Wenmiao Hu

Senior Data Scientist at Grabtaxi Holdings Pte. Ltd.

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Education

2019 – 2024   **Ph.D. in Computer Science**, *National University of Singapore*, Singapore
Thesis: Usage of very high-resolution optical RGB satellite imagery in geo-information extraction for fine-scale map-making.
Supervisor: Prof. Roger Zimmermann

2014 – 2016   **M.Sc. (Pass with high distinction) in Earth Oriented Space Science and Technology**, *Technical University of Munich*, Munich, Germany
Major in Remote Sensing & Synthetic Aperture Radar (SAR).
Thesis: Object-based multi-view façade matching in SAR images of dense urban areas.
Supervisor: Prof. Xiaoxiang Zhu.

2010 – 2014   **B.E. (First class honours) in Electrical and Electronic Engineering**, *Nanyang Technological University*, Singapore
FYP: Human Emotion Recognition to Improve Driving Safety.

2011 – 2011   **Summer Study**, *University of California, Berkeley*, CA, USA
Two modules on marine science and human resources.

Work Experience

2024 – Now   **Senior Data Scientist**, *GrabTaxi Holdings Pte. Ltd.*, Singapore
○ Senior data scientist in Geo-Data Science team.
○ Conducting research on sensor fusion and localization.

2019 – 2024   **Ph.D. Researcher**, *GrabTaxi Holdings Pte. Ltd.*, Singapore
○ Full-time joint position with Ph.D. work, collaboration with Geo-Data Science team.
○ Conducting research on geo-information extraction from imagery.
○ Co-filed five patents.

2016 – 2019   **Product Manager & Solution Developer**, *Skymap Global Pte. Ltd.*, Singapore
○ Conducted market research, product design, algorithm development for satellite imagery based insight generation and services.
○ Applied for and was awarded a government grant.
○ Managed multi-cultural product development group and recruited team members.

2016 – 2016   **Research Assistant**, *German Aerospace Center / TUM Signal Processing in Earth Observation*, Oberpfaffenhofen, Germany
○ Thesis: Object-based Multi-view Facade Matching in SAR Images of Dense Urban Areas.

2015 – 2016   **Research Assistant**, *TUM Institute of Astronautics*, Munich, Germany
○ Supported data collection and performed data analysis.
○ Vehicle route detection and visualization from GPS logs.

2013 – 2013   **Intern**, *Panasonic R&D Center Singapore*, Singapore
○ Developed algorithm for nail beautification application.
○ Improved car plate recognition algorithm.

Research Interests

Location-based augmented/mixed reality, Satellite imagery, Geo-localization, Scene understanding

Publications

As Main Contributor:

[1] Utilizing Very High-resolution Optical RGB Satellite Imagery in Geo-information Extraction for Fine-scale Map-making, W. Hu., In *32th ACM International Conference on Multimedia, 2024.*

[2] PetalView: Fine-grained Location and Orientation Extraction of Street-view Images via Cross-view Local Search (oral), W. Hu, Y. Zhang, Y. Liang, X. Han, Y. Yin, H. Kruppa, S.-K. Ng, and R. Zimmermann., In *31th ACM International Conference on Multimedia, 2023.*

[3] GAN-assisted Road Segmentation from Satellite Imagery, W. Hu, Y. Yin, Y. K. Tan, A. Tran, H. Kruppa, and R. Zimmermann, In *ACM Trans. Multimedia Comput. Commun. Appl., 2023.*

[4] Beyond Geo-localization: Fine-grained Orientation of Street-view Images by Cross-view Matching with Satellite Imagery, W. Hu, Y. Zhang, Y. Liang, Y. Yin, A. Georgescu, A. Tran, H. Kruppa, S.-K. Ng, and R. Zimmermann, In *30th ACM International Conference on Multimedia, 2022.*

[5] A Context-enriched Satellite Imagery Dataset and an Approach for Parking Lot Detection, Y. Yin, W. Hu, A. Tran, H. Kruppa, R. Zimmermann, and S.-K. Ng., In *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2022.*

[6] GeoPalette: Road Segmentation with Limited Satellite Imagery, W. Hu, Y. Yin, Y. K. Tan, A. Tran, H. Kruppa, and R. Zimmermann, In *29th International Conference on Advances in Geographic Information Systems, 2021.*

As Collaborator:

[7] Multimodal Deep Learning for Robust Road Attribute Detection, Y. Yin, W. Hu, A. Tran, Y. Zhang, G. Wang, H. Kruppa, R. Zimmermann, and S.-K. Ng., In *ACM Trans. Spatial Algorithms Syst., 2023.*

[8] CrossMatch: Source-Free Domain Adaptive Semantic Segmentation via Cross-Modal Consistency Training, Y. Yin, W. Hu, Z. Liu, G. Wang, S. Xiang, and R. Zimmermann., In *IEEE/CVF International Conference on Computer Vision (ICCV), 2023.*

[9] Multimodal Fusion of Satellite Images and Crowdsourced GPS Traces for Robust Road Attribute Detection, Y. Yin, A. Tran, Y. Zhang, W. Hu, G. Wang, J. Varadarajan, R. Zimmermann, and S.-K. Ng., In *29th International Conference on Advances in Geographic Information Systems (SigSpatial), 2021.*

Patents

Patents are applied for GrabTaxi Holdings Pte. Ltd. The information on patents submitted in Singapore can be found at the Intellectual Property Office of Singapore (IPOS).

Granted
- Method of Predicting Road Attributes, Data Processing System and Computer Executable Code. US11828620B2 (Nov 2023)
- Segmenting Method for Extracting a Road Network for Use in Vehicle Routing, Method of Training the Map Segmenter, and Method of Controlling a Vehicle. SG10202107190U (Feb 2023)
- System and Method for Detecting Information about Road Relating to Digital Geographical Map Data. SG10202114283R (May 2024)

Pending
- Method and System for Processing a Target Image. SG10202109989S (Sep 2021)
- A Computer Implemented Method, and a Server. SG10202251145Y (Sep 2022)

Awards and Grants

- **Research Achievement Award for Outstanding Research Performance (Academic Year 2023/2024)**, *School of Computing, National University of Singapore.*
- **Best Paper Runner-up for ACM SigSpatial 2021**, *for paper Multimodal Fusion of Satellite Images and Crowdsourced GPS Traces for Robust Road Attribute Detection.*
- **Singapore Ministry of Education (MOE) Academic Research Fund (AcRF) Tier 2 (Under Review)**, *Supporting and participating in drafting the research proposal.*
- **Enterprise Development Grant from Enterprise Singapore (Completed)**, *Applied and awarded for SkyMap Global Pte. Ltd. Government grant for supporting innovation and upgrade of small and medium-sized enterprises.*

Skills

Technical	Python, C/C++, Matlab, Git, LaTeX, OpenCV, Pytorch, QGIS, Linux
Languages	English (Proficient), Chinese (Native)

Academic Services

Reviewer	Peer review for ACM Multimedia conference and ISPRS Journal of Photogrammetry and Remote Sensing.
Teaching	Teaching assistant for CS4243 Computer Vision and Pattern Recognition at NUS.

Other Projects

2017	**Water Resource Detection using Synthetic Aperture Radar (SAR) Data**, *Detection and segmentation of waterbody from Synthetic Aperture Radar Imagery.*
2016 – 2017	**Vessel Detection & Information Extraction using SAR and AIS Data**, *Detect static and moving vessels from SAR data. Perform information fusion with AIS data along with location adjustment by the speed and location profile of the vessels that appeared in the area.*
2015	**Vehicle Route Detection and Visualisation from GPS Log**, *Pattern recognition in long-term historical GPS logs to identify task-specific trips and visualization on maps.*

Hobbies and Interests

- ☻ I like to travel, have been to many countries in Asia and Europe. Occasional Writer.