



# Zhu Mao

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## • EDUCATION

LIESMARS, WHU (Wuhan University)

Ph.D. in Photogrammetry and Remote Sensing

Wuhan, China

Sep. 2019 – Jun. 2023

LIESMARS, WHU (Wuhan University)

M.Eng. in Surveying and Mapping Engineering

Wuhan, China

Sep. 2016 – Jun. 2018

NUIST (Nanjing University of Information Science & Technology)

B. Sc. in Geographic Information System

Nanjing, China

Sep. 2012 – Jun. 2016

## • WORK EXPERIENCE

IBM CIO Identity

Business Analyst in AccessHub Team

Chengdu, China

Access Management, UI Design, Team Working Skills, Technical Supports

Jul. 2018 – Aug. 2019

Geo-spatial Information Science (GIS, 2022 IF: 6.0; JCR Q1; Citescore: 7.5)

Student/Assistant Editor, Article Editing & Proof, Poster Design, Journal Promotion

Wuhan, China

Mar. 2021 – Present

## • RESEARCH INTERESTS

- Photogrammetry and Computer Vision
- Photogrammetric-based 3D City and Landscape Modeling
- Scene Understanding in UAV Images and Photogrammetric 3D models

Regarding my research interests, I focused on the related fields of photogrammetry and computer vision, mainly including photogrammetric 3D city and landscape modeling, and scene understanding in UAV images and photogrammetric 3D models. Specifically, my research aims to solve photogrammetry-based 3D modeling problems and improve the quality of 3D scenes, generating complete and photorealistic 3D models. The related works include improving the quality of glass facades in 3D building models, embedding user-generated content (urban road facility 3D models) to augment 3D scenes, etc. To address the abovementioned issue, it is important to efficiently extract the semantic information of objects in UAV images and 3D scenes, providing a guidance for 3D reconstruction or model repairing. Thus, I study the deep-learning based frameworks of object detection and image segmentation.

I am also interested in the research of computer vision, photogrammetry, and remote sensing to solve scientific questions in the environmental sciences and geosciences, for example, exploring the role of digital technologies and methods in cultural heritage conservation, etc. The related projects I was involved: (1) fragments assembly methods to virtually restore the Buddha statue in Yungang Grottoes and (2) quantitative damage evaluation of the Great Wall (China) using aerial oblique images.

## • SKILLS

Languages:

- English
- Chinese (Native)

Programming:

- Python
- Matlab

Frameworks:

- Pytorch
- TensorFlow

Text Editing:

- LaTeX
- MS Office

Tools:

- Opencv
- ContextCapture
- ArcGIS
- Get3D

## • REFEREES

Prof. Deren Li, Wuhan University ✉ [drli@whu.edu.cn](mailto:drli@whu.edu.cn) ☎ 027-68778001

Prof. Xianfeng Huang, Wuhan University (Ph.D. Supervisor) ✉ [huangxf@whu.edu.cn](mailto:huangxf@whu.edu.cn) ☎ (+86) 13886126821

## • PUBLICATIONS (Journal Articles)

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- [1] [Mao, Z.](#), Huang, X., Niu, W., Wang, X., Hou, Z., & Zhang, F. (2023). Improved instance segmentation for slender urban road facility extraction using oblique aerial images. *International Journal of Applied Earth Observation and Geoinformation*, 2023, 121:103362. [Link](#)
- [2] [Mao, Z.](#), Huang, X., Xiang, H., Gong, Y., Zhang, F., & Tang, J. (2023). Glass façade segmentation and repair for aerial photogrammetric 3D building models with multiple constraints. *International Journal of Applied Earth Observation and Geoinformation*, 118, 103242. [Link](#)
- [3] Wang, X., Xiang, H., Niu, W., [Mao, Z.](#), et al. (2023) Oblique photogrammetry supporting procedural tree modeling in urban areas. *ISPRS Journal of Photogrammetry and Remote Sensing*, 200, 120-137. [Link](#)
- [4] [Mao, Z.](#), Huang, X., Gong, Y., Xiang, H., & Zhang, F. (2022). A dataset and ensemble model for glass façade segmentation in oblique aerial images. *IEEE Geoscience and Remote Sensing Letters*, 19, 1-5. [Link](#)
- [5] [Mao, Z.](#), Zhang, F., Huang, X., Jia, X., Gong, Y., & Zou, Q. (2021). Deep neural networks for road sign detection and embedded modeling using oblique aerial images. *Remote Sensing*, 13(5), 879. [Link](#)
- [6] Yang, C., Zhang, F., Gao, Y., [Mao, Z.](#), Li, L., & Huang, X. (2021). Moving car recognition and removal for 3D urban modelling using oblique images. *Remote Sensing*, 13(17), 3458. [Link](#)
- [7] Gong, Y., Zhang, F., Jia, X., [Mao, Z.](#), Huang, X., & Li, D. (2021). Instance Segmentation in Very High Resolution Remote Sensing Imagery Based on Hard-to-Segment Instance Learning and Boundary Shape Analysis. *Remote Sensing*, 14(1), 23. [Link](#)
- [8] Gong, Y., Zhang, F., Jia, X., Huang, X., Li, D., & [Mao, Z.](#) (2021). Deep Neural Networks for Quantitative Damage Evaluation of Building Losses Using Aerial Oblique Images: Case Study on the Great Wall (China). *Remote Sensing*, 13(7), 1321. [Link](#)

## • RESEARCH EXPERIENCE

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- [1] Slender Urban Road Facility (SURF) detection and 3D modeling (2019.9-2020.12)
- we propose an improved instance segmentation method to extract slender urban road facilities from UAV images.
  - a dense anchor ratio with an IoU-balanced sampling strategy (DASS) for proposal generation.
  - the balanced finegrained features (BFGF) to improve the boundary segmentation results.
  - work accepted by the journal *JAG* (2023).
  - SURF 3D modeling via template matching.
  - generate 3D points of SURF by triangulation and predict the location and orientation via least-squares fitting.
  - retrieve SURF 3D template from sketch model and texture database.
  - work accepted by the journal *RS* (2021) .
- [2] Glass façades segmentaion and 3D building model repair (2021.5-2022.5)
- we propose an ensemble method to segment glass façades in oblique aerial images.
  - a strategy is adopted to preserve the spatial relationship between glass façade panels.
  - edge features are extracted to improve the detector's performance.
  - work accepted by the journal *GRSL* (2022).
  - glass façades extraction and repair in photogrammetric 3D models.
  - a projection-based method to extract glass façades in photogrammetric 3D building models.
  - a mesh denoising method to remedy the geometric deformation and apply texture mapping to correct the distortion.
  - applying multiple constraints guarantees the proposed pipeline will not worsen the 3D buidling models.
  - work accepted by the journal *JAG* (2023).
- [3] Other research projects
- Quantitative damage evaluation of the Great Wall (China) using aerial oblique images (2019.9-2021.1)
  - Vehicle detection in UAV images and moving vehicle removal from photogrammetric 3D urban models (2021.1-2021.4)
  - Fragments assembly methods to virtually restore the Buddha statue in Yungang Grottoes (2022.4-2022.8)
  - Assembly-based 3D traffic facility modeling (2022.9-now, ongoing)

## • HONORS AND AWARDS

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- The Outstanding Student Editor of the journal Geo-spatial Information Science (GSIS, SCI Q1, 2023)
- Student scholarships of Wuhan University (2022)
- The Best Volunteer in the 2020 International Graduate Workshop on GeoInformatics (IGWG, 2020)