Nattapon Jaroenchai

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Professional Summary

Ph.D. in Geography and Geographic Information Science from UIUC with expertise in geospatial AI, remote sensing, hydrologic feature extraction, and cyberGIS. Developing spatially transferable deep learning models for environmental sustainability and academic contribution. Dedicated to leveraging this experience to foster the growth of CyberGIS understanding, geospatial knowledge, and GeoAI infrastructure within Thailand.

Education

2025	**Ph.D. in Geography & GIScience**, *University of Illinois Urbana-Champaign*
2018	**M.S. in GIS (PSM)**, *University of Illinois Urbana-Champaign*
2011	**B.Eng. in Computer Engineering**, *Chulalongkorn University*, Thailand

Research Interests

Geospatial Artificial Intelligence (GeoAI)
Hydrologic Mapping & Watershed Analysis
Remote Sensing & Earth Observation
Deep Learning and Transfer Learning
CyberGIS and High-Performance Computing

Thesis

Title   **A Geospatial Deep Learning Framework for Scalable Hydrographic Mapping**

Advisor   Dr. Shaowen Wang

Abstract   Advances the automation of hydrography mapping across the United States through deep learning and high-performance computing. It develops a unified framework that learns from diverse geospatial data—such as elevation, radar, and optical imagery—to delineate streams and predict flow directions with greater accuracy and efficiency. The research progresses through three stages: (1) applying transfer learning to enhance segmentation accuracy using ImageNet-pretrained models; (2) improving spatial adaptability via meta-learning for data-scarce regions like Alaska; and (3) designing a multimodal, multitask architecture for national-scale mapping using CyberGIS workflows. Together, these studies contribute to scalable, physically consistent, and reproducible hydrography modeling—paving the way for the next generation of automated water-feature mapping and environmental monitoring.

Publications

2025   Wang, S., Baig, F., Kang, Y., Li, E., Michels, A., **Jaroenchai, N.**, Padmanabhan, A., Kumar, A., Kalyanam, R., Oller Smith, N. S., Song, X. C., Zhao, L., Manson, S., Ramamurthy, M., Taghavikish, S., & Tarboton, D. *I-GUIDE Platform for Geospatial Data-intensive Convergence Research and Education.* PEARC '25. `https://doi.org/10.1145/3708035.3736108`
Presents the I-GUIDE cyberinfrastructure platform for reproducible, scalable geospatial research and education.

2024 Saxton, A., Luo, S., Bode, A., Kramer, W., Zhu, X., Dong, J., **Jaroenchai, N.**, Steffen, C., & Kooper, R. *Accurate Polygonal Feature Extraction from Historical Geologic Maps using Prompted Segmentation.* AGU Fall Meeting 2024.
Discussed polygonal extraction techniques from geologic maps using prompted segmentation methods.

2024 Luo, S., Saxton, A., Bode, A., Zhu, X., **Jaroenchai, N.**, Dong, J., Kooper, R. *Digitizing Scanned Geologic Maps by Exploiting Few-Shot Models.* AGU Fall Meeting 2024.
Presented advanced GeoAI techniques for one-shot segmentation of geologic polygons from scanned maps.

2024 **Jaroenchai, N.**, Wang, S., Stanislawski, L. V., Shavers, E., Jiang, Z., Sagan, V., & Usery, E. L. *Transfer learning with convolutional neural networks for hydrological streamline delineation.* Environmental Modelling & Software, 181. `https://doi.org/10.1016/j.envsoft.2024.106165`
Proposes a CNN-based transfer learning approach for stream mapping. *(Cited by 9)*

2024 Vandewalle, R., Michels, A., Li, Z., **Jaroenchai, N.**, & Wang, S. *Building Blocks for Geospatial Software Education Using the I-GUIDE Platform.* I-GUIDE Forum 2024. `https://doi.org/10.5703/1288284317803`

2024 Saxton, A., Dong, J., Bode, A., **Jaroenchai, N.**, Kooper, R., Zhu, X., Kwark, D. H., & Luo, S. *Accurate Feature Extraction from Historical Geologic Maps Using Open-Set Segmentation and Detection.* Geosciences, 14(11), 305. `https://doi.org/10.3390/geosciences14110305`
(Cited by 1)

2023 Stanislawski, L. V., **Jaroenchai, N.**, Wang, S., Shavers, E. J., Duffy, A., Thiem, P. T., Jiang, Z., Camerer, A. *Transferring Deep Learning Models for Hydrographic Feature Extraction from IfSAR Data in Alaska.* GIScience 2023 Workshop on CartoAI.
(Cited by 1)

2022 Stanislawski, L. V., Shavers, E. J., Duffy, A. J., Thiem, P., **Jaroenchai, N.**, Wang, S., Jiang, Z., Kronenfeld, B. J., & Buttenfield, B. P. *Scaling-up Deep Learning Predictions of Hydrography from IfSAR Data in Alaska.* ISPRS Archives. `https://doi.org/10.5194/isprs-archives-XLVIII-4-W1-2022-819-2022`
(Cited by 1)

2021 Xu, Z., Wang, S., Stanislawski, L. V., Jiang, Z., **Jaroenchai, N.**, Sainju, A. M., Shavers, E. J., Usery, E. L., Chen, L., Li, Z., & Su, B. *An Attention U-Net Model for Detection of Fine-Scale Hydrologic Streamlines.* Environmental Modelling & Software, 140, 104992. `https://doi.org/10.1016/j.envsoft.2021.104992`
Implements an attention mechanism in U-Net for more accurate stream network predictions. *(Cited by 53)*

Conference Presentations

2025 **CEGIS Annual Research Meeting 2025** – Spatially Transferable Hydrographic Feature Delineation.
Presented meta-learning approach for scalable streamline extraction from IfSAR data.

2025 **AAG 2025** – Spatially Transferable Hydrographic Feature Delineation.
Presented meta-learning model for stream delineation using IfSAR data.

2023 **AAG 2023** – Transfer Learning for Streamline Delineation.
Shared performance comparison of pretrained CNNs vs. region-specific training.

2022 **AAG 2022** – Data-Intensive Geospatial Understanding.
Delivered talk on AI-powered watershed extraction and co-chaired deep learning in GIScience panel.

2022 **Geo-Resolution 2022** – Geospatial Perspectives on Climate Change.
Participated in poster session showcasing hydrologic mapping results.

2022 **I-GUIDE All-Hands Meeting 2022**
Collaborated with interdisciplinary teams on spatial AI infrastructure discussions.

Invited Talks & Workshops

2025 **Introducing Transfer Learning: Bridging ImageNet Innovations with Geospatial Analysis**
I-GUIDE Virtual Consulting Office. Showcased how pre-trained models can be fine-tuned for geospatial tasks.

2023 **Geospatial Transfer Learning on I-GUIDE Platform**
I-GUIDE Virtual Consulting Office. Gave live demonstration of stream prediction models.

2023 **Transferring deep learning knowledge for scaling up hydrographic feature extraction**
USGS Hydrography Community Call. Presented collaborative work on automating stream network extraction.

2021 **Discover the Unknown: What is CyberGIS?**
Department of Statistics, Chiang Mai University. Delivered an invited guest lecture introducing CyberGIS and HPC to tackle big data spatial problems.

Assistantships

2019–Pres. **Graduate Research Assistant**, *CyberGIS Center*, UIUC
Developed machine learning workflows for hydrologic mapping and contributed to the I-GUIDE cyberinfrastructure platform.

2019–Pres. **Web Developer (Graduate Assistant)**, *CyberGIS Center*, UIUC
Designed, developed, and maintained key geospatial web platforms including the CyberGIS Center, I-GUIDE, I-GUIDE Platform, and CIGI Lab.

Professional Service & Leadership

2025 **Local Arrangement Chair**, *I-GUIDE Forum*
Coordinated local logistics and venue arrangements; led production of promotional materials.

2025 **Session Organizer & Chair**, *AAG 2025 Symposium on Spatial AI & Data Science*
Geospatial Artificial Intelligence, Remote Sensing, and Deep Learning (Hybrid Session).

2024 **Technical Committee Member**, *Spatial AI Challenge 2024 (I-GUIDE)*
Helped design and evaluate a multi-track international machine learning challenge.

2023 **Session Organizer & Chair**, *AAG 2023 Symposium*
Geospatial Artificial Intelligence and Deep Learning (Paper Sessions).

2022 **Representative of Int'l Students**, *Illinois Spirit & Traditions Council*, UIUC
Advocated for international student voices in a campus-wide council.

2022 **Session Organizer & Chair**, *AAG 2022 Symposium*
Geospatial Artificial Intelligence and Deep Learning (Paper Sessions).

2021 **Member**, *Senate Committee on University Student Life*, UIUC
Participated in shared governance by shaping student-focused policies and initiatives.

Awards & Honors

2020 Student of the Year – CyberGIS Center & CIGI Lab, UIUC

2018 Student of the Year – Professional Science Master's (GIS concentration), UIUC

2018 Leadership Award – Global Leaders Orange Blue Engagement Program, UIUC