# Wei Chien Benny CHIN 陳威全

*a Geographer, Cartographer, & Geographical Information Scientist*

## Personal Information

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| Current position: | Postdoctoral Researcher, Singapore University of Technology and Design |
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| Nationality: | Malaysian |
| Language: | English (Upper intermediate), Chinese (Native), Malay (Basic) |

## 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 both of the horizontal and vertical dimensions of spatial structures.

## Education

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

## Publication

### 2021

- Yan, Y. **Chin, W. C. B.**\*, Leong, C.-H., Wang, Y.-C., & Feng, C.-C. (In press). Emotional responses through COVID-19 in Singapore. In S.-L. Shaw, D. Sui (eds.), **Human Dynamics in Smart Cities**. Springer: Switzerland.
  *Topics*: *health geography, sentiment analysis*

- Leong, C.-H.\*, **Chin, W. C. B.**, Wang, Y.-C., & Feng, C.-C. (In press). 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.
  *Topics*: *health geography, GIS*

### 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](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](10.4018/ijagr.2014010101)
  *Topics*: health geography, GIS

# Submitted / In Preparation

- Multi-sensor identification of Vertical Displacement Activity. (In preparation)

- Geographical analysis of the vertical displacement activity during the journey to/from school. (Planning)

- Fractal skyline: Exploring the vertical complexity through the spatial scaling errors. (In preparation)

- The effects of point clustering properties on spatial scaling patterns. (In preparation)

- The super-spreader and super-susceptible airports after a global lockdown: Post-pandemic re-opening of air-transportation. (Planning)

# Conference Presentation

- 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.

## Personal Open Source Project

### Data analysis algorithms

**Hierarchical Arc Type Analysis (HATA)**

Description   An algorithm for evaluating the strength of directed arcs.
Repository   https://github.com/wcchin/HATA

**Hierarchical Edge Type Analysis (HETA)**

Description   An algorithm for evaluating the strength of edges.
Repository   https://github.com/wcchin/HETA

**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

**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

**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/

### Tools

**Taiwan Geographic Open Data (TGOD)**

Description   a python package that wrap some open data real-time API (Taiwan) and convert the data into dataframe format.
Repository   https://github.com/wcchin/tgod

**Vector MAP ProducER (vmapper)**

Description   a simple python library for creating SVG map in python.
Repository   https://github.com/wcchin/vmapper

**ColouringMap (colouringmap)**

Description   a convenient mapping tool for generating categories and colours for making choropleth map from geopandas geodataframe.
Repository   https://github.com/wcchin/colouringmap

## Professional Experience

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| 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)<br>3 years project funded by *MOST Taiwan*. |
| 2015 | A production model for developing geographic network analysis module. (Proposal writer and project executor)<br>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.<br>(Proposal writer and project executor (2015-16); data analysis (2017))<br>3 years project funded by *Taiwan CDC*. |
| 2016-2019 | A framework for high spatial and temporal resolution geodemographic segmentation.<br>(Proposal writer and programmer)<br>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.<br>(Proposal writer)<br>3 years project funded by *MOST Taiwan*. |

## Computer Skills

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| *Programming* | Python, R, Netlogo, Java, Javascript, Processing, Julia, Matlab |
| *GIS* | ArcGIS, QGIS |
| *Cartography* | Illustrator, Inkscape, web-mapping |
| *Database* | PostgreSQL, SQLite |
| *Familiar OS* | Linux, Windows |

## Research Interests

- **Geocomputation**
- Network Analysis
- Space-time Analysis
- Human Movement
- Scaling
- Spatial Visualization