Chen Liu

Email: cliu2660@usc.edu Website:https://crellian.github.io/ Address: 1517 West 28th Street, Los Angeles

EDUCATION

University of Southern California, Los Angeles, United States — Jan. 2021-Dec. 2023
Master of Science in Computer Science, advised by Prof. Laurent Itti — GPA: 3.65

University of Western Ontario, London, Ontario, Canada — Sep.2018-Dec. 2020
Bachelor of Science Honors in Computer Science (Dual Degree) — GPA: 89.5%

Central South University, Changsha, China — Sep.2016-Step. 2020
Bachelor of Engineering in Computer Science, advised by Prof. Yixiong Liang — GPA: 85.1%

RESEARCH

Vision-Language Model Dynamics *(in-progress)* *USC iLab*, Sep. 2023 – Present

- Currently designing a multi-task robotic system that empowers robots to perform long-horizon manipulation tasks by mimicking a human demonstration video, facilitated by the VLM's strengths in handling multi-modal information and LLM's capability to generate reward signals and dynamics functions for reinforcement learning.

World Model-Based Sim2Real Transfer for Robot Visual Navigation *USC iLab*, May. 2023 - Aug. 2023
6th Robot Learning Workshop at Neural Information Processing Systems (NeurIPS) 2023, NeurIPs Registration Award; Under Review for ICRA.

- We propose a robust system that integrates the control policy with pretrained visual perception model and LSTM-based robustness-enhanced world model, facilitating efficient transfer of the policy from simulation to real-world scenarios.
- Trained the Perception model on simulation data through a **contrastive learning** approach to predict Bird's Eye View (BEV) embeddings given First Person View (FPV) images. Deployed pretrained models on a **differential-drive robot** for **real-world testing** and effectively addressed **point-to-point visual navigation** tasks.

Real-world Visual Navigation in a Simulator using Scene Generation: A new Benchmark *USC iLab*, Apr. 2023 – Present
Under preparation. Presented at the 2023 Annenberg Research Symposium. Awarded cash prize.

- We collected a large, augmented dataset comprising panoramic RGB images annotated with pose stamps and developed a simulator rendering real-world observations that allows for seamless evaluation of reinforcement learning methods on robot visual navigation tasks. Responsible for employing **LeGO-LOAM LiDAR SLAM** for data annotation.

PROJECTS

Schoomatic - A Differential-Drive Robot Simulator *USC iLab*, Feb. 2023 - May. 2023

- Built a **differential-drive robot simulator** based on the **CARLA** framework and produced a large-scale BEV-FPV simulation dataset with the simulator. This involved developing dynamics, collisions and **C++** plugins in **Unreal Engine 4**, enabling client-server communication via **remote procedure call (RPC)**, and packaging/releasing the simulator as a **Docker** image. Implemented a **ROS**-based end-to-end autonomous navigation system in **Python** and **C++** including components such as **A*** global path planning, **Gmapping** SLAM, **LiDAR**-based occupancy grid mapping, **Timed-Elastic-Band** obstacle avoidance, and **PD** motion control.

Deep Learning-based Image Bad Weather Removal: A Review *USC*, Sep. 2021-Dec. 2021

- Investigated the state-of-the-art transformer-based model, TransWeather, to restore images degraded by different bad weathers. Implemented and compared CBMA, LeFF, Coordinate Attention and Global-Enhanced Transformer to adapt the model to heavy rain scenarios. Designed cascaded model to improve the restoration performance.

Deep Feature Representation Learning in Multi-modal Ophthalmic *CSU CVIU*, Mar. 2018-Dec. 2019

- Built a stacked auto-encoder which automatically extracts image-based biological representations from OCT images for patients with dry age-related macular degeneration. Used SIFT, RANSAC and affine transformation for image preprocessing, and ANOVA for feature selection. The diagnosis accuracy successfully achieved 82.27%.

Image Processsing Algorithm Library *CSU*, Aug. 2017-Dec. 2017

- Built a computer vision library written in **C++**. Implemented features including: a template Matrix class with reference counting, matrix operations, image filters (linear, nonlinear, morphological, and Gabor), image pyramids, etc.

INTERNSHIP

Software Engineer Intern, *Spotlist Inc.* *New York, United States*, May. 2022-Aug.2022

- Built Web **RESTful APIs** with **Django REST framework** to handle HTTP requests and tested them in **Postman**.
- Normalized existing tables to **3NF** and mapped out new **schemas** in the **PostgreSQL** database. Developed **controllers** that allow users to upload and modify their basic information and preferences. Implemented search functionality based on users' preferences, acceptable price ranges, GPS locations, distances, etc.

TECHNICAL SKILLS

- Python, C++, Java, PyTorch, OpenCV, Ray, RLlib, CARLA, PyBullet, MuJoCo, ROS, Linux, Bash, Git

HONORS

- Dean's Honor List in 2018, 2019, 2020 by University of Western Ontario
- Overseas Exchange Scholarship, Second-Class Scholarship by Central South University