Curriculum Vitae

Tzu-Chi Yen

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Contact Information

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Research Interests

Complex systems — network modeling & analysis, computational topology, neuroscience
Optimization — first-order methods, randomized algorithms, signal processing
Generative modeling — statistical inference, sampling, diffusion models

Academic Positions

BioFrontiers Institute, University of Colorado Boulder   Sep 2023–present
Postdoctoral Scholar

Education

Ph.D. in Computer Science   Aug 2023
University of Colorado Boulder, USA
"Structure, Inference, and Optimization in Complex Networks"
Advisors: Joshua A. Grochow and Daniel B. Larremore

B.S. in Biology   Jun 2011
National Taiwan University, Taiwan
"Quantum Coherence and Optimal Chromophore Organization for Light Harvesting"
Advisor: Yuan-Chung Cheng (Chemistry)

Awards

- **NeuroData Discovery Award**, The Kavli Foundation   2023
- **Outstanding TA Award**, Department of Computer Science   2022
- **Second Prize**, in the inaugural Taipei City Open Data Hackathon   2015
- **Excellent Poster Award**, Department of Chemistry   2011

Peer-Reviewed Publications

♥ See my Google Scholar and Web of Science for citations and referee records.

Journal Papers

1. Tzu-Chi Yen, "Construction of simplicial complexes with prescribed degree-size sequences," Phys. Rev. E **104**, L042303 (2021).
2. Tzu-Chi Yen and Daniel B. Larremore, "Community detection in bipartite networks with stochastic block models," Phys. Rev. E **102**, 032309 (2020).

3. Hsiao-Mei Wu, Ying-Hsiu Lin, Tzu-Chi Yen, and Chia-Lung Hsieh, "Nanoscopic substructures of raft-mimetic liquid-ordered membrane domains revealed by high-speed single-particle tracking," Sci. Rep. **6**, 20542 (2016).

4. Jeong Min Lee, Jung A Kim, Tzu-Chi Yen, In Hwan Lee, Byungjun Ahn, Younghoon Lee, Chia-Lung Hsieh, Ho Min Kim, and Yongwon Jung, "A Rhizavidin Monomer with Nearly Multimeric Avidin-Like Binding Stability Against Biotin Conjugates," Angewandte Chemie **55**, 3393 (2016).

5. Qing Ai, Tzu-Chi Yen, Bih-Yaw Jin, and Yuan-Chung Cheng, "Clustered Geometries Exploiting Quantum Coherence Effects for Efficient Energy Transfer in Light Harvesting," J. Phys. Chem. Lett. **4**, 2577, (2013).

Conference Proceedings

1. Hsun-Ping Hsieh, Tzu-Chi Yen, and Cheng-Te Li, "What Makes New York So Noisy? Reasoning Noise Pollution by Mining Multimodal Geo-Social Big Data," ACM international conference on Multimedia (2015).

2. Tzu-Chi Yen and Yuan-Chung Cheng, "Electronic Coherence Effects in Photosynthetic Light Harvesting," 22nd Solvay Conference on Chemistry (2011).

Other Publications

Workshop Papers

1. Tzu-Chi Yen, Tzu-Yun Lin, Ching-Yuan Yeh, Hsun-Ping Hsieh, and Cheng-Te Li, "An Interactive Visualization System to Analyze and Predict Urban Construction Dynamics," ACM SIGKDD International Workshop on Urban Computing (2015).

Translations (English → Chinese)

1. Chia-Hung Yang and Tzu-Chi Yen, "Complexity Explained," 2019.
2. Tzu-Chi Yen and Cheng-Te Li, "Network Literacy: Essential Concepts and Core Ideas," 2016.

Funding

Mapping Functional Neuronal Networks to Behavioral States   2023–2024
PI. LS-2023-GR-04-2746, NeuroData Discovery Award, The Kavli Foundation
$50,000 to Yen.
With Co-PI Yi-Yun Ho (Massachusetts Institute of Technology).

Contributed or Submitted Talks and Presentations

- Aspiration of prestige in the selection of peer institutions
  - Talk: International Conference for Computational Social Science, Copenhagen, Denmark   Jul 2023
- Active learning strategies in community reconstruction
  - Poster: North American School of Information Theory at UCLA, Los Angeles   Aug 2022
- Simpliciality testing and related topics
  - Talk: project Tyra, online   Jul 2020
  - Talk: Student Symposium in Combinatorics, online   Jun 2022
  - Talk: Conference on Dynamics of Social Interactions, Aspen Center for Physics, Aspen   Mar 2022
- Community detection in bipartite networks with stochastic block models
  - Talk: project Tyra, online   Nov 2020
  - Poster: NetSci Conference, Indy   Jun 2017
  - Talk: Statistical Inference on Network Models symposium, NetSci Conference, Indy   Jun 2017
- Social customer relationship management system to analyze large on-line social networks
  - Poster: NetSci Conference, Seoul   May 2016
- Dissecting urban noises from heterogeneous geo-social media and sensor data
  - Talk & Poster: ACM Multimedia Conference, Brisbane   Oct 2015
- An interactive visualization system to analyze and predict urban construction dynamics
  - Talk: Urban Computing Workshop, ACM SIGKDD Conference, Sydney   Aug 2015

Affiliations, Accreditations

- National Outdoor Leadership School "Wilderness First Responder" – certification   2023–present
- IEEE Information Theory Society – Member   2021–present
- American Physical Society – Member   2020–present
- Society of Industrial and Applied Mathematics – Member   2020–present
- Python Software Foundation – Contributing Member   2018–present
- Network Science Society – Member   2017–present
- Society of Young Network Scientists – Event Officer   2019–2023
- Strauch Family Graduate Fellowship, College of Engineering & Applied Sciences   2018–2019

Travel Grants

- Allen Institute (NeuroDataReHack workshop)   Oct 2022
- North American School of Information Theory, UCLA   Aug 2022
- Aspen Center for Physics (Winter conference)   Mar 2022
- Graduate and Professional Student Government, CU Boulder   Mar 2022
- SciPy Conference, Austin   Jul 2019
- NetSci Conference, UVM   Mar 2019

Teaching Experience

University of Colorado Boulder (*instructor*)
CSCI 5352: Network Analysis and Modeling   Spring 2024

University of Colorado Boulder (*teaching assistantship*)
CSCI 2270: Data Structures   Spring 2022
CSCI 3308: Software Development Methods and Tools   Fall 2021
CSCI 5822: Probabilistic Models   Spring 2021 & Spring 2023

National Cheng Kung University, Taiwan (*guest instructor*)
STAT 1021: Introduction to Data Science   Spring 2018 & Spring 2019

Referee Work

Journal Review
- Advances in Complex Systems
- Communications Physics
- EPL (formerly Europhysics Letters)
- Journal of Complex Networks
- Network Science
- Physical Review Letters (PRL)
- Physical Review E (PRE)
- Physical Review Research (PRResearch)
- PLoS ONE
- PLoS Computational Biology

Conferences
- Program Committee, Python Conference (PyCon 2020, 2021)
- Program Committee, Scientific Computing with Python Conference (SciPy 2018, 2019, 2020, 2021)

Synergistic Activities

Network Science Education in Taiwan   2016–present
- Website: https://www.netscied.tw
- Publicly accessible network science materials in traditional Chinese

Public release of working algorithms or systems
Typically licensed under GPL-3.0-or-later or LGPL-3.0-or-later.
- Algorithm for the simplicial complex realization problem (Python)   2021
- Model selection heuristic for bipartite stochastic block models (Python)   2020
- MCMC inference for bipartite stochastic block models code (C++)   2020
- BP inference for stochastic block models code (C++; re-implementation)   2017
- Frontend of the Network Science Education Initiative in Taiwan project (JavaScript)   2016

Selected Projects

Map of the projected air pollution. (at Greenpeace Japan)   2018
Built a map to show how the pollution (such as $PM_{2.5}$, NO_2, and SO_2) would spread, if the Government of Japan were to build the coal power plants as planned.
- Petition homepage: https://act.greenpeace.org/page/21550/petition/1.
- URL to map: https://netscied.tw/greenpeace/jp/index.html.

Text mining of customer complaints. (at Dai Ke Network Technology)   2016
Designed a Python toolkit for short-text data mining, with modules about noise reduction, documents labelling, topic modeling, and token-to-token similarity.
- Code on GitHub: https://github.com/junipertcy/nick.

System to identify influential customers in a business network. (at Sensoro)   2015–2016
Made an Angular widget to collect, rank, and visualize WeChat users as a dynamic social network.
- Video demo (1 min): https://netscied.tw/sensoro/network.m4v.
- Demo of a related D3.js exploratory data analysis system: https://netscied.tw/sensoro/label.m4v.

System to analyze urban construction dynamics. (w/ Tzu-Yun Lin and Ching-Yuan Yeh)   2015
Made a predictive system for citizens and government agencies to understand, track, and predict the construction dynamics in urban area.
- Code on GitHub: https://github.com/junipertcy/uConstruction.
- Demo in Chinese: https://netscied.tw/data_taipei/view-cht/index.html.
- Demo in English: https://netscied.tw/data_taipei/view-eng/index.html.

Skills

Language
- Mandarin Chinese (Native)
- English (Full professional proficiency)
- German (Limited professional proficiency)

Academic Experience

Academia Sinica (Institute of Atomic and Molecular Sciences)   Taipei, Taiwan; 2013–2014
Research Assistant w/ Chia-Lung Hsieh

National Taiwan University (Department of Chemistry)   Taipei, Taiwan; 2012–2013
Research Assistant w/ Yuan-Chung Cheng

Industry Experience

♥ See the Selected Projects section for my work during 2015–2018.

Greenpeace (Air Pollution Sector)   Beijing, China; 2017–2018
Data Analyst w/ Lauri Myllyvirta

Sensoro Co., Ltd.   Beijing, China; 2015–2016
Software Engineer, Full Stack

Other Experience

Northwestern University (Kellogg School of Management)   Remote; 2017
Software Engineer (contractor, 1 month) w/ Hyejin Youn

Santa Fe Institute   Santa Fe, NM, USA; 2017
Visiting Scholar (1 week) w/ Daniel Larremore

Chinese Academy of Sciences (Institute of Theoretical Physics)   Beijing, China; 2017
Visiting Scholar (6 months) w/ Pan Zhang

Tsinghua University (Department of Computer Science and Technology)   Beijing, China; 2016
Research Software Engineer (contractor, 7 months) w/ Jie Tang

Dai Ke Network Technology Co., Ltd.   Remote; 2016
Software Engineer (natural language processing, contractor, several months)

Military Service   Taiwan; 2011–2012

References

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