active contour methods – elastic interaction-based method with the U-shape deep learning framework.
– Proposed an attention module to leverage spatial and channel context information to enhance high-level semantic understanding, prompting thin structure segmentation accuracy and efficiency.
– Focused on applications in medical imaging, contributing to improved diagnosis and treatment planning.
– The article **GAEI-UNet: Global Attention and Elastic Interaction U-Net for Vessel Image Segmentation** is submitted to Arxiv.

•The Detection of Apparent Cracks in Bridges Using Computer Vision *Nanjing, China*
Project Leader – Supervised by Prof. Yanjie Zhu from ***Southeast University*** Aug. 2021-Jun. 2022
– Developed a deep learning model using YOLOv5's image recognition algorithm to detect and analyze cracks in bridge structures.
– Implemented lens distortion correction and orthogonal projection methods to quantify the identified cracks accurately.
– An article in process of modifying: **YOLOv5s-GTB: light-weighted and improved YOLOv5s for crack detection**.

•Automated Road Information Extraction Based on Laser Scanning Point Cloud *Nanjing, China*
Project Leader – Supervised by Prof. Bin Yu from ***Southeast University*** Aug. 2020-Aug. 2021
– Utilized machine learning techniques to extract road level data sets, contributing to urban planning and development.
– Innovated a linear index-based segmentation strategy for efficient point cloud data processing.
– Addressed noise issues through data refinement, enhancing the accuracy of surface segmentation.

•Vehicle Dispatching Considering User Preference Based on Reinforcement Learning *Singapore*
Project Leader – Supervised by Prof. Yang Liu from ***National University of Singapore*** Aug. 2021- May. 2022
– Led a team to analyze NYC taxi data, studying user behavior preferences for carpooling platforms.
– Developed and tested incentive strategies using multi-agent reinforcement learning, maximizing platform efficiency and user satisfaction.
– Implemented a deep Q-network-based ordered allocation system, contributing to the field of intelligent transportation systems.

Honours and Awards

- Honours: Subot Scholarships (2021-2022) (top 1 out of 95), Outstanding Graduate of Southeast University(2022)
- Awards: First Prize of Jiangsu Student Transportation Technology Competition (2021) (top 6 out of 122), The Second Prize Contemporary Undergraduate Mathematical Contest in Modeling (2020)

Working Experience

•Hong Kong Center for Construction Robotics (HKCRC) *Hong Kong*

Research Intern Sep. 2022-Jan. 2023

- Conducted comprehensive data collection and organization, tracking the latest trends and technologies in the Hong Kong construction industry.
- Developed strategic plans for implementing robotics, focusing on the digitalization of construction sites, with potential applications in medical and structural imaging.

Technical Skills and Interests

Languages: C/C++, Python, LaTeX
Technical: Pytorch, Git, Linux, Tensorflow, Matlab
Specialized Skills: Medical Image Analysis, Deep Learning, Computer Vision, Active Contour Methods
Libraries : C++ STL, Python Libraries, CUDA Libraries
Soft Skills: Problem Solving, Self-learning, Presentation, Adaptability