Tianyang Chen

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WORK EXPERIENCE:

Post Doctoral Fellow, 2024 –
University of North Carolina at Charlotte, Charlotte, NC, U.S
Research/Teaching Assistant, 2018 – 2024
University of North Carolina at Charlotte, Charlotte, NC, U.S
Teaching Assistant, 2015 – 2017
Eastern Michigan University, Ypsilanti, MI, U.S.

EDUCATION:

Doctor of Philosophy in Geography, 2018 – 2024
University of North Carolina at charlotte, Charlotte, U.S
Master of Science in Geographic Information Science, 2015 – 2017
Eastern Michigan University, Ypsilanti, U.S.
Bachelor of Engineering in Surveying and Mapping, 2010 – 2014
Hebei University of Engineering, Handan, China

PUBLICATIONS:

1. Tang, W., **Chen, T.,** and Armstrong, M. (2025) GPU-accelerated Parallel All-Pair Shortest Path Routing Within Stochastic Road Networks. *International Journal of Geographic Information Science, 1-33*. https://doi.org/10.1080/13658816.2024.2394651
2. **Chen, T.,** Tang, W., Allan, C., and Chen., S. (2024). Explicit Incorporation of Spatial Autocorrelation in 3D Deep Learning for Geospatial Object Detection. *Annals of American Association of Geographers.* 1-20. https://doi.org/10.1080/24694452.2024.2380898
3. Tang, W., Hearne, H. S., Slocum, Z., & **Chen, T.** (2023). GIS-Based Scientific Workflows for Automated Spatially Driven Sea Level Rise Modeling. *Sustainability*, *15*(17), 12704. https://doi.org/10.3390/su151712704
4. Liu, C., Liu, C., Sun, Q., **Chen, T**., & Fan, Y. (2022). Vegetation Dynamics and Climate from A Perspective of Lag-Effect: A Study Case in Loess Plateau, China. *Sustainability*, *14*(19), 12450. https://doi.org/10.3390/su141912450
5. Sun, Q., Liu, C., **Chen, T.,** Zhang, A., Liu, C., & Tao, Y. (2022). Adaptive Decomposition and Multitimescale Analysis of Long Time Series of Climatic Factors and Vegetation Index Based on ICEEMDAN-SVM. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, *15*, 6203-6219. https://doi.org/10.1109/JSTARS.2022.3194987
6. Chavan, V. S., Chen, S. E., Shanmugam, N. S., Tang, W., Diemer, J., Allan, C., Braxtan,

N., Shukla, T., **Chen, T.,** & Slocum, Z. (2022). Modeling of Progressive Scouring of a Pier-on-Bank. *CivilEng*, *3*(2), 365-384. https://doi.org/10.3390/civileng3020022

7. Chavan, V. S., Chen, S. E., Shanmugam, N. S., Tang, W., Diemer, J., Allan, C., Braxtan, N., Shukla, T., **Chen, T.,** & Slocum, Z. (2022). An analysis of local and combined (global) scours on piers-on-bank bridges. *CivilEng*, *3*(1), 1-20. https://doi.org/10.3390/civileng3010001
8. Tang, W., **Chen, T.,** Slocum, Z., Lan, Y., Delmelle, E., Chen, D., ... & Gibas, C. (2022). A web-based spatial decision support system of wastewater surveillance for COVID-19 monitoring: a case study of a university campus. *medRxiv*, 2021-12. https://doi.org/10.1101/2021.12.29.21268516
9. Sun, Q., Liu, C., **Chen, T.,** & Zhang, A. (2021). A weighted-time-lag method to detect lag vegetation response to climate variation: A case study in Loess Plateau, China, 1982–2013. *Remote Sensing*, *13*(5), 923. https://doi.org/10.3390/rs13050923
10. Tao, Y., Liu, C., **Chen, T.,** Zhao, X., Liu, C., Hu, H., ... & Xin, H. (2021). Real-time multipath mitigation in multi-GNSS short baseline positioning via CNN-LSTM method. *Mathematical Problems in Engineering*, *2021*, 1-12. https://doi.org/10.1155/2021/6573230
11. Sun, Q., Liu, C., **Chen, T.,** & Zhang, A. (2021). A weighted-time-lag method to detect lag vegetation response to climate variation: A case study in Loess Plateau, China, 1982–2013. *Remote Sensing*, *13*(5), 923. https://doi.org/10.3390/rs13050923
12. Zheng, M., Tang, W., Ogundiran, A., **Chen, T.**, & Yang, J. (2020). Parallel landscape visibility analysis: A case study in archaeology. In High Performance Computing for Geospatial Applications (pp. 77-96). Springer, Cham. https://doi.org/10.1007/978-3-030-47998-5_5
13. Zeng, J., **Chen, T.**, Yao, X., & Chen, W. (2020). Do Protected Areas Improve Ecosystem Services? A Case Study of Hoh Xil Nature Reserve in Qinghai-Tibetan Plateau. Remote Sensing, 12(3), 471. https://doi.org/10.3390/rs12030471
14. Yang, J., Liu, C., **Chen, T.**, & Zhang, Y. (2019). The invasive weed optimization–based inversion of parameters in probability integral model. Arabian Journal of Geosciences, 12(14), 424. https://doi.org/10.1007/s12517-019-4592-9
15. **Chen, T.**, Xie, Y., Liu, C., Bai, Y., Zhang, A., Mao, L., & Fan, S. (2018). Trend Analysis of Relationship between Primary Productivity, Precipitation and Temperature in Inner Mongolia. ISPRS International Journal of Geo-Information, 7(6), 214. https://doi.org/10.3390/ijgi7060214
16. Zhang, A., **Chen, T.**, Liu, X., & Yang, Y. (2015). “Monitoring Data Filter and Deformation Information Extraction Based on Wavelet Filter and Empirical Mode Decomposition”. *Applied Mechanics and Materials*, Vol. 742, pp. 261-271, 2015. https://doi.org/10.4028/www.scientific.net/AMM.742.261
17. Liu, X., Li, S., Zhang, Y., Yang, Y., & **Chen, T.** (2015, January). Prediction Model for Nonlinear Deformation Time Series. In 2015 International Symposium on Computers & Informatics (pp. 2290-2299). Atlantis Press. https://doi.org/10.2991/isci-15.2015.299

Publication in Progress

1. **Chen, T.,** Tang, W., Allan, C., and Chen., S. (2024). Spatial Autocorrelation Encoder for 3D Deep Learning of Geospatial Object Detection (Submitted for review). *Remote Sensing.*
2. **Chen, T.,** Tang, W., Allan, C., and Chen., S. 3D Geospatial Object Detection: A Case

Study on Hydraulic Structures.

Dissertation/Thesis:

1. **Chen, T.** (2024). Spatially Context-Aware 3D Deep Learning for Geospatial Object Detection (Doctoral dissertation, The University of North Carolina at Charlotte).

RESEARCH PROJECTS

1. **DeepPipe: Spatially Explicit Deep Learning-Based Underground Pipe Prediction for Urban Stormwater Management**
   (PI: Wenwu Tang), sponsored by NCDOT
   Role: Led the development of deep learning models for detecting underground stormwater pipelines.
   Participation Duration: *August 2023 – Present*

2. **Subgrade corrosion mapping and utility interaction mapping in the United States**
   (PI: Wenwu Tang), sponsored by EPRI
   Role: Development of spatial analytics framework and development of Web GIS based dashboards
   Participation Duration: *August 2019 – Present*

3. **Mapping of mangrove inventory in Dominican Republic**
   (PI: Wenwu Tang), sponsored by USDA
   Role: Development of the spatial optimization framework and the Web GIS-based dashboards.
   Participation Duration: *January 2024 – Present*

4. **Evaluating Primary and Secondary Roadway Pavement Conditions using Deep Learning**
   (PI: Don Chen), sponsored by NCDOT
   Role: Development of photogrammetry framework for GoPro images processing.
   Participation Duration: *Jan 2024 – May 2024*

5. **Geo-FRIT: Development of a spatial decision support system for assessing freight route resilience under potential hazards**
   (PI: Wenwu Tang), sponsored by NCDOT
   Role: Conceptual design and development of the analytical framework.
   Participation Duration: *July 2021 – October 2024*

6. **GIS-based Analytics and Computational Modeling for the Monitoring of Covid-19 Outbreak via Wastewater Surveillance: Spatially Informed Decision Making Support**
   (PI: Wenwu Tang), supported by UNC Charlotte
   Role: Spatial analytics and Web GIS-based dashboards development
   Participation Duration: *May 2021 – November 2023*

7. **DeepHyd: A Deep Learning-Based Artificial Intelligence Approach for the Automated Classification of Hydraulic Structures From LiDAR and Sonar Data**
   (PI: Wenwu Tang), sponsored by NCDOT.
   Role: Development of deep learning models for detecting hydraulic structures from LiDAR point cloud.

Participation Duration: *August 2018 – December 2021*

PROJECT REPORT:

1. Tang, W., Chen, S. E., Diemer, J., Allan, C., **Chen, T.,** Slocum, Z., ... & Shanmugam, N. S. (2022). *DeepHyd: A Deep Learning-based Artificial Intelligence Approach for the Automated Classification of Hydraulic Structures from LiDAR and Sonar Data* (No. FHWA/NC/2019-03). North Carolina Department of Transportation. Research and Development Unit.

CONFERENCE PRESENTATIONS (as presenter):

1. **Chen, T.,** & Tang, W. Mapping the Invisible with AI: Predicting Underground Stormwater Pipeline Locations in Poorly Documented Areas. Annual Meeting of American Association of Geographers 2025, Detroit, MI, March 24-28, 2025.
2. **Chen, T.,** & Tang, W. Mapping Mangrove Inventory in the Dominican Republic Using Geospatial Analytics. International Association for Landscape Ecology—North American Regional Chapter, Raleigh, NC, April 13-17, 2025.
3. **Chen, T.,** Tang, W. Considering spatial dependency of predicted labels in deep learning-based 3D object detection. American Association of Geographers Annual Meeting 2024. April 16-20, 2024.
4. **Chen, T.,** Tang, W. Deep learning on 3D point cloud: an exploratory experiment in incorporating spatial-related features. American Association of Geographers Annual Meeting 2023. March 23, 2023.
5. **Chen, T.,** Tang, W., Chen, S., Allan, C., Diemer, J., Shukla, T., Slocum, Z., Shanmugam, N., Chavan, V., and Lauffer, M.S. 2022. Empirical knowledge related to deep learning-based 3D point cloud classification in 3D GIS. American Association of Geographers Annual Meeting 2022, February 25 to March 1, 2022
6. **Chen, T.,** Tang, W., Chen, S., Allan, C., Diemer, J., Shukla, T., Slocum, Z., Shanmugam, N., Chavan, V., and Lauffer, M.S. 2022. Evaluation of 3D deep learning-based classifiers using pseudo-LiDAR data from 3D video games. The Applied Geography Conference. October 20-22, 2022. (Virtual)
7. **Chen, T.,** Tang, W., Chen, S., Allan, C., Diemer, J., Shukla, T., Shanmugam, N., Chavan, V., Lauffer, M.S. 2021. Deep learning-based 3D semantic segmentation: a practical case in hydrualic structures, Annual Meeting of the American Association of Geographers, Virtual Conference., April 7th, 2021.
8. **Chen, T.,** Tang, W., Chen, S., Allan, C., Diemer, J., Shukla, T., Shanmugam, N., Chavan, V., Lauffer, M.S. 2021. Automated semantic segmentation of point cloud data driven by deep learning and 3D GIS. NCDOT Research & Innovation Summit 2.0. Virtual. October 5-6, 2021.
9. **Chen, T.,** Tang, W., Chen, S., Allan, C., Diemer, J., Shukla, T., Slocum, Z., Shanmugam, N., Chavan, V., and Lauffer, M.S., 2020. 3D Point Cloud Semantic Segmentation: A practical case in bridge detection. USGIF GEOINTegration Summit, September 28th, 2020
10. **Chen, T**., Tang, W., Chen, S., Chavan, V., Shanmugam, N., Slocum, Z., Shukla, T., Allan, C., Diemer, J., and Lauffer, M.S., 2020. Deep Learning-based Semantic Segmentation of 3D Point Clouds: A Case Study for Hydraulic Structures and its components. NCDOT Research & Innovation Virtual Summit, October 13th-14th, 2020.
11. **Chen, T.,** A case study to evaluate clusterODM toolkit for unmanned aerial vehicle mapping. GIS Day Lighting Talk, November 13th, 2019, Charlotte, NC.
12. **Chen, T.,** Tang, W., Chen, S., Allan, C., Diemer, J., Shukla, T., Shanmugam, N., Chavan, V., Lauffer, M.S., Massive 3D scene reconstruction of hydraulic structures

accelerated using high-performance computing. NCDOT Research & Innovation Summit, May 7th, 2019, Greensboro, NC.

13. **Chen, T.,** and Tang, W., When geospatial big data meets high performance computing in 3D GIS. Annual Meeting of the American Association of Geographers, Washington D.C., April 3rd-7th, 2019
14. **Chen, T.,** and Xie, Y., Trend Analysis of relationship between Primary Productivity, Precipitation and Temperature in Inner Mongolia. Association of American Geographers Annual Meeting, New Orleans, LA, 2018
15. **Chen, T.,** and Liu, C., A new weighted method in detecting the time lag of climate factors impacting on vegetation communities. East Lakes Division of the American Association of Geographers Annual Meeting, Ypsilanti, October 12th-13th, 2017.
16. **Chen, T.,** and Xie, Y., Vegetation response to climate in long time series in Inner Mongolia, China, using Empirical Mode Decomposition. Fourth International Joint Conference Geo-informatics in Sustainable Ecosystem and Society. Ypsilanti, October 8th-9th, 2016.

TEACHING ACTIVITIES

Year (semester)	Role	Class Name (# students)	Location
2025 (Spring)	Invited Lecturer	Lansing Bridge to Recovery (13)	UNCC
2024 (Fall)	Invited Lecturer	Web GIS (21)	UNCC
2023 (Fall)	Instructor of Record	Web GIS (11)	UNCC

PROFESSIONAL SERVICES

Manuscript Reviews since 2018 (32 manuscripts; 13 journals)

1. 13 manuscripts for *Socio-Ecological Practice Research.*
2. 5 manuscripts for *Land.*
3. 4 manuscripts for *Remote sensing.*
4. 1 manuscript *for Cartography and geographic information science*.
5. 1 manuscript for *Environmental monitoring and assessment.*
6. 1 manuscript for *PLOS one.*
7. 1 manuscript for *Cluster Computing.*
8. 1 manuscript for *Scientific reports.*
9. 1 manuscript for *Theoretical and applied climatology.*
10. 1 manuscript for *Heritage Science.*
11. 1 manuscript for *Earth Science Informatics.*
12. 1 manuscript for *Annals of American Association of Geographers.*
13. 1 manuscript for *Landscape Ecology.*

SERVICES

2024 Led organization of GIS Day 2024 at UNC Charlotte as a member of GIS Day organization committee at UNC Charlotte.
2024 Volunteer for Open House at UNC Charlotte.
2024 Volunteer for Charlotte Kids Festival at UNC Charlotte.
2023 Volunteer for GIS Day 2023 at UNC Charlotte.
2022 Volunteer for Charlotte Kids Festival at UNC Charlotte.
2022 Volunteer for GIS Day 2022 at UNC Charlotte.
2022 Host the virtual session of GIS methods in Applied Geography Conference (AGX) 2022 as the session chair.
2019 Volunteer for GIS Day 2019 at UNC Charlotte.

Notable Mentions

2025 Western North Carolina Neighbors Need Help. Niner Engineers Are Designing Solutions. https://engr.charlotte.edu/2025/02/21/western-north-carolina-neighbors-need-help-niner-engineers-are-designing-solutions/

RECOGNITION AND AWARDS

2025 Travel award for OSG School 2025 for learning to use high-throughput computing (HTC) systems. June 22-27, 2025 at Madison, WI.
2024 Travel award for 2024 Geospatial Cyberinfrastructure Workshop: Building High-Performance, Ethical, and Secured Geospatial Software, Honolulu, HI
2020 Graduate School's Proposal Development Summer Fellowship at University of North Carolina at Charlotte, Charlotte, NC
2019 Travel award for San Diego Supercomputer Center Summer Institute, San Diego, CA
2017 Master's Student Research Award Presentation (2nd place) for master program at East Lakes Division Meeting of the American Association of Geographers, Ypsilanti, MI

PROFESSIONAL ASSOCIATION

2015 – now American Association of Geographer

ORGANIZATIONS

2021 – 2023 Chinese Students and Scholars Association at University of North Carolina at Charlotte
2022 – 2023 Expanding Your Horizons Charlotte Chapter at University of North Carolina at Charlotte