賴旭昭

Hsu-Chao Lai

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OVERVIEW

Dr. Hsu-Chao Lai received his Ph.D. in Computer Science from National Yang Ming Chiao Tung University (NYCU), specializing in recommender systems, social network analysis, and cross-domain data mining. His research interests span interdisciplinary topics, including applications in e-commerce, financial products, sport science, and healthcare. Dr. Lai has participated in many interdisciplinary research projects at leading institutions and has published papers in international top conferences (CIKM, VLDB, IJCAI, etc) and journals (Physics Reports, The Journal of Supercomputing, etc). He has extensive teaching experience and is actively involved in volunteering to help international students and other underprivileged groups with after-school tutoring. Dr. Lai was granted by Ministry of Science and Technology to conduct international collaborative research with Professor Philip S. Yu' s team at the University of Illinois at Chicago (UIC), broadening his global perspective. He excels at integrating theory and practice and is dedicated to advancing interdisciplinary innovation in artificial intelligence applications for recommender systems and data mining.

Keywords: Recommender Systems, Social Network Analysis, Cross-Domain Topics

EDUCATION

PhD in Computer Science 2017-2024

National Yang Ming Chiao Tung University

"On Recommerder Systems of Next Generation Applications on Social Networks"

Advisors: Jiun-Long Huang and Hong-Han Shuai

MS in Computer Science 2014-2016

National Chiao Tung University

"Predicting Traffic of Online Advertising in Real-time Bidding Systems from Perspective of Demand-side Platforms" (IEEE BigData 2016 (Workshop))

Advisor: Jiun-Long Huang

BS in EECS Undergraduate Honors Program 2010-2014

National Chiao Tung University

WORK EXPERIENCE

Postdoctoral Researcher 2024-Present

National Cheng Kung Univeristy

- Designed a power-efficient sleep stage classifier for wearable devices by bypassing 54.5% EEG signals to low-powered classifiers with a novel confidence-based switch, which reduces 32.7%-77.8% FLOPS with insignificant 1.9% accuracy drops (IEEE BigData 2024)
- Developed a multi-entity healthcare instruction recommender system for elders, incorporating unique demands of elders, diversities of individual multidisciplinary doctors, and their consensus-building process, resulting in 5-10% improvement in NDCG on synthetic data generated by domain experts (UHIMA&TLCMA 2025)
- Delivered in-person lectures on supervised learning, recommender systems, and real-time bidding as part of the Data Mining course (2025 Spring), totaling 9 hours
- Assisted submissions to top conference papers (accepted and to appear in IJCAI 2025) and advised a multi-agent multidisciplinary healthcare decision support system

Visiting Scholar 2021-2022

University of Illinois at Chicago. Host: Prof. Philip S. Yu

- Designed a novel framework by recognizing and using the co-evolution on live stream platforms to recommend next-topics for live streamers, which outperforms conventional video recommenders by 27.1% in terms of precision and recall (CIKM 2023)

Research Assistant 2016-2021

Academia Sinica. PI: Dr. De-Nian Yang

- Leveraged viewer-streamer interactions on live streams and proposed a tensor co-factorization recommendation system, which reduces nearly 50% model parameters compared to SOTA methods (CIKM 2020)
- Identified a novel scenario of Virtual Reality (VR) group shopping and designed an effective recommender system and a query system, respectively (CIKM 2019 and VLDB 2020)
- Cooperated with experts from different domains, including Sociology (6 teams), Physics and Biology (15 teams from 4 research institutes), and developed machine learning models for social sentiment analysis and drosophila neuron identifications (Physics Reports 2023)
- Organized and analyzed results of four user studies and managed large-scale crowd-sourcing data annotations in four papers (one published in AAAI 2018, two in CIKM 2019, and one in VLDB 2020)

Student Research Assistant 2015-2016

cacaFly Inc.

- Used Lasso Regression model to improve the efficiency of CTR prediction by 61% without loss of precision

Summer Intern 2014 Summer

Taiwan Semiconductor Manufacturing Company (TSMC)

- Incorporated a C4.5 Decision Tree model to identify causes of memory failure from sensor data with at least 98% accuracy and 40x speedup
- Built a rule-based FP tree model to generate reports of defects on wafers from manufacture data without human involving

TEACHING EXPERIENCE

- **Data Mining**, TA, Delivered 9 hours of in-person lectures on supervised learning, recommender systems, and real-time bidding, 2025 Spring
- **Data Mining**, TA, 2020 Spring and 2020 Fall
- **Recommender Systems**, TA, 2020 Spring
- **Formal Language**, TA, 2015 Spring
- **Object-Oriented Programming Language**, TA, 2014 Spring
- **Introduction to Computers and Programming**, Volunteer of tutoring foreign and underprivileged students after-class, 2014 Spring
- **Data Structure**, TA, 2013 Summer

TEACHING PLAN

My teaching philosophy is to introduce both fundamental and advanced topics using concept-level explanations and examples to facilitate student understanding. I place strong emphasis on hands-on assignments and data analysis, enabling students to bridge the gap between theoretical formulas and real-world applications, especially in big data contexts. Assignments and projects will be designed around real large-scale datasets, guiding students through tasks in a progressive manner. For each assignment, students will be asked to submit meaningful and insightful reports to practice their analytical and presentation skills. I am capable of teaching courses in both fluent English and Mandarin. Below is a list of courses I am available to teach for graduate and undergraduate students:

- **Graduate Courses**
  1. **Recommender Systems**
     - Content-based Approaches
     - Collaborative Filtering
     - Matrix (and Tensor) Factorization
     - Deep Learning Approaches
     - Generative and Agentic Models
  2. **Big Data Applications**
     - E-commerce and Recommender Systems
     - Real-time Bidding in Online Advertisement
     - Stock Trading AI

  - Mining Social Network
3. **Social Network Analysis**
  - Community Detection
  - Link Prediction and Friend Recommendation
  - Sentiment Analysis on Social Networks
  - Anomaly and Scam Detection
4. **Data Mining**
  - Supervised Learning (classification and regression)
  - Unsupervised Learning (clustering and dimension reduction)
  - Basic Graph Mining
  - Text Mining
5. **Machine Learning**
  - Traditional and Deep Learning
  - Attention Models
  - Sequential Models
  - Graph Neural Networks
  - Reinforcement Learning
  - Multi-modal and Generative Models

- **Undergraduate Courses**: Introduction to Artificial Intelligence, Introduction to Data Mining, Introduction to Machine Learning, Algorithms, Introduction to Database Systems, Introduction to Computers and Programming, Object-Oriented Programming Language, Data Structure, Discrete Mathematics, Linear Algebra, etc

ACADEMIC SERVICE

- **Technical Committee Member:** BDE 2025
- **Reviewer:** IEEE GLOBECOM 2021, BDE 2024, ICOIN 2024

AWARDS

- **Grants for Graduate Students Study Abroad Program**, MOST Taiwan, 2021-2022
- **Semi-finalist**, Big Data Analytics for Semiconductor Manufacturing, TSMC, 2015
- **IBM SPSS Modeler Best Application Award**, Big Data Analytics for Semiconductor Manufacturing, TSMC, 2015

PUBLISHED PAPERS [Google Scholar]

[Journal Papers]

22. C.-C. Hsu, H.-C. Lai, G.-Y. J., J.-L. Huang, and J.-Z. Wang, "NEST: A Novel Ensemble Method for Estimating Spatio-Temporal Gait Parameters Using Inertial Measurement Units", *to appear in* ***Journal of Artificial Intelligence and Soft Computing Research*** 2025. **SCIE. SJR journal rank Q1 in Information Systems and Q2 in Artificial Intelligence. Impact Factor=2.8.**

21. W.-Y. Shih, H.-C. Lai, and J.-L. Huang, "A Robust Real Time Bidding Strategy Against Inaccurate CTR Predictions by Using Cluster Expected Win Rate", ***IEEE ACCESS*** 2023. **SCIE. SJR journal rank Q1 in Computer Science and Engineering. Impact Factor=3.6.**

20. A. Sampfl, Z. Liu, and 29 others including H.-C. Lai, "SYNAPSE: An International Roadmap to Large Brain Imaging", ***Physics Reports*** 2023. **SCIE. SJR journal rank Q1 in Physics and Astronomy. Impact Factor=29.5.**

19. J.-Y. Lu, H.-C. Lai, W.-Y. Shih, Y.-F. Chen, S.-H. Huang, H.-H. Chang, J.-Z. Wang, J.-L. Huang, and T.-S. Dai, "Structural Break-aware Pairs Trading Strategy using Deep Reinforcement Learning", ***The Journal of Supercomputing*** 2022. **SCIE. SJR journal rank Q2 in Supercomputing and Information Systems. Impact Factor=2.7.**

[Conference Papers]

18. L. P.-Y. Ting, Y.-H. Chiang, Y.-T. Tsai, H.-C. Lai, and K.-C. Chuang, "DeCo: Defect-Aware Modeling with Contrasting Matching for Optimizing Task Assignment in Online IC Testing", *To Appear in International Joint Conference on Artificial Intelligence (**IJCAI**)* 2025. **Top conference in Artificial Intelligence. ICORE conference rank: A*. Acceptance rate: 18%.**

17. P.-C. Sung, H.-C. Lai, Y.-C. Chang, J.-C. Huang, and J.-L. Huang, "Player Movement Predictions Using Team and Opponent Dynamics for Doubles Badminton", *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD) Special Session* 2025.

16. Y.-J. Chen, Y.-C. Kuo, H.-C. Lai, and C.-Y. Yeh, "Addressing Inconsistencies in Community Care for Older Adults: A Pilot Study Using an AI-Based Group Recommendation Model", *International Conference on Healthcare Information Management and The 7th Conference on Taiwan Long-term Care Management (UHIMA&TLCMA) Abstract Paper* 2025.

15. H.-C. Lai, P.-H. Fang, Y.-T. Wu, L. P.-Y. Ting, and K.-T. Chuang, "A Confidence-Based Power-Efficient Framework for Sleep Stage Classification on Consumer Wearables", *IEEE International Conference on Big Data (BigData)* 2024.

14. P.-C. Sung, H.-C. Lai, G.-Y. Jhang, Y.-U. Ik, C.-C. Wang, and J.-L. Huang, "MoCVAE: Movement Prediction by A Conditional Variational Autoencoder for Doubles Badminton", *IEEE International Conference on Big Data and Smart Computing (BigComp)* 2024.

13. H.-C. Lai, P. S. Yu, and J.-L. Huang, "Learning the Co-evolution Process on Live Stream Platforms with Dual Self-attention for Next-topic Recommendations", *ACM International Conference on Information and Knowledge Management (**CIKM**)* 2023. **Top conference in Information Retrieval and Knowledge Management. ICORE conference rank: A. Acceptance rate: 24%.**

12. Y.-F. Chen, W.-Y. Shih, H.-C. Lai, H.-C. Chang, and J.-L. Huang, "Pairs Trading Strategy Optimization Using Proximal Policy Optimization", *IEEE International Conference on Big Data and Smart Computing (BigComp)* 2023.

11. C.-H. Su, H.-C. Lai, W.-Y. Shih, J.-Z. Wang, and J.-L. Huang, "Spread Movement Prediction for Pairs Trading with High-Frequency Limit Order Data", *IEEE International Conference on Big Data and Smart Computing (BigComp)* 2022.

10. H.-C. Lai, Y.-S. Lu, M.-F. Wang, Y-.C. Chen, W.-Y. Shih, and J.-L. Huang, "SPENT$^+$: A Category- and Region-aware Successive POI Recommendation Model", *Asia-Pacific Network Operations and Management Symposium (APNOMS)* 2021.

9. Y.-Y. Chen, H.-C. Lai, J.-L. Huang, and M-.J. Hwang, "The Design and Implementation of a Blockchain-Based Logistics Platform for International Trade", *Asia-Pacific Network Operations and Management Symposium (APNOMS)* 2021.

8. Y.-S. Liu, H.-C. Lai, J.-L. Huang, and A. F. Y. Chao, "On Detecting Cloud Container Failures from Computing Utility Sequences", *Asia-Pacific Network Operations and Management Symposium (APNOMS)* 2021.

7. H.-C. Lai, J.-Y. Tai, H.-H. Shuai, J.-L. Huang, W.-C. Lee and D.-N. Yang, "Live Multi-Streaming and Donation Recommendations via Coupled Donation-Response Tensor Factorization", *ACM International Conference on Information and Knowledge Management (**CIKM**)* 2020. **Top conference in Information Retrieval and Knowledge Management. ICORE conference rank: A. Acceptance rate: 21%.**

6. S.-H. Ko, H.-C. Lai, H.-H. Shuai, D.-N. Yang, W.-C. Lee and P. S. Yu, "Optimizing Item and Subgroup Configurations for Social-Aware VR Shopping", *International Conference on Very Large Data Bases (**VLDB**)* 2020. **Top conference in Database and Knowledge Management. ICORE conference rank: A*. Acceptance rate: 24.8%.**

5. D.-R. Yu, C.-C. Chu, H.-C. Lai, and J.-L. Huang, "Social Attentive Network for Live Stream Recommendation", *The World Wide Web Conference (WWW) Poster* 2020.

4. H.-C. Lai, H.-H. Shuai, D.-N. Yang, J.-L. Huang, W.-C. Lee, and P. S. Yu, "Social-Aware VR Configuration Recommendation via Multi-Feedback Coupled Tensor Factorization", *ACM International Conference on Information and Knowledge Management (**CIKM**)* 2019. **Top conference in Information Retrieval and Knowledge Management. ICORE conference rank: A. Acceptance rate: 19.6%.**

3. S.-H. Ko, Y.-C. Lin, H.-C. Lai, D.-N. Yang, and W.-C. Lee, "On VR Spatial Query for Dual Entangled Worlds", *ACM International Conference on Information and Knowledge Management (**CIKM**)* 2019. **Top conference in Information Retrieval and Knowledge Management. ICORE conference rank: A. Acceptance rate: 19.6%.**

2. C.-Y. Huang, L.-F. Meng, C.-P. Fu, S.-P. Hwang, and H.-C. Lai, "The Relationships Between Motor Skills and Intellectual Functions in Preschool-age Children with Autism Spectrum Disorders", *Autism, Preschool Children (Poster)* 2019.

1. H.-C. Lai, W.-Y. Shih, J.-L. Huang, and Y.-C. Chen, "Predicting Traffic of Online Advertising in Real-Time Bidding Systems from Perspective of Demand-side Platforms", *ACM IEEE International Conference on Big Data (BigData) Workshop* 2016.