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教育背景

清华大学, 硕士 2022.9 – 至今

车辆与运载学院智能出行所 GPA:3.88/4

北京航空航天大学, 本科 2018.9 – 2022.7

自动化科学与电气工程学院 GPA:3.82/4
所获荣誉：优秀毕业生，三好学生，全国大学生数学竞赛一等奖，北航数学建模一等奖等

研究方向

自动驾驶地图
以传感器出发实现自动驾驶地图构建，并辅以先验知识进行地图感知增强

- 语义分割，视觉点云融合
- 在线拓扑建图，地图信息多源融合

实习经历

滴滴出行, 基于生成式模型的地图分割 2023.10 – 至今

- 地图表达形式及结构形状信息具有一定规律性，而现有的检测框架往往忽略这一特性，生成式模型具备模拟数据分布的能力；针对此，借助生成式模型搭建地图分割网络，利用记忆先验补全矫正分割缺失不准的地方。**本人提出该算法，并完整负责算法模块搭建和开发。**
- 对接参与滴滴在线建图上车业务，支持落地工作。

上海人工智能研究院, 拓扑地图构建及数据集开发 2023.4 – 2023.10

- 针对在线建图几何和拓扑关联缺失的问题，提出 LaneSegNet 模型，将车道线与中心线紧耦合在一起，同时提出了具有 Heads-to-Regions 机制的车道注意力模块，用于捕获长距离注意力。**本人提出了论文主要创新点：两者耦合的新学习范式，主导了该模型全链条的开发及各类实验。**产出 **1** 篇顶会论文，项目获 **108**stars，开源地址:LaneSegNet。
- 针对地图研究领域，缺乏复杂的车道连接关系及车道-交通灯连接关系的现状，提出 OpenLaneV2 数据集。**本人参与了车道线拓朴连接关系数据处理部分，主导了 LaneSegment 扩展包的开发；参与了测评指标的设计与开发；参与了与之相关的 CVPR2023 自动驾驶挑战赛运维。**参与 1 篇顶会论文撰写，项目获 **458**stars，开源地址:OpenLaneV2

商汤, 三维重建 2022.6 – 2022.9

- 针对乡村屋顶光伏板安装项目，基于多视角影响优化建筑物轮廓，提高轮廓重建准确度。**本人负责对于重建所需的原始多视角图片进行合规性筛查，并依据多视几何的关系进行线参数重建。**

项目及实践经历

导航控制所项目，轻量级语义地图构建及视觉语义定位技术 已完成

- 负责子模块：典型地图要素三维重建。探究地图要素的矢量化表达形式，利用图片中道路要素的提取结果及雷达与相机的标定关系进行投影，得到三维重建结果，并提取其矢量特征点。

北京市科委项目，在线感知与离线地图相融合的自动驾驶建图 进行中

- 负责子模块：研究融合离线地图的在线感知算法。探究导航地图，历史离线地图，轨迹数据对于在线感知的增强作用。

微软人工智能教育社区共建 已完成

- 曾参与微软人工智能教育社区 AI-EDU 的建设并为其开源社群主要负责人。负责 AI-EDU 社区整体内容设计及更新工作，维护社区活动及实践项目两大版块。目前该社区已获 **10.8k**stars，开源地址：ai-edu

代表性文章

- **LaneSegNet: Map Learning with Lane Segment Perception for Autonomous Driving**
  International Conference on Learning Representations (ICLR 2024)
  Tianyu L*, **Peijin Jia***, Bangjun Wang, Li Chen, Kun Jiang, Junchi Yan, Hongyang Li (*Equal contribution)
- **LaneDag: Automatic HD Map Topology Generator Based on Geometry and Attention Fusion Mechanism**
  IEEE Intelligent Vehicles Symposium (IV 2024 submitting)
  Peijin Jia, Tuopu Wen, Ziang Luo, Zheng Fu, Jiaqi Liao, Kun Jiang, Mengmeng Yang, Diange Yang
- **OpenLane-V2: A Topology Reasoning Benchmark for Unified 3D HD Mapping**
  Conference and Workshop on Neural Information Processing Systems (NIPS 2023)
  Huijie Wang, Tianyu Li, Yang Li, Li Chen, Chonghao Sima, Zhenbo Liu, Bangjun Wang, **Peijin Jia** et.al
- **High-Definition Maps Construction Based on Visual Sensor: A Comprehensive Survey**
  IEEE Transactions on Intelligent Vehicles, 2023
  Xuewei Tang, Kun Jiang, Mengmeng Yang, Zhaoyang Liu, **Peijin Jia** et.al and Diange Yang

个人总结

- 编程语言：Python, C, C++, Matlab
- 英语：CET4:598　CET6：541
- 依托项目实践，从相关算法综述整理到数据集 AV2, NuScenes，Openlanev2 处理到拓扑关联研究及相关算法优化，全方面积累了对于自动驾驶地图领域的认知，熟练使用 pytorch 深度学习框架，并熟悉了 mmdet，detectron2, diffusers 等一系列开源工具链，可快速适应实习工作要求

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Education

Tsinghua University, Master 2022.9 – Present

Intelligent Mobility Institute, School of Vehicles and Transportation GPA:3.88/4

Beihang University, Bachelor 2018.9 – 2022.7

School of Automation Science and Electrical Engineering GPA:3.82/4

Awards : Outstanding Graduate, Excellent student, First Prize in National University Mathematics Competition, First Prize in Mathematical Modeling of Beihang University, etc.

Research Interest

Autonomous Driving Map

Starting with sensors to realize map construction, and supplemented with a prior knowledge for enhancement

- Semantic segmentation, Multi-sensor Fusion
- Online topology construction, Offline post-processing

Intership

DiDi, Generative Model-based Map Segmentation 2023.10 – Present

- Proposed an algorithm for map segmentation using generative model, considering the regularity of map expression form and structural shape information prior.
- Supported the implementation of online mapping on-board business.

Shanghai AI Lab, Topological Map Construction and Dataset Development 2023.4 – 2023.10

- Designed and developed the LaneSegNet model to enhance geometric and topological associations in online map building. Proposed a new learning paradigm for the coupling of lane lines with the centerlines. Led the development of the model and conducted various experiments. Co-built the Lane Attention Module with Heads-to-Regions mechanism to capture long-distance attention. Open-source repository: LaneSegNet(108 stars).
- Contributed to the development of OpenLaneV2 dataset, especially the LaneSegment extension package. Participated in the design and development of evaluation metrics. Open-source repository: OpenLaneV2(458 stars).
- Supported the operation and maintenance of the CVPR2023 Autonomous Driving Challenge.

Sense Time, 3D Reconstruction 2022.6 – 2022.9

- Assisted in optimizing building contours for rural rooftop photovoltaic panel installation projects.

Projects and Experience

Semantic Map Construction and Visual Localization Technology Completed

- Responsible for the 3D reconstruction of typical map elements: Explored the vectorized representation of map elements, utilized the extracted road features from images and the calibration relationship between lidar and camera for projection, obtained 3D reconstruction results, and extracted their vectorized points.

Fusion of Online Perception and Offline Map for Autonomous Driving Mapping In progress

- Responsible for fusion of offline maps in online perception algorithms: Explored the enhancement of online perception through SD maps, historical HD maps, and trajectory data.

Microsoft AI Education Community Co-building Completed

- Participated in the construction of the Microsoft AI Education Community (AI-EDU) and served as the main contributor. Open-source repository: ai-edu

PUBLICATION

- **LaneSegNet: Map Learning with Lane Segment Perception for Autonomous Driving**
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SUMMARY

- Programming Language: Python, C, C++, Matlab
- English: CET4:598 CET6:541
- Based on my project experience, I have gained knowledge and expertise in various aspects of AD maps, including algorithm review, dataset processing (AV2, NuScenes, Openlanev2), topological correlation research, and algorithm optimization. I am proficient in using the PyTorch deep learning framework and familiar with a range of open-source tools such as mmdet, Detectron2, and diffusers. These skills enable me to quickly adapt to internship requirements.