Yuxuan Liu

PHD STUDENT · ELECTRONIC AND COMPUTING ENGINERRING

Hong Kong University of Science and Technology

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Education

Hong Kong University of Science and Technology   *Hong Kong, China*

PH.D. IN ELECTRONIC AND COMPUTING ENGINERRING   *Aug. 2019 - Aug. 2023 (expected)*

- Supervisor: Dr. Ming Liu
- Research Interest: visual depth estimation, visual 3D detection, ground mobile robots, autonomous driving, computer vision.

Zhejiang University   *Zhejiang, China*

B.S. IN MECHATRONIC ENGINEERING   *Aug. 2015 - Jul. 2019*

Publications

Yuxuan Liu, Yixuan Yuan and Ming Liu, "Ground-aware Monocular 3D Object Detection for Autonomous Driving," in IEEE Robotics and Automation Letters (RA-L), vol. 6, no. 2, pp. 919-926, April 2021, doi: 10.1109/LRA.2021.3052442.

Yuxuan LIU, Lujia Wang, Ming Liu, "YOLOStereo3D: A Step Back to 2D for Efficient Stereo 3D Detection", International Conference on Robotics and Automation (ICRA), 2021 , Xi An, China.

Yuxuan LIU, Zhenhua Xu, Ming Liu, "Star-Convolution for Image-Based 3D Object Detection", International Conference on Robotics and Automation (ICRA), 2022, Philadelphia, the US.

Peng Yun, **Yuxuan LIU** and Ming Liu, "In Defense of Knowledge Distillation for Task Incremental Learning and its Application in 3D Object Detection," IEEE Robotics and Automation Letters (RA-L), 2021

Zhenhua Xu, **Yuxuan LIU**, Lu Gan, Xiangcheng Hu, Yuxiang Sun, Ming Liu, Lujia Wang, CsBoundary: City-Scale Road-Boundary Detection in Aerial Images for High-Definition Maps, IEEE Robotics and Automation Letters 7, no. 2 (2022): 5063-5070.

Zhenhua Xu, **Yuxuan Liu**, Lu Gan, Yuxiang Sun, Lujia Wang, and Ming Liu, "RNGDet: Road Network Graph Detection by Transformer in Aerial Images", IEEE Transactions on Geoscience and Remote Sensing (TGRS), 2022

Hengli Wang*, **Yuxuan Liu***, Huaiyang Huang*, Yuheng Pan*, Wenbin Yu, Jialin Jiang, Dianbin Lyu, Mohammud J. Bocus, Ming Liu, Ioannis Pitas, Rui Fan, ATG-PVD: Ticketing Parking Violations on A Drone, European Conference on Computer Vision (ECCV) Workshops, 2020, Glasgow, UK. (* indicates equal contribution)

Projects

OPEN SOURCE

VisualDet3D: A unify toolbox for visual 3D object detection and supervised depth estimation. `https://github.com/Owen-Liuyuxuan/visualDet3D`

FSNet: Full-scale self-supervised monocular depth estimation network and toolbox. (under review) `https://sites.google.com/view/fsnet/home`

RESEARCH EXPERIENCE

Monocular 3D Object Detection

- We developed ground-aware feature aggregation module and a data-driven anchor definition for monocular 3D object detection. The proposed GAC approaches achieved competitive performance on the KITTI 3D detection benchmark. (Accepted by IEEE RA-L)
- We developed a star-convolution module for image-based 3D detection that explicitly awared of the camera intrinsic parameters. The proposed approach is robust to camera parameters and achieved competitive performance on the KITTI 3D detection benchmark. (Accepted by ICRA-2022)

Stereo 3D Object Detection

- We developed YOLOStereo3D framework, which treats stereo detection as an augmented monocular detection. We integrated light-weight correlation modules and multi-scale fusion architectures into this framework. The proposed approach is one of the fastest stereo methods on KITTI 3D detection benchmark while achieving competitive performance. (Accepted by ICRA-2021)

HDMap Creation
- We developed a transformer-based network to construct adjacency matrix for graph-based road-boundary detection given keypoints detected from aerial images (Accepted by IEEE RA-L 2021).

- We applied DETR-based detection framework to road network generation. For each agent (graph instance), we applied DETR-based detection networks to search for the next growing keypoints. We manage to produce high-quality road network from aerial images. (Accepeted by IEEE TGRS 2022).

Continuous Learning
- We developed apply knowledge distillation to regularize the loss when we transfer old task knowledge into new tasks. The proposed methods are evaluted in image classification task and 3D object detection (Accepted by IEEE RA-L 2021).

ENGINEERING EXPERIENCE

Trials of the Autonomous Logistic Vehicle in HKUST
- * This project aims at deploying an autonomous logistic vehicle in HKUST to deliver food and goods between restaurants and offices. I am responsible of arranging and managing a series of tests on the campus to demonstrate that the vehicle is safe, reliable and intelligent. We have got Hong Kong Transport Departments's (HKTD) appreciation that : "HKUST has been advancing the trials and becoming the **first** trial organization in Hong Kong to carry out autonomous vehicles without a driver/operator on board".

Autonomous Platform in Elderly Care Centers
- * This project aims at developing an autonomous platform to support the movement of the elderly in elderly care centers. I am the developer of this project. I designed and constructed the autonomous platform and deployed a stack of perceptions and autonomous navigation algorithms on board.

Teaching Experience

ELEC-5670	**Robot Perception and Learning**, Teaching Assistant	*Spring 2019-2020*
ELEC-3210	**Machine Learning and Information Processing for Robotics**, Teaching Assistant	*Autumn 2020-2021*

Skills

Programming: Python, C/C++, Javascript
Frameworks: Pytorch, ROS
Developer Tools Git, Docker, Gitlab
Certification: National Computer Rank Examination Embeded System Certificate of Level 3
Languages: Chinese (Native), Cantonese (Native), English (TOEFL-IBT 104/120), Japanese (JLPT N1)