

# CAI WU

## PhD Candidate

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Urban Informatics / Urban Morphology / Urban Simulation / GIS / Planning Support System

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## Education

### Faculty of Geo-Information Science and Earth Observation (ITC), University of Twente / PhD Urban Analytics

01/2020 – Present, ENSCHEDE

- **Thesis:** An Urban Pattern Language Analytical Approach for Design and Planning with Spatial Data
- **Supervisors:** Professor Menno-Jan Kraak, Dr. Jiong Wang & Dr. Mingshu Wang

### Bartlett Centre for Advanced Spatial Analysis (CASA), University College London / MSc Smart Cities & Urban Analytics (Merit)

09/2018 – 09/2019, LONDON

- **Dissertation:** An Analysis of Singapore's master plan: Detecting and predicting the urban spatial structure and polycentricity via spatial network analysis.
- **Supervisor:** Dr. Duncan Smith

### National University of Singapore / BA(Hons) Architecture

07/2012 – 10/2016, SINGAPORE

- Zigong, Sichuan Green Core & Belt concept plan and urban design, Zigong, China (2016)
  - Student Exchange Program – Meiji University, Tokyo, Japan (2015)
  - Asian City Workshop – Revitalization of Eastern Chao Phraya River, Bangkok, Thailand (2014)
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## Working Experience

### Urban Analytics Lab, National University of Singapore / Visiting Scholar

01/2024 – Present, SINGAPORE

- **Project:** Understanding the neighbourhood's pedestrian dynamic with computer vision-based walkability and street network analytics.
- **Supervisors:** Dr. Filip Biljecki

### Hunan Planning Bureau Information Centre / Analyst Intern

06/2018 – 09/2018, CHANGSHA

- Perform accessibility analysis for a new urban planning project in Changsha using GIS software.
- Handling communication with other government departments and private companies

### Sea Group / UI/UX Designer

12/2016 – 05/2018, SINGAPORE

- Transform product requirements into mock-ups and solid UI/UX design.
- Design data visualisation platform for restaurants' daily performance and backend operation analysis.

### Woods Bagot / Urban Design Intern

05/2015 – 08/2015, BEIJING

- Comprehensive concept and field research for an urban design project in Beijing.
- Concept design and modelling for polit development.

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## Publications

### Peer-reviewed Journal Articles

- **Wu, C.\*** , Wang, J. , Wang, M. , & Kraak, M. J. (2024). Machine learning-based characterisation of urban morphology with the street pattern. *Computers, environment and urban systems*, 109, 102078.
- **Wu, C.** , Wang, Y., Wang, J., Kraak, M. J., & Wang, M.\* (2024). Mapping Street Patterns with Network Science and Supervised Machine Learning. *ISPRS International Journal of Geo-Information*. (Accepted)
- **Wu, C.** , Smith, D. , & Wang, M.\* (2021). Simulating the urban spatial structure with spatial interaction: A case study of urban polycentricity under different scenarios. *Computers, environment and urban systems*, 89, 1-13.
- **Wu, C.** , Wang, M.\* , Smith, D., Wang, J. , & Kraak, M. J. (2024). “Local Hubs and Global Gateways”: Understanding the Impact of Singapore’s master plan on urban polycentricity. *Environment and Planning B: Urban Analytics and City Science*. (First Revision)
- **Wu, C.\*** , Wang, J. , Wang, M. , Biljecki, F. , & Kraak, M. J. (2024). Formalising the urban pattern language: A morphological paradigm towards understanding the multi-scale structure of cities. *Cities*. (Under Review)
- Zhao, W. , Li, M.\* , **Wu, C.** , Zhou, W., & Chu, G. (2022). Identifying urban functional regions from high-resolution satellite images using a context-aware segmentation network. *Remote sensing*, 14(16), [3996].

### Peer-reviewed Conference Proceedings

- **Wu, C.\*** , Wang, J. , & Kraak, M. J. (2023). Urban spatial structure from a street network perspective: mapping street patterns with random forest classification. In S. Sangiambut (Ed.), *The 18th International Conference on Computational Urban Planning and Urban Management (CUPUM) 2023*
- **Wu, C.\*** , Wang, J. , Wang, M. , & Kraak, M. J. (2024). Evolving Urban Landscapes: A Spacematrix and Clustering Approach to understanding the morphology of Singapore's HDB Estates. *The Association of Geographic Information Laboratories in Europe (AGILE) 2024*

### Journal Articles in Preparation

- **Wu, C.** , Wang, J. , & Zhao, W.\* (2024). Enhancing Digital Literacy in Urban Planning: Leveraging GeoAI and OpenStreetMap Data for Building Form Analysis. (Submit by 30/06/2024)
- **Wu, C.** , Ito, K. , & Zhao, W. & Biljecki, F. \* (2024). Understanding the neighbourhood's pedestrian dynamic with computer vision-based walkability and street network analytics. (Submit by 30/09/2024)

\* Corresponding Author

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## Awards

- Association of Geographic Information Laboratory in Europe (AGILE) Grant, 2024
- Dutch Assistant in Opleiding (AIO) Scholarship, 2020-2023
- NUS Awards for Study Abroad – NASA Enhancement Scholarship, 2014, 2016
- Japanese Student Service Association (JASSO) Scholarship 日本留学奨学金, 2015
- Singapore Ministry of Education Senior-Middle 1 (SM1) Scholarship, 2008-2011

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## Teaching

### ITC, University of Twente

- 202001419-1A Course 1: GIS and RS or Geospatial Solutions / **Student Project Supervisor**, 2021,2022
- 202001419-1A Course 2: Geospatial Data: Concepts, Acquisition and Management / **Instructor**, 2020-2023
- 202001419-1A Course 3: Geospatial Analysis and Interpretation / **Instructor**, 2020-2023
- HTHT GIS Minor, / **Instructor**, 2020

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## Presentation

### Conferences

- Association of Geographic Information Laboratory in Europe (AGILE), Glasgow, 2024 / **Oral Presentation**
- The 18th International Conference on Computational Urban Planning and Urban Management (CUPUM), Montreal, 2023 / **Oral Presentation**
- The 16th Spatial Behaviour and Planning Research Conference, Online, 2020 / **Oral Presentation**

### Talks

- College of Architecture and Arts, Hunan University of Science and Technology, Xiangtan, China, 2023
- Urban Analytics Lab, National University of Singapore, Singapore, 2021

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## Organisational Activities

- Association of Geographic Information Laboratory in Europe (AGILE), Glasgow, 2024 / **Program Committee, Reviewer**
- International Geoscience and Remote Sensing Symposium (IGARSS), Brussels, 2021 / **Session Moderator**
- Computer, Environment and Urban Systems / **Reviewer**
- Transactions in GIS / **Reviewer**
- Asian Geographer / **Reviewer**

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## Skills

### Programming & Data Science

Python, R, JavaScript, SQL, HTML/CSS, ABM, GIS, Machine Learning, Deep Learning, Network Analysis

### Design & Visualization

Sketch, Photoshop, Illustrator, Sketchup, Rhino, AutoCAD