Heng-Chien (Leo) Liou

NETWORK SCIENCE · TOPOLOGICAL DATA ANALYSIS · GRAPH SIGNAL PROCESSING

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"Philosophers have hitherto only interpreted the world in various ways; the point is to change it."-Karl Marx

Research Statement

My goal is to use engineering and computational methods to understand complex social and natural systems, and to even solve the associated problems.
Keywords: *Network Science*, *Computational Social Science*, *Algorithmic Fairness*

Education

National Taiwan University College of Electrical Engineering & Computer Science *Taipei, TWN*

B.S.Eng. in **Electrical Engineering**, *Phi Tau Phi* *2021*

- **GPA: 4.26/4.30** and **Ranking: 1/222** ⬀, cumulative to Jan 2021
- Nominated as Phi Tau Phi Honor Fellow
- Selected Courses ⬀ (all with letter grade **A+**; † denotes graduate-level courses)
  - Information and Decision Systems
    Eng Linear Algebra, Eng Differential Equation, Probability & Statistics, Signals & Systems, Data Structure & Programming, Design & Analysis of Algorithms†, Control Systems, Information Theory†, Convex Optimization†
  - Social and Behavioral Science
    Economics I-II, Game Theory†, Introductory Sociology, Sociological Theory (1)-(2), General Psychology, Social Psychology, Psychology of Personality, Abnormal Psychology, Neural and Behavioral Modeling†
- Advisors: **Shyh-Kang Jeng** (General Academic), **Hung-Yun Hsieh** (Network Science), **Hsuan-Wei Lee** (Computational Sociology), **Ho-Lin Chen** (Algorithms)

Taipei Municipal Chien Kuo High School *Taipei, TWN*

High School Diploma, Concentration in Math and Natural Science *2016*

- Recipient of Taipei City Mayor Award (for the students with highest GPA in class)
- Scored full marks (75/75) in General Scholastic Ability Test 2016 [CNA News]

Research Experience

Institute of Sociology, Academia Sinica *Taipei, TWN*

Undergrad Research on Computational Sociology, advised by Prof. Hsuan-Wei Lee *Jan. 2020 - PRESENT*

- Social Consensus and Cultural Variation: Modeling and Theorizing for Social Dynamics
  – Proposal admitted by MOST Research Grant for University Students
  – Abstract admitted by 2020 Conference on Computational Sociology poster track and 2020 Taiwanese Sociological Association Annual Meeting

Collective Algorithms Lab, National Taiwan University *Taipei, TWN*

Undergrad Research on Algorithmic Fairness, advised by Prof. Ho-Lin Chen *Sep. 2019 - PRESENT*

- Fairness for Vaccine Allocation on Networks
  – Introduced the concern of fairness into the vaccine allocation problem

TONIC Research Group, National Taiwan University *Taipei, TWN*

Undergrad Research on Network Science, advised by Prof. Hung-Yun Hsieh *Sep. 2018 - Apr. 2020*

- Formation of Friendship Networks among Agents with Personality Traits
  – Proposal admitted by MOST Research Grant for University Students
  – Developed computational network models to incorporate psychological concept into network science research
  – Received MOST Research Creativity Award

Publications

PREPRINTS
- **Heng-Chien Liou**, and Hsuan-Wei Lee. 2020. "Social Contagion and Associative Diffusion in Multilayer Networks." *arXiv preprint arXiv:2011.07746*. [arXiv] [TSA2020 slide]
- **Heng-Chien Liou**, and Hung-Yun Hsieh. 2020. "Modeling Friendship Networks among Agents with Personality Traits." *arXiv preprint arXiv:2004.12901*. [arXiv]

Professional Development and Certification

MITx   *Online*
MicroMasters Program in **Statistics and Data Science**   *Feb. 2019 -*
- Completed four graduate level courses, at a similar pace and level of rigor as on-campus courses at Massachusetts Institute of Technology; waiting to complete the capstone exam.
- Credentials: Probability ↗, Data Analysis in Social Science ↗, Fundamentals of Statistics ↗, Machine Learning ↗

Coursera & edX   *Online*
Online Courses   *indefinite*
- **Information and Decision Systems**
  Probability ↗, Fundamentals of Statistics ↗, Machine Learning ↗, Quantum Machine Learning ↗
- **Social and Behavioral Science**
  Data Analysis in Social Science ↗, Game Theory ↗, Moral Foundations of Politics ↗, Introduction to Social Research Methods ↗, Classical Sociological Theory ↗, Network Dynamics of Social Behavior ↗, Anthropology of Current World Issues ↗

University of British Columbia   *Vancouver, BC, CAN*
Vancouver Summer Program, Design Thinking   *2017*
- Received training on design thinking with group project and presentation experience.

Honors & Awards

RESEARCH GRANTS

2020	MOST RESEARCH GRANT FOR UNDERGRADUATE STUDENTS, Ministry of Science and Technology	*TWN*
TWN	MOST RESEARCH GRANT FOR UNDERGRADUATE STUDENTS, Ministry of Science and Technology	

FELLOWSHIP

2021	PHI TAU PHI HONOR FELLOW, The Phi Tau Phi Scholastic Honor Society	*TWN*

SCHOLARSHIP

2020	DELTA ELECTRONICS SCHOLARSHIP, Delta Electronics	*TWN*
2019	MR. CHIEN SHIH-LIANG MEMORIAL SCHOLARSHIP, National Taiwan University	*TWN*
2018	DELTA ELECTRONICS SCHOLARSHIP, Delta Electronics	*TWN*
2018	NTUHKAA SCHOLARSHIP, National Taiwan University Hong Kong Alumni Association	*TWN*
2018	IRVING T. HO MEMORIAL SCHOLARSHIP, Irving T. Ho Memorial Foundation	*TWN*

AWARDS

2020	RESEARCH CREATIVITY AWARD ↗, Ministry of Science and Technology	*TWN*
2017-9	PRESIDENTIAL AWARD (TOP 5% OF CLASS) FOR 4 SEMESTERS ↗, National Taiwan University	*TWN*
2016	MAYOR AWARD, Taipei City Government	*TWN*

Extracurricular Activity

Global Initiatives Symposium Organizing Committee   *Taipei, TWN*
Officer of Academics and Curation   *Oct. 2016 - July. 2017*
- Organized and host Pre-Symposium Speech: Revolution of Sustainable Life.
- Was responsible for one of the academic topics- Low Carbon Economy in annual symposium.

Viking Bar

Writer for Technology and Business Section

- Analyzed several topics in modern technology development.
- Also wrote articles about personal growth, interdisciplinary learning, gender equality.

NTU Musical Club

Club Member & Main Actor in Annual Performance

Taipei, Taiwan

Sep. 2016 - Jun. 2017

- Learned how to act and sing like a musical actor.
- Participated in annual musical performance as one of the main actors.

Skills

Software Systems	LaTeX
Programming Language	Python, C++, MATLAB, R
Python Library	NetworkX, graph-tool, NumPy
Natural Language	Mandarin (native), English (fluent), Taiwanese (listening)