

Keyu Li

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EDUCATION

- **Xidian University** Xi'an, China
Master of Electronic and Information Engineering, supervised by Prof. Nannan Wang. Sep. 2020 – June. 2023
- **Xidian University** Xi'an, China
Bachelor of Communication Engineering, supervised by Prof. Nannan Wang. Sep. 2016 – June. 2020

RESEARCH INTEREST

Autonomous Driving Perception
Object Detection & Tracking
Model Quantization
Image Super-Resolution

EXPERIENCE

- **Shanghai AI Laboratory** Shanghai, China
Research Intern, supervised by Li Chen and Dr. Hongyang Li June. 2022 - Feb. 2023
 - **Unified Autonomous Driving Framework:**
This project proposes an Unified Autonomous Driving Framework (**UniAD**) that uses Query as an intermediate state to link tasks such as perception, prediction, and planning together, enabling end-to-end training. This allows the final prediction control task to use features from the perception side effectively. The output paper was published at **CVPR2023**, and selected as **Best Paper Award**.
- **Megvii** Beijing, China
Research Intern, supervised by Feiyang Tan July. 2021 - June. 2022
 - **Lidar Point Cloud based End-to-end 3D Perception:**
This project proposes an **end-to-end perception structure** that can perform end-to-end training of **detection, tracking, and prediction** tasks. First, Detr structure (end-to-end model) is referred to and 3D Detr is implemented on point cloud data, and its effectiveness is verified (reaching 50+ mAP on NuScenes val). Then, the query is divided into two types: **det query and track query**. Det query is responsible for detecting newly appearing objects in each frame, while track query is responsible for tracking an object throughout all frames. The track query contains temporal information of an object and is followed by MLP network to output prediction results (center points coordinates).
 - **Visual based 3D Object Detection:**
This project is based on the reproduced BevDet framework, which explicitly converts image features to Bev features and uses conventional 3D detection head for 3D detection. Optimization is performed from the perspectives of **depth estimation** and **temporal information fusion**. The model can achieve 45+ mAP on NuScenes val dataset and 60+ mAP on the company's large self-collected dataset.
 - **Codebase:**
Participate in the development and maintenance of the entire team's perception codebase.

RESEARCH PROJECT

- **Huawei Noah's Ark Laboratory Collaborative Research Project:**
Single Image Super-Resolution (SISR) is a representative direction in the low-level field. The current SISR models have a huge number of parameters and computations due to the use of deep convolution layers. In order to reduce the computations and parameters, we first analyzed the differences between the super-resolution and classification tasks, and proposed a 1-bit quantization model for the super-resolution task. The model achieves model compression while maintaining high accuracy (with a drop of no more than 0.3dB). The research has been published in the **TNNLS** journal.
- **National Youth Fund Research Project:**
The main research of this National Youth Fund project is face image-to-sketch reconstruction in cross-domain scenarios. Firstly, we used CycleGAN as the baseline, and addressed the issue that the generated images have poor texture details and resemble gray images rather than artworks due to the use of MSELoss. To solve this problem, we introduced the perceptual loss from image style transfer to make the generated images/artworks more visually appealing to the human eye. Additionally, we proposed a feature-level supervised loss to further improve the quality of the generated images/artworks. The research results have been published in **PRCV2020**, and selected as an **Oral** presentation.

HONORS AND AWARDS

CVPR2023 Best Paper Award

June. 2023

Outstanding Master Thesis Award, Xidian University

June. 2023

2022-2023 Outstanding Graduate Student

May. 2023

2nd Class School Scholarship

Sep. 2022

Outstanding Graduate Special Scholarship

Sep. 2020

PUBLICATIONS

(* Equal contribution, # Corresponding authors)

[J1] **K. Li**, N. Wang#, et al. Local Means Binary Networks for Image Super-Resolution[J]. IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**). 2022.

[J2] X. Jiang, N. Wang#, J. Xin, **K. Li**, et al. Toward Pixel-Level Precision for Binary Super-Resolution With Mixed Binary Representation[J]. IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**). 2022.

[C3] Y. Hu*, J. Yang*, L. Chen*#, **K. Li***, ..., H. Li#, et al. Planning-oriented Autonomous Driving[C] // Proceedings of IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR, CCF-A**). 2023. [\(Best Paper Award\)](#)

[C4] **K. Li**, N. Wang#, et al. Feature Space based Loss for Face Photo-Sketch Synthesis [C] // Chinese Conference on Pattern Recognition and Computer Vision (**PRCV, CCF-C**). 2020. [\(Oral\)](#)

[C5] X. Jiang, N. Wang#, J. Xin, **K. Li**, et al. Training Binary Neural Network without Batch Normalization for Image Super-Resolution[C] // Proceedings of the AAAI Conference on Artificial Intelligence (**AAAI, CCF-A**). 2021.

ACADEMIC SERVICE

Program Committee Member/Conference Reviewer

- IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2023
- IEEE/CVF International Conference on Computer Vision (ICCV), 2023
- CAAI International Conference on Artificial Intelligence (CICAI), 2021, 2022

SKILLS AND INTERESTS

- **Languages:** Mandarin Chinese, English (CET-6)
- **Programming:** Python, Matlab, Pytorch
- **Interests:** Reading, playing badminton and watching movies