Wei Chien Benny CHIN 陳威全

a Geographer, Cartographer, & Geographical Information Scientist

(update: 04 April 2022)

Personal Information

Current position:	Research Fellow, National University of Singapore
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Short-bio

Wei Chien Benny Chin is a Malaysian who holds a Taiwanese Ph.D. degree in geography and currently works in Singapore as a postdoctoral research fellow. He is a *geographical information scientist*. His research interests include ***computational geography***, ***complex network***, ***spatial scaling***, and ***space-time patterns***. He is participating in projects associated with complex human movement networks and spatial epidemiology.

Work

2022/4 - present	***Research Fellow***, GIS Unit, Department of Geography, **National University of Singapore**.
2019/6 - 2022/3	***Research Fellow***, Applied Complexity Group (2019/6-2020/12), Advanced Architecture Laboratory (2021/1-2022/3), Sustainable Urban Mobility Research Laboratory (2021/7-2022/3), SGP-Cities, **Singapore University of Technology and Design**.
2018/9 - 2018/12	***Research Fellow***, Lab for Geospatial Computational Science, Department of Geography, **National Taiwan University**.
2013/9 - 2014/8	***Research Assistant***, Department of Geography, **National Taiwan University**.

Education

2014 - 2018	**Ph.D.**, Department of Geography, National Taiwan University. Thesis : The scaling properties of point clustering phenomena. DOI : 10.6342/NTU201802404 Award : Dean's Award (Ph.D.), College of Science, NTU, Taiwan. Advisor : Prof. Tzai-Hung Wen
2011 - 2013	**M.Sc.**, Department of Geography, National Taiwan University. Thesis : Geographically Modified PageRank Algorithm: Measuring the importance of nodes in a geospatial network. DOI : 10.6342/NTU.2013.00187 Award : Scholarship for Outstanding Overseas Chinese Graduate Student, MOE, Taiwan. Advisor: Prof. Tzai-Hung Wen
2007 - 2011	**B.Sc.**, Department of Geography, National Taiwan University. Thesis: The spatial relationship between urbanization factors, environmental quality and health quality. Award : College Student Research Scholarship, NSC, Taiwan Advisor: Prof. Mei-Hui Li

Publication

2022

- Manivannan, A., Willemse, E. J., Balamurali B. T., **Chin, W. C. B.**, Zhou, Y., Tunçer, B., Barrat, A., and Bouffanais, R. (2022) A Framework for the Identification of Human Vertical Displacement Activity Based on Multi-Sensor Data. ***IEEE Sensors*** 22(8): 8011-8029. DOI: 10.1109/JSEN.2022.3157806.
  Topics*: complex network, human movement*

2021

- Yan, Y. **Chin, W. C. B.***, Leong, C.-H., Wang, Y.-C., & Feng, C.-C. (2021). Emotional responses through COVID-19 in Singapore. In S.-L. Shaw, D. Sui (eds.), ***Human Dynamics in Smart Cities***. Springer: Switzerland. ISBN: 978-3-030-72807-6. DOI: 10.1007/978-3-030-72808-3_5.
  Topics*: health geography, sentiment analysis*
- Leong, C.-H.*, **Chin, W. C. B.**, Wang, Y.-C., & Feng, C.-C. (2021). A socio-ecological perspective on COVID-19 spatiotemporal integrated vulnerability in Singapore. In S.-L. Shaw, D. Sui (eds.), ***Human Dynamics in Smart Cities***. Springer: Switzerland. ISBN: 978-3-030-72807-6. DOI: 10.1007/978-3-030-72808-3_6.
  Topics*: health geography, GIS*
- **Chin, W. C. B.*** (2021). Daily life pattern of a city: Delineating activity space and time using social media data. ***SSRN preprint***: 3961269. DOI: 10.2139/ssrn.3961269.
  Topics*: GIS, complex network*

2020

- **Chin, W. C. B.**, & Bouffanais, R.* (2020). Spatial super-spreaders and super-susceptibles in human movement networks. ***Scientific Reports*** 10: 18642. DOI: 10.1038/s41598-020-75697-z.
  Topics*: complex network, health geography*
- Manivannan, A., **Chin, W. C. B.**, Barrat, A. & Bouffanais, R.* (2020). On the Challenges and Potential of Using Barometric Sensors to Track Human Activity. ***Sensors*** 20(23): 6786. DOI: 10.3390/s20236786.
  Topics*: sensors, vertical displacement*
- Huang, C. Y., & **Chin, W. C. B.*** (2020). Distinguishing arc types to understand complex network strength structures and hierarchical connectivity patterns. ***IEEE Access*** 8: 71021-71040. DOI: 10.1109/ACCESS.2020.2986017.
  Topics*: complex network*

2019

- Huang, C. Y., **Chin, W. C. B.***, Fu, Y. H., & Tsai, Y. S. (2019). Beyond bond links in complex networks: Local bridges, global bridges and silk links. ***Physica A: Statistical Mechanics and its Applications***. DOI: 10.1016/j.physa.2019.04.263
  Topics*: complex network*
- Huang, C. Y., **Chin, W. C. B.*,** Wen, T. H., Fu, Y. H., & Tsai, Y. S. (2019). EpiRank: Modeling Bidirectional Disease Spread in Asymmetric Commuting Networks. ***Scientific Reports*** 9: 5415. DOI: 10.1038/s41598-019-41719-8
  Topics*: complex network, health geography*

2017

- **Chin, W. C. B.**, Wen, T. H.*, Sabel, C. E., & Wang, I. H. (2017). A geo-computational algorithm for exploring the structure of diffusion progression in time and space. ***Scientific Reports*** 7: 12565. DOI: 10.1038/s41598-017-12852-z
  Topics*: space-time, health geography*

- Wen, T. H.*, **Chin, W. C. B.**, & Lai, P. C. (2017). Understanding the topological characteristics and flow complexity of urban traffic congestion. ***Physica A: Statistical Mechanics and its Applications*** 473: 166-177. DOI: 10.1016/j.physa.2017.01.035
  Topics: *GIS, complex network*

2016

- Wen, T. H.*, Tsai, C. T., & **Chin, W. C. B.** (2016). Evaluating the role of disease importation in the spatiotemporal transmission of indigenous dengue outbreak. ***Applied Geography*** 76: 137-146. DOI: 10.1016/j.apgeog.2016.09.020
  Topics: *health geography, space-time*
- Lin, M. H., Kuo, R. N., **Chin, W. C. B.**, & Wen, T. H.* (2016). Profiling the patient flow for seeking healthcare in Taiwan: using gravity modeling to investigate the influences of travel distance and health-care resources. ***Taiwan Journal of Public Health*** 35(2): 136-151. (TSSCI, full text in chinese, with english abstract) DOI: 10.6288/TJPH201635104086
  Topics: *health geography, complex network*
- Wen, T. H.*, **Chin, W. C. B.**, & Lai, P. C. (2016). Link structure analysis of urban street networks for delineating traffic impact areas. In M. Nemiche, M. Essaaidi (eds.), ***Advances in Complex Societal, Environmental and Engineered Systems, Nonlinear Systems and Complexity 18***. Part 2: 203-220. Springer: Switzerland. ISBN: 978-3-319-46164-9. DOI: 10.1007/978-3-319-46164-9_10.
  Topics: *GIS, complex network*

2015

- **Chin, W. C. B.**, & Wen, T. H.* (2015). Geographically modified PageRank algorithms: Identifying the spatial concentration of human movement in a geospatial network. ***PLOS ONE*** 10(10): e0139509. DOI: 10.1371/journal.pone.0139509
  Topics: *GIS, complex network*
- Wen, T. H.*, & **Chin, W. C. B.** (2015). Incorporation of spatial interactions in location networks to identify critical geo-referenced routes for assessing disease control measures on a large-scale campus. ***International Journal of Environmental Research and Public Health*** 12(4): 4170-4184. DOI: 10.3390/ijerph120404170
  Topics: *health geography, complex network*

2014

- Lee, J.*, Lay, J. G., **Chin, W. C. B.**, Chi, Y. L., & Hsueh, Y. H. (2014). An experiment to model spatial diffusion process with nearest neighbor analysis and regression estimation. ***International Journal of Applied Geospatial Research*** 5(1): 1-15. DOI: 10.4018/ijagr.2014010101
  Topics: *health geography, GIS*

Submitted / In Preparation

- Fractal skyline: Exploring the vertical complexity through the spatial scaling of errors. (Manuscript in preparation)
- Delineating urban functional zones by analysing the spatial distribution of amenities in three Singapore planning areas. (Manuscript in preparation)
- Delineating zones for disease controls from the spatial network analysis of amenity-sharing network in Peninsular Malaysia. (Submitted)
- The effects of point clustering properties on spatial scaling patterns. (Manuscript in preparation)

Conference Presentation

- 2022 - Connect or Adapt: Analytic framework for the planning and design of resilient spatial networks, in **ARCC-EAAE Conference 2022**, Miami, Florida, USA. Forthcoming.

- 2022 - Assessing Spatiotemporal Vulnerability for COVID-19 in Singapore, in **AAG Annual Meeting 2022**, New York City, USA. Forthcoming.
- 2020 - Identification of super-spreaders and super-susceptibles locations from directed and weighted human movement networks for disease control and prevention, in **Conference on Complex Systems 2020**, Online. 7 December 2020.
- 2018 - Delineating communities of cities in space and times, in **18th Chinese Cartography Academic Conference**, Taipei, Taiwan. 20 October 2018.
- 2017 - Lifestyle of a city: An urban life footprint analysis using Twitter data in Tokyo, in **TGSW 2017 - 1st CiC Student Workshop**, Tsukuba, Japan. 27 September 2017. *Young Scientist Award*.
- 2017 - Exploring space-time diffusion process of Dengue Fever in Kaohsiung City, Taiwan, in **7th Asian Seminar in Regional Science**, Taipei, Taiwan. 9 September 2017.
- 2017 - Applying space-time information to explore disease processes: The dynamic patterns of Dengue Fever in Kaohsiung City, 1998-2015, in **Annual Meeting of the SRA Taiwan 2017**, Taichung, Taiwan. 25-26 May 2017. *Excellent Student Poster Award*.
- 2016 - Profiling topological characteristics of street network to identify urban traffic congestion, in **15th Conference for Global Spatial Data Infrastructure Association (GSDI)**, Taipei, Taiwan. 1 December 2016.
- 2016 - Understanding urban traffic congestion by analyzing the link structure and the vehicle flows of urban street network, in **8th Conference on Development Studies**, Taipei, Taiwan. 16 October 2016.
- 2016 - Link structure analysis of urban road networks for identifying traffic impact areas, in **NetSci 2016**, Seoul, South Korea. 2 June 2016.
- 2015 - A web-based framework for monitoring spatial-temporal clustering of epidemics in Taiwan, in **FOSS4G 2015**, Seoul, South Korea. 17 September 2015.
- 2013 - Geographically modified PageRank algorithm: Measuring the importance of nodes in a geospatial network, in **AAG Annual Meeting 2013**, Los Angeles, USA. 9 April 2013.
- 2012 - Integration of PageRank and spatial interaction modeling to analyze topological dynamics of networked cities, in **Annual Meeting of The Geography Society of China located in Taipei**, Taipei, Taiwan. 21 April 2012.

Analysis algorithm packages

Name	**Hierarchical Arc Type Analysis (HATA)**
Description	An algorithm for evaluating the strength of directed arcs.
Repository	https://github.com/wcchin/HATA
Name	**Hierarchical Edge Type Analysis (HETA)**
Description	An algorithm for evaluating the strength of edges.
Repository	https://github.com/wcchin/HETA
Name	**Geographical PageRank (GPR)**
Description	a python package for measuring concentration distribution in a spatial network.
Repository	https://bitbucket.org/wcchin/gpras
Pypi	https://pypi.python.org/pypi/GPRas
Name	**Flow-based PageRank (FBPR)**
Description	a python package that calibrate the attractiveness and PR score to meet the flow.
Repository	https://bitbucket.org/wcchin/fbpr
Name	**TrAcking Progression In Time And Space (TaPiTaS)**
Description	A data exploration and visualization algorithm for understanding diffusion process.
Repository	https://bitbucket.org/wcchin/TaPiTaS
Pypi	https://pypi.org/project/tapitas/

Professional Experience

2015-2018	An urban environmental sensing infrastructure with crowdsourcing and spatial big data for early warning of critical conditions: A space-time multi-layered urban mobility model for assessing transmission risk of infectious disease. (Proposal writer and project executor) 3 years project funded by *MOST Taiwan*.
2015	A production model for developing geographic network analysis module. (Proposal writer and project executor) 1 year project funded by *MOST Taiwan*.
2015-2017	Incorporating the seasonal incidence into detecting spatial-temporal thresholds of food-borne disease outbreaks for the epidemic early warning system. (Proposal writer and project executor (2015-16); data analysis (2017)) 3 years project funded by *Taiwan CDC*.
2016-2019	A framework for high spatial and temporal resolution geodemographic segmentation. (Proposal writer and programmer) 3 year project funded by *MOST Taiwan*.
2014-2016	Integration of geographic information with social network analysis to establish a geospatial model for predicting tuberculosis (TB) contacts with latent infection and developing active disease. (Proposal writer) 3 years project funded by *MOST Taiwan*.