

Tianhang Cheng

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EDUCATION

Zhejiang University

Zhejiang, China

Bachelor of Science, Opto-Electronics Information Science and Engineering

09/2017-06/2022

- Overall GPA: 3.96/4.0(89.3/100), Major GPA: 3.94(89.6/100), Ranking: 6/116(Top 5%)
- Chu Kochen Honors College, Zhejiang University

University of Illinois Urbana-Champaign

Master of Science, Computer Science

08/2022-now

- Advisor: Prof. [Shenlong Wang](#) in CS department and Prof. [Kaiyu Guan](#) in NRES department.

PUBLICATION

1. **Tianhang Cheng**, Wei-Chiu Ma, Kaiyu Guan, Antonio Torralba, Shenlong Wang, “Structure from Duplicates: Neural Inverse Graphics from a Single Image”, *Conference on Neural Information Processing Systems (NeurIPS)*, 2023. (Poster)

RESEARCH

Inverse Rendering for Single Image with Multiple Duplicate Instances

University of Illinois Urbana-Champaign

10/2022-09/2023, Advisor: Shenlong Wang

- *Idea*: different instances share the same geometry and BRDF material in canonical space.
- *Pipeline*: estimate relative object poses by pretrained Super-Point and Super-Glue model from instance segmentations with in-plane rotation augmentation. Then train geometry, global visibility field and object material in a 3-stage pipeline.
- *Result*: we achieve a better disentanglement between geometry, texture, and environment light than baseline models.

Quantifying Top-View Crop Cover from Street-view Video by geometric digital twins and vision-based deep learning (Interdisciplinary Project)

University of Illinois Urbana-Champaign

8/2022-now, Advisor: Kaiyu Guan

- *Idea*: quantify top-view residue fraction by explicitly modeling the occlusion effect of straws
- *Pipeline*: Use SfM to recover camera pose and ground geometry, then either (1) build a 3D digital twin model in Blender or (2) use mathematical analysis to predict top-view residue fraction.
- *Result*: we are the first one to explicitly predict residue fraction only from street-view video, and the performance is better than several simple baselines. We will submit our manuscript to IEEE Transactions on Geoscience and Remote Sensing recently.

Unsupervised 3D Dynamic Scene Reconstruction of Multi Rigid Bodies

State Key Lab of CAD&CG, Zhejiang University, China

06/2021-06/2022

Advisor: Xiaowei Zhou

- *Idea*: Optimize the object pose of in-the-wild scenes from single-view video
- *Pipeline*: Chose a video with a constant number of cars and represented them as NeRFs attached to the nodes of the graph neural network, then Optimized objects' 6D position and its NeRF through video frames, no need to manually mark the 3D position of the object
- *Result*: The model can perform 3D reconstruction for cars in the KITTI dataset, but pose estimation fails.

SDF-based 3D GAN

UC-Merced

05/2021-08/2021, Advisor: Ming-Hsuan Yang

- *Idea*: Use signed distance field (SDF) to generate 3D-consistent feature and 3D shape.

- *Pipeline*: Passed the features through a style-based convolution upsampler and generated high-frequency detail of the image.
- *Result*: Model can generate with higher image quality and better shape quality than naïve NeRF.

Parameter-Efficient Group Equivariant Neural Network

Zhejiang University

07/2020-11/2020, Advisor: Kaiwei Wang

- *Idea*: decompose dense bases into sparse bases, which can speed-up group convolution while keeping group equivariance and receptive field unchanged.
- *Pipeline*: Decomposed the group convolution kernel into N orthogonal bases, then only selected K different bases to form the group convolution kernel.
- *Result*: Obtained a Model with only 1/4 the parameter and 4x faster convolution speed compared with the existing regular representation group equivariance neural network

SKILLS

Language	Fluent English, Native Mandarin
Programming	MATLAB, C, Python3 (Pytorch & TF2)
Software	Zemax / SolidWorks / FDTD solution / COMSOL / Lingo / Latex, MS office

HONORS AND AWARDS

2018	National Scholarships, Zhejiang University (top 1% of 327 students)
2018	First-class academic scholarship, Zhejiang University (top 3% of 327 students)
2019	Provincial scholarship (top 2% of 145 students)
2019	Third-class academic scholarship, Zhejiang University (top 15% of 145 students)
2020	Second-class academic scholarship, Zhejiang University (top 10% of 145 students)