Dr. Hung-Hsun Chen

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Biography

Dr. Hung-Hsun Chen is an Assistant Professor in the Department of Mathematics at Fu Jen Catholic University, Taiwan. He received his Ph.D. in Applied Mathematics from National Chiao Tung University in 2016. His research spans machine learning, deep learning, graph theory, and their interdisciplinary applications, particularly in medical imaging, healthcare analytics, and algorithm design. He has collaborated with multiple medical institutions and research teams to develop AI-based diagnostic systems for spinal fractures, brain tumors, glaucoma, and atrial fibrillation using X-ray, CT, and MRI data. Dr. Chen also actively explores Explainable AI and natural language processing for clinical applications. He has published extensively in international journals such as the Journal of Medical Internet Research, Scientific Reports, and IEEE Open Journal of Intelligent Transportation Systems.

EDUCATION

- 2011-2016 Ph.D., Department of Applied Mathematics, National Chiao Tung University
- 2008-2010 M.S., Department of Applied Mathematics, National Chiao Tung University
- 2004-2008 B.S., Department of Applied Mathematics, National Chiao Tung University

EXPERTISE

- Machine Learning,
- Graph Theory
- Artificial Intelligence Applications in Medical Imaging,
- Mathematical Modeling and Algorithm Design

RESEARCH INTERESTS

- My research interests lie in developing and applying machine learning and deep learning models for various domains, particularly in medical imaging, healthcare data analysis, and algorithmic modeling. I am also interested in explainable AI, natural language processing in clinical applications, and decidability problems in mathematical tiling and coloring.

PROFESSIONAL EXPERIENCE

2025

Principal Investigator, Research on Real-Time Prediction and Application of Traffic Origin-Destination Data Based on Deep Learning Models, funding support by the National Science and Technology Council, Taiwan (Aug 2025 – Jul 2026).

Co-Principal Investigator, Building a Cohort Study on the Care and Reconstruction of Workers Affected by Occupational Accidents: Using Digital Mental Health and Artificial Intelligence to Build an Ecosystem for Physical and Mental Recovery and Work-Life Balance, funding support by the National Science and Technology Council, Taiwan (Aug 2025 – Jul 2026).

2024

Principal Investigator, Integrating Reinforcement Learning and Graph Neural Networks for Dynamic Traffic Signal Optimization, funding support by the National Science and Technology Council, Taiwan (Aug 2024 – Jul 2025).

Co-Principal Investigator, Social-Cultural Insights into Gender Bias in LLMs: Constructing Traditional Chinese Bias Corpora and Models, funding support by the National Science and Technology Council, Taiwan (Aug 2024 – Jul 2026).

2023

Co-Principal Investigator, Automatic Identification of Hip-Spine Syndrome from Lumbar X-ray Images Using a Cross-disciplinary Deep Learning Module: Recognition of 12 Pathological Conditions, funding support by the National Science and Technology Council, Taiwan (Aug 2023 – July 2026).

Co-Principal Investigator, Automated Interpretation of Bone Mineral Density Based on Radiomic Features Extracted from Lumbar CT Scans, funding support by the National Science and Technology Council, Taiwan (Aug 2023 – July 2025).

2022

Co-Principal Investigator, Ground truth generalizability affects performance of the artificial intelligence model in automated vertebral fracture detection: training, validation and testing a new artificial intelligence model based on different aged population , funding support by the National Science and Technology Council, Taiwan (Aug 2022 – July 2023).

Co-Principal Investigator, COVID-19 Prevention Policies in Taiwan: Data Mining, Machine Learning, and MCDM-Based Analyses of Gender Differences, funding support by the National Science and Technology Council, Taiwan (Aug 2022 – July 2024).

2020

Principal Investigator, Development of transfer learning and ensemble learning based on artificial intelligence for the diagnosis of primary brain tumors, funding support by the National Science and Technology Council, Taiwan (Mar 2020 – Dec 2021).

Co-Principal Investigator, Mining, Analyzing, and Visualizing the Knowledge Map for the Hydrothermal Vent Socio-Ecological System of Kueishantao, funding support by the National Science and Technology Council, Taiwan (Aug 2020 – July 2022).

RESEARCH AREAS

Machine Learning, Graph Theory, Algorithm

Publications

Journal papers

1. **Hung-Hsun Chen**, Chen Lin, Hsiang-Chih Chang, Jen-Ho Chang, Hai-Hua Chuang, Yu-Hsuan Lin. Developing Methods for Assessing Mental Activity Using Human-Smartphone Interactions: Comparative Analysis of Activity Levels and Phase Patterns in General Mental Activities, Working Mental Activities, and Physical Activities. Journal of Medical Internet Research, 2024.
2. Yu-Cheng Yao, Cheng-Li Lin, **Hung-Hsun Chen**, Wei Hsiung, Shih-Tien Wang, Ying-Chou Sun, Yu-Hsuan Tang, Po-Hsin Chou. Development and validation of deep learning models for identifying the brand of pedicle screws on plain spine radiographs. JOR Spine. 2024 Sep 17;7(3):e70001.
3. **Hung-Hsun Chen**, Henry Horng-Shing Lu, Wei-Hung Weng, Yu-Hsuan Lin. Developing a Machine Learning Algorithm to Predict the Probability of Medical Staff Work Mode Using Human-Smartphone Interaction Patterns: Algorithm Development and Validation Study. Journal of Medical Internet Research, 2023.
4. Yu-Chieh Ko, Wei-Shiang Chen, **Hung-Hsun Chen**, et al. Widen the Applicability of a Convolutional Neural-Network-Assisted Glaucoma Detection Algorithm of Limited Training Images across Different Datasets. Biomedicines, 2022.
5. **Hung-Hsun Chen***, Yi-Bing Lin, I-Hau Yeh, Hsun-Jung Cho, Yi-Jung Wu. Prediction of Queue Dissipation Time for Mixed Traffic Flows With Deep Learning. IEEE Open Journal of Intelligent Transportation Systems, 2022.
6. Po-Hsin Chou, Tony Hong-Ting Jou, Hung-Ta Hondar Wu, Yu-Cheng Yao, Hsi-Hsien Lin, Ming-Chau Chang, Shih-Tien Wang, Henry Horng-Shing Lu, **Hung-Hsun Chen***. Ground truth generalizability affects performance of the artificial intelligence model in automated vertebral fracture detection on plain lateral radiographs of the spine. The Spine Journal, 2021.
7. Cheng-Chung Li, Meng-Yun Wu, Ying-Chou Sun, **Hung-Hsun Chen**, et al. Ensemble classification and segmentation for intracranial metastatic tumors on MRI images based on 2D U-nets. Scientific Reports, 2021.
8. Ying-Chou Sun, Ang-Ting Hsieh, Ssu-Ting Fang, Hsiu-Mei Wu, Liang-Weid Kao, Wen-Yuh Chung, **Hung-Hsun Chen**, et al. Can 3D artificial intelligence models outshine 2D ones in the detection of intracranial metastatic tumors on magnetic resonance images? Journal of the Chinese Medical Association, 2021.
9. Yi-Chu Li, **Hung-Hsun Chen**, Henry Horng-Shing Lu, Hung-Ta Hondar Wu, Ming-Chau Chang, Po-Hsin Chou. Can a Deep-learning Model for the Automated Detection of Vertebral Fractures Approach the Performance Level of Human Subspecialists? Clinical Orthopaedics and Related Research, 2021.
10. **Hung-Hsun Chen**, Wen-Guei Hu, Song-Sun Lin. Nonemptiness problems of Wang cubes with two colors. Taiwanese Journal of Mathematics, 2020.
11. Chih-Min Liu, Shih-Lin Chang, **Hung-Hsun Chen**, et al. The Clinical Application of the Deep Learning Technique for Predicting Trigger Origins in Paroxysmal Atrial Fibrillation Patients with Catheter Ablation. Circulation: Arrhythmia and Electrophysiology, 2020.
12. **Hung-Hsun Chen**, et al. Automated Extraction of Left Atrial Volumes from Two-dimensional Computer Tomography Images Using a Deep Learning Technique. International Journal of Cardiology, 2020.

13. Kai-Chi Chen, Hong-Ren Yu, Wei-Shiang Chen, Wei-Che Lin, Yi-Chen Lee, **Hung-Hsun Chen**, et al. Diagnosis of common pulmonary diseases in children by X-ray images and deep learning. Scientific Reports, 2020.

Conference Paper

1. Shih-Rou Cheng, Chia-Lee Yang, Hung-Hsun Chen (2024, Nov). Do Large Language Models Reflect Societal Gender Bias? A Comparative Analysis. The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC24 workshop), Atlanta, GA.US.
2. Chia-Lee Yang, Chi-Yo Huang, Hung-Hsun Chen, Steven J. H. Shiau, Chao-Chun Chuang (2024, Jul). Gender Differences in Psychosocial and Physiological Responses to COVID-19 Vaccination. 33rd International Congress of Psychology, Prague, Czech Republic.
3. Chia-Lee Yang, Steven J. H. Shiau, Hung-Hsun Chen, Chao-Chun Chuang, Chi-Yo Huang (2024, Jul). Developing a Comprehensive Framework for Identifying and Evaluating Gender Bias in Chinese Large Language Models. 33rd International Congress of Psychology, Prague, Czech Republic.
4. Chia-lee yang, Hung-Hsun Chen, Chao-Chun Chuang, Chi-Yo Huang (2024, Jul). Social Media and Gender Dynamics: Emotional Reactions to COVID-19 Vaccination. International Conference on Social Media & Society, London, UK.
5. Chao-Chun Chuang, Chia-Lee Yang, Hung-Hsun Chen (2024, May). From Simplified to Traditional: Dataset Reconstruction and Fine-tuning of Open-Source Large Language Models for Taiwanese Cultural Context. ITAOI 2024, Taiwan.
6. Hung-Hsun Chen, Yen-Chang Chen, Wei-En Wang,Tian-Fu Lee , Chia-Lee Yang and Chung-Hsing Chang (2023, May). Artificial Intelligence-based Subtyping of Cutaneous Basal Cell Carcinoma. CVGIP 2023, Taiwan.
7. Chia-Lee Yang*, Chi-Yo Huang, Hung-Hsun Chen, Steven J. H. Shiau, Chao-Chun Chuang,and YH Shiau (2022, Dec). Prediction of COVID-19 Vaccine Selection by Using Random Forest and Data Mining . 2022 5th Artificial Intelligence and Cloud Computing Conference, OSAKA, Japan.
8. Chia-lee Yang*, Steven J.H Shiau, Hung-Hsun Chen (2022, May). Factors Affecting Public Support on Social Media: Example of an offshore Island in Taiwan. 2022 Conference on Information Technology and Application in Outlying Islands, Taiwan.
9. Chia-lee Yang*, Hung-Hsun Chen, Chi-Yo Huang, Chao-Chun Chuang, Steven J.H shiau, Chuang-wei Yeh (2021, May). Mining Public Environmental Concerns of Offshore Island: Examine Real Case of Guishan Island in Taiwan.
10. Chia-lee Yang, Hung-Hsun Chen, and Steven J.H shiau （2021.12）◦ Creating a Story Map Using Open Source Platform to Enhance Public Awareness of Marine Environment◦ 2021◦