HOUJIAN YU

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EDUCATION

University of Minnesota Twin Cities — Minneapolis, MN
Doctor of Philosophy in Electrical and Computer Engineering, GPA: 3.7/4.0 — Sept. 2020 – Exp. May 2025

University of California San Diego — La Jolla, CA
Master of Science in Electrical and Computer Engineering, GPA: 3.5/4.0 — Sept. 2018 – Mar. 2020

North China Electric Power University — Beijing, China
Bachelor of Engineering in Electrical and Electronic Engineering, GPA: 3.5/4.0 — Sept. 2014 – Jun. 2018

EXPERIENCE

Robotics Research Assistant [website] — Sept. 2020 – Present
Choice Robotics Lab, University of Minnesota — Minneapolis, MN
- Proposed a robot-assisted interactive segmentation pipeline to solve the novel object segmentation problem, achieving 0.84 AP score
- Developed a deep Q-learning network to singulate objects from a dense clutter, achieving 70% success rate
- Trained an optical flow binary classifier to recognize the multi-object moving scenes

Lab Teaching Assistant — Sept. 2021 – Jun. 2022
EE 1301, Intro to Computation System, University of Minnesota — Minneapolis, MN
- Programming basics with C++, IoT projects with Particle Photon

PROJECTS

Target-aware Object Searching and Grasping
- Trained a DQN to perform a synergy of push and grasp on a target object from a dense clutter, achieving task success rate of 91%
- Trained a classifier-based hierarchical policy to determine the current low-level task type
- Trained a Siamese Network with self-collected synthetic data for target matching with an accuracy of 92% on novel object

Data Visualization for Neural Network Interpretation
- Implemented the multi-slice PHATE to embed high-dim information in neural network into two dimensions while preserving the data geometry evolving over training
- Visualize the hidden units activation in LeNet fully connected layers during training on MNIST and captured the trajectory of the activation geometry

Particle Filter Based Simultaneous Localization and Mapping (SLAM) and Texture Mapping
- Implemented a Particle Filter based SLAM algorithm with odometry and 2-D laser data
- Applied Bayes decision rule and log-odds mapping methods to update the map over time

Extended Kalman Filter Based Visual Inertial SLAM
- Implemented an EKF based SLAM with real-world IMU measurement and a stereo camera data to visualize the vehicle trajectory and landmark points

SKILLS

Programming: Python, C/C++, MATLAB, JAVA
Deep Learning and Robotics: PyTorch, PyTorch-Geometric, Tensorflow, Keras, scikit-learn, Franka Emika Panda, ROS, OpenCV, Gym, MuJoCo, Coppeliasim
Courses: Robotics Vision, Sensing and Estimation in Robotics, Computer Architecture, Data Geometry, Intelligent Robotic Systems, Linear Algebra

SELECTED PUBLICATIONS

Self-Supervised Interactive Object Segmentation Through a Singulation-and-Grasping Approach
European Conference on Computer Vision (ECCV) Tel Aviv, Israel, 2022 [website, pdf]

BEGIN: Big Data Enabled Energy-Efficient Vehicular Edge Computing
IEEE Communications Magazine, 2018 [pdf]