Zongrui Li, Ph.D.

Rapid-Rich Object Search (ROSE) Lab
Nanyang Technological University

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EDUCATION

Ph.D., Rapid-Rich Object Search (ROSE) Lab	Sep. 2021 - Present
Nanyang Technological University (NTU); Supervisor: Prof. Jiang Xudong;	**GPA**: 5.00/5.00
M.Sc., Computer Control & Automation	Aug. 2020 - Aug. 2021
Nanyang Technological University (NTU); Supervisor: Prof. Hu Guoqiang;	**GPA**: 4.88/5.00
B.Eng., Intelligent Transportation Engineering	Sep. 2016 - Jul. 2020
Beijing Jiaotong University (BJTU);	**GPA**: 3.63/4.00

RESEARCH INTERESTS

3D Object Reconstruction (Photometric Stereo and Multi-view Stereo), Differentiable Rendering, Physically Based Rendering, 3D Generative Models (Diffusion Models), Neural Radiance Field, Multi-agent Systems.

WORK EXPERIENCE

Intern, Institute for Infocomm Research (I2R), A*STAR, Singapore   Aug. 2020 - Aug. 2021
Supervisor: Prof. Weimin Huang
- Built a convolutional autoencoder to extract features of patches cropped from Pneumonia X-ray images. Applied DBSCAN to cluster the latent X-ray images.
- Studied cutting-edge contrastive, semi-supervised, and unsupervised learning papers. Trained a typical contrastive learning framework, SimCLR, to extract discriminative information in CT images.

Intern, Institute of Software Chinese Academy of Sciences, Beijing, China   Apr. 2019 - Aug. 2020
Supervisor: Prof. Zhiyu Huang. Data Science and Artificial Intelligence Laboratory. Duties include:
- Used the reinforcement learning to train a UAV swarm executing specific missions.
- Built up a UAV simulator using the real-world map with an interface for deep reinforcement learning.

PUBLICATIONS

- Zongrui Li*, Zhan Lu*, Haojie Yan, Boxin Shi, Gang Pan, Qian Zheng, Xudong Jiang. Spin-UP: Spin Light-based Unsupervised Natural Light Uncalibrated Photometric Stereo. Proc. Computer Vision and Pattern Recognition (CVPR), 2024.
- Zongrui Li, Qian Zheng, Boxin Shi, Gang Pan, and Xudong Jiang. DANI-Net: Uncalibrated photometric stereo by differentiable shadow handling, anisotropic reflectance modeling, and neural inverse rendering. Proc. Computer Vision and Pattern Recognition (CVPR), 2023.
- Zongrui Li, Qian Zheng, Feishi Wang, Boxin Shi, Gang Pan, and Xudong Jiang. NeIF: Representing general reflectance as neural intrinsics fields for uncalibrated photometric stereo. arXiv, preprint., 2022.

RESEARCH PROJECTS

Fashion Diffusion: Text-to-Image Fashion Prototypes Generation with Stable Diffusion
- Applied Stable Diffusion with a pre-trained contrastive image-text encoder that is effective in developing high-quality aesthetic fashion prototypes with a broad range of genres and flexible in creating personalized images for fashion practitioners based on the simple prompt.

Traffic Signal Control Simulation Based on Multi-agent Reinforcement Learning
- Used multi-agent reinforcement learning algorithm, Lenient Q-Learning, to realize large-scale traffic coordinated controlling; optimized the traffic condition of the road net based on the real-world traffic data.
- Built a traffic simulator based on Keras and SUMO TraCI interface.
- Investigated the performance of different classical reinforcement learning algorithms, including DDPG, DQN, and compared them with Lenient Q-Learning.

3D Modeling Visualization and Automatic Parameter Extraction Software Development of High-speed Rail Contact Network (Catenary) Based on Airborne Laser Radar (LiDAR)
- Used C++ to write a visualization project based on Qt, and rendered the point cloud data obtained by UAV with LiDAR.

PROFESSIONAL SERVICES

Conference Reviewer: CVPR, AAAI, WACV, NeurIPS, ICIVC.
Teaching Assistant: Computational Thinking to Programming (EE1005); Intelligent System Design (EE4208); Artificial Intelligence (CZ3005).

TECHNICAL SKILLS

IT Skills: C, C++, Advanced proficiency in Python and Deep Learning Framework (Pytorch), Linux Ubuntu.
Theories: Robotics, Automatic Control Theory, Signal Analysis, Reinforcement Learning, Neural Radiance Field, Diffusion Model, Physically Based Rendering.