

Yao Wei

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SUMMARY

I am a third-year Ph.D. student at Faculty of Geo-Information Science and Earth Observation (ITC) at University of Twente, supervised by Prof. George Vosselman and Prof. Michael Ying Yang. My research interests include 3D scene understanding, generative models and multi-modal learning.

PUBLICATIONS

- [1] Yao Wei, George Vosselman, Michael Ying Yang. **BuilDiff: 3D building shape generation using single-image conditional point cloud diffusion models.** *IEEE/CVF International Conference on Computer Vision Workshops*, 2023.
- [2] Yao Wei, George Vosselman, Michael Ying Yang. **Flow-based GAN for 3D point cloud generation from a single image.** *British Machine Vision Conference*, 2022.
- [3] Yao Wei, Shunping Ji. **Scribble-based weakly supervised deep learning for road surface extraction from remote sensing images.** *IEEE Transactions on Geoscience and Remote Sensing*, 2021, 60: 1-12.
- [4] Yao Wei, Kai Zhang, Shunping Ji. **Simultaneous road surface and centerline extraction from large-scale remote sensing images using CNN-based segmentation and tracing.** *IEEE Transactions on Geoscience and Remote Sensing*, 2020, 58(12): 8919-8931.
- [5] Yao Wei, Kai Zhang, Shunping Ji. **Road network extraction from satellite images using CNN based segmentation and tracing.** *IEEE International Geoscience and Remote Sensing Symposium*, 2019.
- [6] Jingjing Yan, Shunping Ji, Yao Wei. **A combination of convolutional and graph neural networks for regularized road surface extraction.** *IEEE Transactions on Geoscience and Remote Sensing*, 2022, 60: 1-13.

RESEARCH EXPERIENCE

Scene Understanding Group, University of Twente

Enschede, The Netherlands

Ph.D. Candidate

9/2021-Present

Supervisor: Prof. George Vosselman and Prof. Michael Ying Yang

- **3D scene understanding**

- Scene-level: controllable multi-object 3D scene synthesis guided by scene graphs or layouts.
- Object-level: single image-to-3D shape synthesis. (cf. Publication [1] [2])

- **Generative models**

- Propose a conditional diffusion-based method for generating 3D point clouds of buildings from single general-view images. (cf. Publication [1])
- Propose a Normalizing Flow-based GAN for point cloud reconstruction that can generate an arbitrary number of points while maintaining detailed 3D structure. (cf. Publication [2])

- **Multi-modal learning**

- Improve latent diffusion models with signed distance functions (SDFs) for multi-object 3D scene generation and manipulation using scene graphs. (in progress)
- Develop a fine-grained text-shape cross-modal retrieval framework. (in progress)

Supervisor: Prof. Shunping Ji

- **Road extraction from remote sensing images using deep learning techniques**

- Propose a weakly supervised learning approach for road surface extraction from remote sensing images under the weak supervision of centerline-like scribble annotations. (cf. Publication [3])
- Propose a multi-stage framework for simultaneous road surface segmentation and centerline tracing, advancing the automation and road extraction accuracy, especially in terms of road connectivity and completeness. (cf. Publication [4] [5])
- Propose a GNN-based framework for regularized road surface extraction. (cf. Publication [6])
- 2 patents have been granted: ZL(2019)1-1228166.8; ZL(2020)1-0771919.6.

EDUCATION

University of Twente

Enschede, The Netherlands

Ph.D. in Computer Science

9/2021-7/2025(*expected*)

Wuhan University

Wuhan, China

M.S. in Photogrammetry and Remote Sensing

9/2018-6/2021

China University of Petroleum

Qingdao, China

B.S. in Geographic Information Science

9/2014-6/2018

OTHER EXPERIENCE

Teaching Assistant

2/2022-4/2022

- Lecture: 2D and 3D Scene Analysis
- Practical and Exercise: Semantic Segmentation and Object Detection

PROGRAM COMMITTEES

Member, British Machine Vision Association.

Student Member, IEEE.

Reviewer, CVPR; ICCV; NeurIPS; BMVC; ISPRS Journal of Photogrammetry and Remote Sensing; IEEE Sensors Journal; Geo-spatial Information Science; International Journal of Digital Earth, etc.

SKILLS

Professional experience: Machine Learning, Computer Vision, Remote Sensing

Programming: Python, Matlab, C/C++

Library: Pytorch, OpenCV, NumPy, Keras, Tensorflow

Software: ArcGIS, CloudCompare

Language: English (fluent), Chinese (native)

Other: Linux, Windows, Git, Microsoft Office, LaTeX