Dayu Yu, Ph.D. Candidate

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⚗ Research Interests: GIS, 3D Reconstruction, High Performance Computing

Education

2023 – Current	🔖 **Visiting Student**, National University of Singapore, Singapore. Current Study: *The 3D Reconstruction and Lightweighting for Photo-Realistic Buildings.*
2020 – 2024	🔖 **Ph.D. Cartography and Geographic Information Engineering**, Wuhan University, China. Dissertation: *Lightweight Generation and Service Methods for Photo-Realistic 3D Building Models.*
2017 – 2020	🔖 **M.Eng. Survey and Mapping Engineering**, Fuzhou University, China. Thesis title: *Simulation and Analysis of Tailing Dam Failure Based on Virtual Geographic Environment.*
2013 – 2017	🔖 **B.Eng. Land Resource Management**, Henan Polytechnic University, China.

Research Publications

Manuscripts In Process

1 **D. Yu**, P. Yue, F. Biljecki, L. Lu, and B. Wu, *Towards an integrated approach for cloud-optimized 3d data management and service in spatial data infrastructure*, International Journal of Geographical Information Science, Status: Out For Review, 2024.

2 **D. Yu**, F. Biljecki, and P. Yue, *Rooformer: Reconstructing sophisticated 3d roof meshes from high-resolution remote sensing imagery using transformer*, Status: Under Preparation, 2024.

3 **D. Yu**, *Lightweighting of 3d geomesh with minimal visual discrepancy by combining differentiable rendering and self-supervised learning*, Status: Under Preparation, 2024.

Journal Articles

1 **D. Yu**, P. Yue*, F. Ye, D. Tapete, and Z. Liang, "Bidirectionally greedy framework for unsupervised 3d building extraction from airborne-based 3d meshes," *Automation in Construction*, vol. 152, p. 104 917, 2023, ISSN: 0926-5805. 🔗 DOI: https://doi.org/10.1016/j.autcon.2023.104917.

2 **D. Yu**, L. Tang*, and C. Chen, "Three-dimensional numerical simulation of mud flow from a tailing dam failure across complex terrain," *Natural Hazards and Earth System Sciences*, vol. 20, no. 3, pp. 727–741, 2020. 🔗 DOI: 10.5194/nhess-20-727-2020.

3 **D. Yu**, L. Tang*, F. Ye, and C. Chen, "A virtual geographic environment for dynamic simulation and analysis of tailings dam failure," *International Journal of Digital Earth*, vol. 14, no. 9, pp. 1194–1212, 2021. 🔗 DOI: 10.1080/17538947.2021.1945151.

4 **D. Yu**, L. He*, F. Ye, L. Jiang, C. Zhang, Z. Fang, and Z. Liang, "Unsupervised ground filtering of airborne-based 3d meshes using a robust cloth simulation," *International Journal of Applied Earth Observation and Geoinformation*, vol. 111, p. 102 830, 2022, ISSN: 1569-8432. 🔗 DOI: 10.1016/j.jag.2022.102830.

5 L. Qiu, **D. Yu***, C. Zhang, and X. Zhang, "A local–global framework for semantic segmentation of multisource remote sensing images," *Remote Sensing*, vol. 15, no. 1, 2023. 🔗 DOI: 10.3390/rs15010231.

6. L. Tang*, D. Yin, C. Chen, **D. Yu**, and W. Han, "Optimal design of plant canopy based on light interception: A case study with loquat," *Frontiers in Plant Science*, vol. 10, 2019. 🔗 DOI: `10.3389/fpls.2019.00364`.

7. M. Wang, **D. Yu***, W. He, P. Yue*, and Z. Liang, "Domain-incremental learning for fire detection in space-air-ground integrated observation network," *International Journal of Applied Earth Observation and Geoinformation*, vol. 118, p. 103 279, 2023, ISSN: 1569-8432. 🔗 DOI: `https://doi.org/10.1016/j.jag.2023.103279`.

8. L. Qiu, **D. Yu***, X. Zhang, and C. Zhang, "Efficient remote-sensing segmentation with generative adversarial transformer," *IEEE Geoscience and Remote Sensing Letters*, vol. 21, pp. 1–5, 2024. 🔗 DOI: `10.1109/LGRS.2023.3339636`.

9. L. Qiu, **D. Yu***, C. Zhang, and X. Zhang, "A semantics-geometry framework for road extraction from remote sensing images," *IEEE Geoscience and Remote Sensing Letters*, vol. 20, pp. 1–5, 2023. 🔗 DOI: `10.1109/LGRS.2023.3268647`.

10. Z. Cao, L. Jiang, P. Yue*, J. Gong, X. Hu, S. Liu, H. Tan, C. Liu, B. Shangguan, and **D. Yu**, "A large scale training sample database system for intelligent interpretation of remote sensing imagery," *Geo-spatial Information Science*, vol. 0, no. 0, pp. 1–20, 2023. 🔗 DOI: `10.1080/10095020.2023.2244005`.

11. F. Ye, Q. Cheng*, W. Hao, **D. Yu**, C. Ma, D. Liang, and H. Shen, "Reconstructing daily snow and ice albedo series for greenland by coupling spatiotemporal and physics-informed models," *International Journal of Applied Earth Observation and Geoinformation*, vol. 124, p. 103 519, 2023, ISSN: 1569-8432. 🔗 DOI: `https://doi.org/10.1016/j.jag.2023.103519`.

12. A. Luo, B. Shangguan, C. Yang, F. Gao, Z. Fang, and **D. Yu**, "Spatial-temporal diffusion convolutional network: A novel framework for taxi demand forecasting," *ISPRS International Journal of Geo-Information*, vol. 11, no. 3, 2022. 🔗 DOI: `10.3390/ijgi11030193`.

13. F. Ye, Y. Sun*, C. Chen, and **D. Yu**, "A personalized attraction recommendation method based on geotagged photos," *Journal of Geo-information Science (In Chinese)*, vol. 23, no. 8, 1391, pp. 1391–1400, 2021. 🔗 DOI: `10.12082/dqxxkx.2021.200608`.

14. X. Peng, L. Tang*, and **D. Yu**, "Recommendation and 3d simulation of urban green space landscape scheme," *Journal of Fuzhou University (In Chinese)*, vol. 47, no. 5, p. 617, 2019. 🔗 DOI: `10.7631/issn.1000-2243.18542`.

Conference Proceedings

1. R. Liu, D. Yu, and P. Yue, "A disaster information service for damaged road networks using dynamic segmentation," in *2022 10th International Conference on Agro-geoinformatics*, 2022, pp. 1–6. 🔗 DOI: `10.1109/Agro-Geoinformatics55649.2022.9859082`.

2. R. Liu, P. Yue, **D. Yu**, K. Wang, H. Deng, and H. Li, "A cube-enabled cloud geoprocessing engine for big earth data," in *2023 11th International Conference on Agro-Geoinformatics*, 2023, pp. 1–6. 🔗 DOI: `10.1109/Agro-Geoinformatics59224.2023.10233597`.

3. F. Ye, Q. Cheng, W. Hao, and **D. Yu**, "Greenland daily ndsi data reconstruction based on spatio-temporal extreme gradient boosting model," in *IGARSS 2023 - 2023 IEEE International Geoscience and Remote Sensing Symposium*, 2023, pp. 102–105. 🔗 DOI: `10.1109/IGARSS52108.2023.10283400`.

4. K. Wang, P. Yue, **D. Yu**, R. Liu, H. Deng, and H. Liu, "Ogescript: An ogc-oriented interoperable script api for online geospatial analysis," in *2023 11th International Conference on Agro-Geoinformatics*, 2023, pp. 1–5. 🔗 DOI: `10.1109/Agro-Geoinformatics59224.2023.10233317`.

5. H. Deng, P. Yue, **D. Yu**, Z. Cao, R. Liu, and K. Wang, "A geospatial data and model hub for online geospatial analysis," in *2023 11th International Conference on Agro-Geoinformatics*, 2023, pp. 1–6. 🔗 DOI: `10.1109/Agro-Geoinformatics59224.2023.10233547`.

6 H. Tan, P. Yue, **D. Yu**, S. Boyi, and Z. Cao, "A provenance-aware method for updating earth observation training data," in *2022 10th International Conference on Agro-geoinformatics*, 2022, pp. 1–6. 🔗 DOI: 10.1109/Agro-Geoinformatics55649.2022.9859187.

7 Y. Pan, B. Shangguan, **D. Yu**, and P. Yue, "Quality considerations for ai training data: Case studies on semantic segmentation of eo imagery," in *2022 10th International Conference on Agro-geoinformatics*, 2022, pp. 1–6. 🔗 DOI: 10.1109/Agro-Geoinformatics55649.2022.9859230.

Standards And Specifications

1 P. Yue, J. Gong, R. Liu, **D. Yu**, S. Lavender, J. Antonisse, L. Di, E. Yu, D. Ziébelin, B. Shangguan, L. Hu, L. Jiang, M. Zhang, and K. Yan, Eds., *OGC Training Data Markup Language for Artificial Intelligence (TrainingDML-AI) Part 1: Conceptual Model Standard*. Open Geospatial Consortium (OGC), 2023.

Patents

1 P. Yue, **D. Yu**, L. Jiang, and Z. Liang, "An automatic method for separating ground and non-ground models for realistic 3d models," No. ZL202110490354.9, 2021.

2 P. Yue, **D. Yu**, and C. Liu, "Method, apparatus, and device for high-performance spatiotemporal trajectory correlation analysis," No. ZL202210920158.5, 2022.

3 P. Yue, **D. Yu**, and B. Shangguan, "Method, apparatus, and device for spatiotemporal correlation analysis based on communication big data," No. ZL202210913511.7, 2022.

Skills

Coding	🔖 C++, Python, Javascript
Dev Experience	🔖 GUI Software, Command-Line Toolkit, Web APP, Deep Leanring
Deep Learning	🔖 PyTorch
C++ Libraries	🔖 Qt, CMake, QMake, Vcpkg, OpenMP
3D Visualization	🔖 OpenSceneGraph, VTK, Cesium
3D Processing	🔖 CGAL, PCL, Pytroch3D
Cloud Computing	🔖 Kubernetes, Dcoker, OpenStack, MongoDB, Spark, Hbase, MinIO, Ray, MPI
CFD	🔖 OpenFOAM
Misc.	🔖 GIS, Photogrammetry, Computer Graphics, Machine Learning, GIServices, High Performance Geographic Computing, Computational Fluid Dynamics

Miscellaneous Experience

Awards and Achievements

2023	🔖 **The 24th Wang Zhizhuo Innovative Talent Award**, Wuhan University
	🔖 **The Academic Innovation Award**, Wuhan University
2022	🔖 **Top Prize of Science and Technology Progress in Surveying and Mapping**, Chinese Society for Geodesy, Photogrammetry and Cartography
	🔖 **National Scholarship for Doctoral Students**, Ministry of Education of China
	🔖 **The Excellent Graduate Honor**, Wuhan University
2021	🔖 **The Second-Prize Award of Best Student Paper Competition**, The 10th International Conference on Argo-Geoinformatics
	🔖 **One-hundred Outstanding Graduation Thesis**, Fuzhou University

Miscellaneous Experience (continued)

■ **First-class Academic Scholarship**, Wuhan University

2020 ■ **The Outstanding Graduate Honor**, Fuzhou University

■ **Top Award of Academic Scholarship**, Fuzhou University

Journal Review

■ ISPRS Open Journal of Photogrammetry and Remote Sensing

■ Automation in Construction

■ International Journal of Applied Earth Observation and Geoinformation

■ Transportation Letters: the International Journal of Transportation Research

Research Experience

* ■ **Open Geo-Spatial Engine**: Successfully directed a team of 20 skilled graduate students in developing OGE, a cloud-native, large-scale remote sensing data analysis platform similar to GEE. OGE can provide petabytes of analysis-ready remote sensing data, offer online analysis with hundreds of GIS operators, and enable online programming capabilities for users. **Website**: URL1 or URL2

■ **Unsupervised Segmentation of Photo-Realistic 3D Mesh**: Developed a robust cloth simulation method to filter ground primitives from 3D meshes. Notably, the method exhibits robustness across diverse landscapes, remaining impervious to noise and fluctuations in vertex density.

Developed a novel bidirectionally greedy framework to extract fine-grained building models from photo-realistic 3D Mesh, ensuring precise extraction of building models while considering their geometric integrity.

■ **Cloud-Optimized 3D Spatial Data Management and Services**: Developed a information model for 3D data management, based on scene graph structure. Then an encoding method is developed to map the data model to a schema suitable for cloud-optimized storage architectures, while also incorporating an SDI service interface to enable the FAIR principles.

■ **3D Roof Reconstruction**: Developed an all-Transformer network that can reconstruct fine 3D roof meshes directly from single remote sensing image.

■ **Photo-Realistic 3D Mesh Lightweighting**: By coupling differential rendering and self-supervised learning, developed a method to generate lightweight meshes with minimal perceptual differences from the original photo-realistic 3D meshes.

■ **Dam Failure Disaster 3D Simulation**: Developed a mathematical model for simulating tailing dam failures based on computational fluid dynamics (CFD), achieving a result with an error margin of only 1.42% compared to the actual measured inundation area.

Developed a virtual geographic environment platform for dam failure disaster evolution simulation, which can simulate, predict, and visualize the route and disaster-causing range of tailings after a failure.