Hongruixuan Chen

DOM: July 22nd, 1997 | Gender: Male | Homepage: https://chrx97.com
Address: Department of Complexity Science and Engineering, Graduate School of Frontier Sciences,
The University of Tokyo, 5-1-5 Kashiwanoha, Kashiwa, Chiba 277-8561, Japan

EDUCATION & GPA

Graduate School of Frontier Sciences, The University of Tokyo | Chiba, Japan *Oct., 2022-Spet., 2025*
- **Ph.D.** in *Complexity Science and Engineering* **Supervisor**: Prof. Naoto Yokoya

State Key Laboratory of Information Engineering in Survey, Mapping and Remote Sensing, Wuhan University | Wuhan, China *Sept., 2019-June, 2022*
- ***M.E*** in *Photogrammetry and Remote Sensing* **GPA**: 91.1/100

School of Resources and Environmental Engineering, Anhui University | Hefei, China *Sept., 2015-June, 2019*
- ***B.E*** in *Geomatics Engineering* **GPA**: 94.4/100 (ranking: 1/230)

WORK EXPERIENCE

Geoinformatics Team, RIKEN AIP | Chiba, Japan *May, 2023-Apr., 2024*
- **Research Part-timer** **Host:** Prof. Naoto Yokoya

Beyond AI Project, The University of Tokyo | Chiba, Japan *Oct., 2022-Apr., 2023*
- **Research Assistant** **Host:** Prof. Masashi Sugiyama

The United Nations Satellite Centre (UNOSAT) | Genevan, Switzerland *May, 2021-May, 2022*
- **Trainee** **Host:** Mr. Lars Bromley, Dr. Sofia Vallecorsa

RESERCH INTERESTS

Remote Sensing Image Interpretation and Analysis; Image Processing; Change Detection; Damage Assessment; Deep Learning; Machine Learning; Transfer Learning; Domain Adaptation; Weakly Supervised Learning

PUBLICATIONS

[1] **H. Chen**, N. Yokoya, and M. Chini, "Fourier Domain Structural Relationship Analysis for Unsupervised Multimodal Change Detection," *ISPRS Journal of Photogrammetry and Remote Sensing*, vol. 198, pp. 99–114, 2023. [link]

[2] **H. Chen**, N. Yokoya, C. Wu, and B. Du, "Unsupervised Multimodal Change Detection Based on Structural Relationship Graph Representational Learning," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 60, pp. 1–18, 2022. [link]

[3] **H. Chen**, C. Wu, B. Du, L. Zhang, and L. Wang, "Change Detection in Multisource VHR Images via Deep Siamese Convolutional Multiple-Layers Recurrent Neural Network," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 58, no. 4, pp. 2848–2864, 2020. (ESI highly cited paper) [link]

[4] C. Wu, **H. Chen,** B. Du, and L. Zhang, "Unsupervised Change Detection in Multitemporal VHR Images Based on Deep Kernel PCA Convolutional Mapping Network," *IEEE Transactions on Cybernetics*, vol. 52, no. 11, pp. 12084–12098, 2022. [link]

[5] C. Han, C. Wu, H. Guo, M. Hu, J. Li, and **H. Chen**, "Change Guiding Network: Incorporating Change Prior to Guide Change Detection in Remote Sensing Imagery," *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, pp. 1-15, 2023. [link]

[6] C. Han, C. Wu, H. Guo, M. Hu, and **H. Chen**, "HANet: A Hierarchical Attention Network for Change Detection with Bitemporal Very-High-Resolution Remote Sensing Images," *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol. 16, pp. 3867-3878, 2023. [link]

[7] C. Wu, Y. Guo, H. Guo, J. Yuan, L. Ru, **H. Chen,** B. Du, and L. Zhang, "An Investigation of Traffic Density Changes inside Wuhan during the COVID-19 Epidemic with GF-2 Time-Series Images," *International Journal of Applied Earth Observation and Geoinformation*, vol. 103, pp. 102503, 2021. [link]

[8] J. Song, **H. Chen**, N. Yokoya, "SyntheWorld: A Large-Scale Synthetic Dataset for Land Cover Mapping and Building Change Detection," *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) 2024*, pp. 1–9, 2024. [link]

[9] **H. Chen**, E. Nemni, S. Vallecorsa, X. Li, C. Wu, L. Bromley, "Dual-Tasks Siamese Transformer Framework for Building Damage Assessment," *Proceeding of the IEEE International Geoscience and Remote Sensing Symposium 2022*, Kuala Lumpur, Malaysia, pp. 1–4, 2022. (Oral) [link]

[10] **H. Chen,** C. Wu, B. Du, and L. Zhang, "Deep Siamese Multi-scale Convolutional Network for Change Detection in Multi-Temporal VHR Images," *2019 10th International Workshop on the Analysis of Multitemporal Remote Sensing Images*, Shanghai, China, pp. 1–4, 2019. (Oral) [link]

HONORS & AWARDS

- Young Researchers' Exchange Programme Special 2023 Exchange Grant *July,2023*
- GSFS Challenging New Area Doctoral Research Grant [link] *June,2023*
- Microsoft Research Asia Collaborative Research Program Grant [link] *Mar.,2023*
- The University of Tokyo Fellowship [link] *Oct., 2022*
- Outstanding Graduates of Wuhan University *June, 2022*
- Wang Zhizhuo Innovation Talent Scholarship (**Top 1‰**) [link] *Dec., 2021*
- National Scholarship for Postgraduates (**Top 1%**) [link] *Oct., 2021*
- National Scholarship for Postgraduates (**Top 1%**) [link] *Oct., 2020*
- First Prize of Wuhan University Scholarship for Excellent Postgraduate (**Top 5%**) *Oct., 2020*
- LIESMARS Scholarship for Excellent First-Year Postgraduates (**Top 9 in 169**) *Sept.,2019*
- Excellent Graduate of Anhui Province, China (**Top 1%**) *May, 2019*
- First Prizes of Academic Scholarship of Anhui University (**Top 3%**) *Oct., 2018*
- National Scholarship for Undergraduates (**Top 1%**) *Oct., 2017*
- Second Prize of Esri Cup GIS Software Development Contest in China (**Top 5%**) *Nov., 2018*
- Outstanding Prize of National Geomatics Contest in Programming (**Top 2%**) *July, 2018*
- Meritorious Winner of the U.S. Mathematical Contest in Modeling *Apr., 2018*
- Second Prize of China National Mathematical Contest in Modeling (**Top 5%**) *Nov., 2017*

RESEARCH EXPERIENCES & PROJECTS

Humanitarian Support and AI Development

Trainee | United Nations Satellite Centre (UNOSAT) *May, 2021 – May, 2022*

Advisor: Lars Bromley and Edoardo Nemni, Researcher at UNOSAT; Sofia Vallecorsa, Researcher at CERN

- Exploration and implementation of machine learning algorithms for various applications using optical and radar satellite imagery.
- Development of code and software to implement the needed workflow and pipeline to prepare satellite imagery for AI-based analysis and conversion of results to standard geospatial formats.
- Participation in UNOSAT AI efforts on refugee settlement mapping, flood mapping, vegetation mapping, damage assessment, simulated imagery, and other topics.

Theoretic Research on Scene Change Detection Method of Time-series High-resolution Remote Sensing Image Based on Deep Slow Feature Analysis (A Project Funded by National Natural Science Foundation of China)

Key Member | Sigma Laboratory of Wuhan University *Jan., 2020 – June, 2022*

Advisor: Chen Wu, Professor at LIESMARS, Wuhan University

- Proposed the concept of cross-domain change detection, introduced domain adaptation into change detection, and presented a deep siamese domain adaptation convolutional neural network for cross-domain change detection.
- Assisted to design and implement a vehicle detection algorithm in very-high-resolution (VHR) images based on local anomaly detection, deep learning, and spectral information post-processing.
- Labeled a multi-temporal vehicle detection data set to evaluate the performance of different vehicle detection algorithms.

Research on Scene Change Detection Method of High-resolution Remote Sensing Image Based on Slow Feature Analysis (A Project Funded by National Natural Science Foundation of China)

Key Member | Sigma Laboratory of Wuhan University *Mar., 2019 – Dec., 2019*

Advisor: Chen Wu, Professor at LIESMARS, Wuhan University

- Proposed a deep siamese convolutional multiple-layers recurrent neural network for multi-source change detection, which not only can process homogeneous images, but also effectively detect changes between heterogeneous images.
- Presented a novel deep kernel PCA convolutional mapping network for unsupervised binary and multi-class change detection in VHR images.
- Designed two deep siamese multi-scale convolutional neural networks to tackle the multi-scale changed objects in VHR images and presented two frameworks for unsupervised and supervised change detection, respectively.
- Labeled a scene change detection data set of high-resolution remote sensing images to evaluate the performance of scene change detection algorithms.

A Deep Learning Method Integrating Visual Attention Mechanism and Multi-feature for Oblique Photograph

Point Cloud Classification

Key Member | Lanzhi Laboratory of Anhui University *May, 2018 – Aug., 2018*

Advisor: Yanlan Wu, Professor at School of Resource and Environmental Engineering, Anhui University

- Preprocessed indoor point cloud data, and trained the PointSIFT model on ScanNet dataset for classifying indoor point cloud data.
- Designed and implemented a point cloud visualization tool based on OpenCV and Python, which could be used to visualize the segmentation results obtained by deep models.

Indoor/Outdoor Seamless Positioning and Navigation System Integrated with Multi-sensor of Mobile Phone (National Undergraduate Innovation and Entrepreneurship Project)

Initiator & Team Leader | Lanzhi Laboratory of Anhui University *Nov., 2016 – Nov., 2018*

Advisor: Peng Jiang, Associate Professor at School of Resource and Environmental Engineering, Anhui University

- Designed and established the framework of indoor/outdoor seamless positioning and navigation system.
- Obtained indoor/outdoor seamless positioning system of smart terminals and data acquisition tools with Android, built back-end server with Java, and established the database of the system with PostgreSQL and PostGIS.
- Proposed and implemented a multi-sensor indoor/outdoor seamless positioning and navigation algorithm based on GPS, WIFI, NFC, and inertial positioning.
- This project was judged as excellent at the end and the established system has won one national second prize, one second prize of Anhui Province, and one software copyright.

OTHER EXPERIENCES

Selected Software Development Projects

Individual Developer / Project Assistant | Lanzhi Laboratory of Anhui University *Sept., 2017 – Sept., 2018*

Advisor: Yanlan Wu, Professor at School of Resource and Environmental Engineering, Anhui University

- *Deep Learning-Based Urban Road Defect Detection System*: Key member of the development of a Deep Learning-Based Urban Road Defect Detection System, independently responsible for the development of client side with Android, back-end server with Java, and the database with PostgreSQL and PostGIS, an automatic sample generation tool for traffic signs with Python for the following urban road research.
- *Planning Model of Highway Construction Scheme*: Key member of the development of a Planning Model of Highway Construction Scheme, responsible for the design and establishment of the whole framework and the implementation the specific highway construction scheme algorithm based on the Voronoi diagram and minimum spanning tree with Python.

Long-term Practice of Mathematical Modeling

Group Leader & Member | Mathematical Modeling Competition Team of Anhui University *Mar., 2017 – Apr., 2018*

Advisor: Ligang Zhou, Professor at School of Mathematics Sciences, Anhui University

- Systematically studied mathematical modeling and data mining and finished five papers on mathematical modeling.
- Applied optimization models to crowdsourcing problems and solved these models using different heuristic algorithms.
- Used statistical modeling and machine learning to find key factors related to energy consumption conditions, establish effective indicators for describing energy structure, and predict future energy situation.
- Designed an innovative algorithm based on ant colony algorithm and cluster analysis for shredded paper stitching.
- Adopted a fuzzy analytic hierarchy process and a statistical regression model to evaluate the mental health of students.

SKILLS, ACTIVITIES & INTERESTS

- **Reviewer:** *IEEE Transactions on Image Processing*, *IEEE Transactions on Neural Networks and Learning Systems*, *IEEE Transactions on Geoscience and Remote Sensing*, *IEEE Geoscience and Remote Sensing Letters*, *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, *ISPRS Journal of Photogrammetry and Remote Sensing*, *Pattern Recognition*, *Neurocomputing*, *Geocarto International*, *European Journal of Remote Sensing*, *Transactions on Emerging Telecommunications Technologies*
- **Language Test:** ***IELTS*** (R/L/S/W: 9.0/7.5/6.0/6.5, Overall: 7.5), ***TOEFL*** (R/L/S/W: 30/23/19/29, Overall: 101), ***GRE*** (160/170/3.5, Overall: 333.5)
- **Programming:** Python, Java, Android, VB.Net, C#, C/C++, R, SQL (PostgreSQL+PostGIS), Latex
- **Deep Learning Framework:** Pytorch, Tensorflow, Keras
- **Software:** MATLAB, ENVI, ArcGIS, eCognition, GoogleEarth, SPSS, Lingo, Geoda, AutoCAD, Photoshop, CityEngine, SketchUp, proficient in PowerPoint