Jingtian Yan

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EDUCATION

Carnegie Mellon University (CMU), Pittsburgh, USA Sep 2021 - May 2023

Major: Electrical & Computer Engineering

Average GPA: 4.0/4.0

Relevant coursework: Robot Localization & Mapping | Planning & Decision-making in Robotics | Computer Vision | Convex Optimization | Reinforcement Learning

Zhejiang University (ZJU), Zhejiang, China Sep 2016 - Jun 2020

Major: Automation

Average GPA: 3.87/4.0 (Major: 3.96/4)

Relevant coursework: Algorithms & Data Structure | Computer vision | Machine learning

EXPERIENCE

Multi-Agent Motion Planning with Bézier Curve Optimization under Kinodynamic Constraints (C++ | Cplex)

March 2023 – Present

Research Assistant | CMU, Pittsburgh, PA

Supervisor: Jiaoyang Li

- Worked on a multi-agent path planner called PSB, which aims to solve the challenges that arise in a path planning for large group of agents under the kinodynamic constraints.
  - PSB fully considered the kinodynamic capability of the agents and produce the solution with a smooth speed profile which is able to be executed by the controller.
  - Empirically, we evaluated our methods within the domains of traffic intersection coordination and grid maps. Our method shows up to 49.79\% improvements in solution cost compared to existing methods.

Terrain Aware Navigation Planner (ROS | C++ | Python) Oct 2022 – March 2023

Student Researcher | CMU, Pittsburgh, PA

Supervisor: Sebastian Scherer, Ji Zhang

- Using the IMU and Odometry feedback to guide the navigation task in an unknown environment.
  - Using the sensor information of IMU, Lidar, and camera to predict the terrain information of the environment.
  - Develop a hierarchical MCTS-based planner that plans the paths to the target in the unknown environment using the estimation of the above-mentioned terrain information.

Multi-agent Exploration with the unknown initial pose (ROS | C++) Jun 2022 – Aug 2022

Student Researcher | CMU, Pittsburgh, PA

Supervisor: Sebastian Scherer, Ji Zhang

- Built a multi-agent autonomous system for exploration with the unknown initial relative pose.
  - Exploration of an unknown environment is an essential task in robotics. However, obtaining the relative pose between agents is hard in many scenarios. Thus, this project aims to solve the problem that using a multi-agent autonomous system to explore the environment without having an initial relative pose.
  - This system uses the place recognition algorithm to get the relative pose. However, passive place recognition methods usually suffer from short overlaps. Thus, this paper proposed an adaptive map merge module to increase the robustness of overlap while keeping exploration performance.
  - Design a sub-map-based global planner that optimizes the global paths for agents in the sub-map.
  - Tested on the simulation environment, shows significant improvement against other state of art methods.

Isaac-sim Simulation Environment Development (ROS | C++) Nov 2021 - May 2022

Student Researcher | CMU, Pittsburgh, PA

Supervisor: Ji Zhang

- Build the 3D real-time simulation environment using Isaac-sim, this simulation environment can provide the interface for the path planner and exploration planner.
- Tested on TARE planner and FAR planner, the GitHub repository is here.

3D CT images Segmentation (Python | PyTorch) Jul 2020 - Jun 2021

Researcher Assistant | Zhejiang University, Hangzhou, China

Supervisor: Chunhui Zhao

- Conducted research on 3D CT images Segmentation algorithm.

- Ovarian cancer is a gynecological malignant tumor with a low early diagnosis rate and high mortality. Thus, using the 3D image Segmentation algorithm to assist the diagnosis process.
- Proposed a multi-scale graph learning U-Net (MGLU-Net) for ovarian tumor segmentation. Designed the graph convolutional module that learns both the local characteristics and the global structure of the tumors, aiming to handle the polycentric distribution of the ovarian tumors and the size variation problem.
- Shows superior performance than the state-of-the-art methods on the real ovarian CT image dataset and Sliver07 challenge dataset.

Monocular Visual-Inertial Odometry (C++ | Linux | ROS | TensorFlow) Jul 2019 – Jun 2020
Student Researcher | Zhejiang University, Hangzhou, China
Supervisor: Jianke Zhu

- Conducted research on the Monocular Visual-Inertial State Estimator algorithm on the platform of UGV.
  - Monocular Visual-Inertial State Estimator has been discussed commonly due to its low cost; however, little research has been conducted utilizing the features of roads for UGV.
  - Applied Fully Convolutional Neural Network to road semantic segmentation based on Python and TensorFlow. Assumed the road found in the image as a plane, then used the feature points on the road as the foundation for the plane constraint.
- Outperformed the VINS-Mono on the dataset Kitti.

PUBLICATIONS

- **papers:**
- ***Yan, Jingtian**, and Jiaoyang Li. "Multi-Agent Motion Planning with Bézier Curve Optimization under Kinodynamic Constraints." (In manuscript for IEEE Robotics and Automation Letters).*
  ***Yan, Jingtian**, Xingqiao Lin, Zhongqiang Ren, Shiqi Zhao, Jieqiong Yu, Chao Cao, Peng Yin, Ji Zhang, and Sebastian Scherer. "MUI-TARE: Cooperative Multi-Agent Exploration with Unknown Initial Position." IEEE Robotics and Automation Letters (2023).*
  *Zihang Liu, Chunhui Zhao, Yan Lu, Yu Jiang, and **Jingtian Yan**. "Multi-scale graph learning for ovarian tumor segmentation from CT images." Neurocomputing 512 (2022): 398-407.*
  *Zhuang, Zhuokai, **Jingtian Yan**, Chenglang Sun, Haiqiang Wang, Yuejun Wang, and Zhongbiao Wu. "The numerical simulation of a new double swirl static mixer for gas reactants mixing." Chinese Journal of Chemical Engineering 28, no. 9 (2020): 2438-2446.*
- **Patent:**
  "The invention relates to a tracked security patrol robot", CN 209492625 U, Oct.2019 (The second prize of the 13th "Zktecho Cup"）
- **Software Copyrights:**
  "Robot mobile terminal software for indoor air quality monitoring", 2019SR0118235, Jan.2019
  "Intelligent mobile robot software for indoor air quality monitoring", 2019SR0117978, Jan.2019
  "UAV mobile terminal software for river garbage monitoring", 2019SR0117981, Jan.2019

HONORS

- "Zktecho" scholarship (Top 1%) Nov 2018
- Outstanding student of Zhejiang University (Top 3%) Jul 2018
- Third prize of academic scholarship (Top 15%) Jul 2018
- A title of Outstanding Volunteers Sep 2017
- Zhejiang provincial government scholarship (Top 1%) Jul 2017
- Second prize of academic scholarship (Top 7%) Jul 2017
- The second prize of the 13th "Zktecho Cup Supermarket Robot Competition" (Top 2%) May 2017

SKILLS

Computer Language	Python | MATLAB | C & C++
Software & Tools	TensorFlow | ROS | PyTorch | OpenCV
Language Proficiency	Chinese (Native) English (Advanced) TOEFL: Total 104 (S23) GRE: Quantitative 170, Verbal 155