Chi-Hsien (Salima) Chang

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RESEARCH INTERESTS

My research focuses on **artificial intelligence** and **optimization theory**, specifically developing theoretical support for **model-based genetic algorithms**. Additionally, my research extends to **information security** and **secure information systems**, leveraging the **Rust programming language** for building reliable, high-performance, and memory-safe architectures.

EDUCATION

National Taiwan University (NTU) September 2018 – June 2026 (Expected)
Doctor of Science in Electrical Engineering, Computer Science Division; GPA: **4.00/4.30**
Topic: Investigation of Problem Decomposition for Model-Building Genetic Algorithms
Advisor: Tian-Li Yu

National Taiwan University (NTU) September 2016 – June 2018
Master of Science in Statistics; GPA: **3.71/4.30**
Topic: Statistical Analysis of the Application of Augmented Reality in the Salah Learning System
Advisors: Cheng-Ying Chou and Yi-Ping Hung

National Chengchi University (NCCU) September 2013 – June 2016
Bachelor of Science in Mathematics; GPA: **3.22/4.30**

PUBLICATION

- **Chi-Hsien Chang**. Augmented Reality Teaching and Cultural Experience of the Hajj. In *International Symposium on Art and Technology (ISAT), 2025.*
- Yu-Hao Kao, **Chi-Hsien Chang**, and Tian-Li Yu. A Constraint-Handling Method for Model-Building Genetic Algorithm: Three-Population Scheme. In *International Conference on Evolutionary Computation Theory and Applications (ECTA), 2025.*
- Jung-Chun Liu, **Chi-Hsien Chang**, Shao-Hua Sun, and Tian-Li Yu. Integrating Planning and Deep Reinforcement Learning via Automatic Induction of Task Substructures. In *the International Conference on Learning Representation (ICLR)*, 2024.
- **Chi-Hsien Chang**, Szu-Ping Chen, Christopher Childers, and Monica Poelchau. From Genetic Variation to Visual Representation: Image Predictions in Insect Databases Using SNP. In *the Joint Conference of the International Association for the Study of Traditional Asian Medicine (IASTAM) and the Asian Society for the History of Medicine (ASHM)*, 2024.
- Tzu-Hao Hsu, **Chi-Hsien Chang**, and Tian-Li Yu. Program Synthesis on Single-Layer Loop Behavior in Pure Functional Programming. In *the IEEE World Congress on Computational Intelligence (WCCI)*, 2024.
- Tu-Chin Chiang, **Chi-Hsien Chang**, and Tian-Li Yu. A Novel Symbolic Regressor Enhancer Using Genetic Programming. In *the IEEE World Congress on Computational Intelligence (WCCI)*, 2024.
- **Chi-Hsien Chang**, Szu-Ping Chen, Monica Poelchau, and Christopher Childers. Exploring Genetic Information with Ease: The Linkout Plugin for JBrowse 2. In *the microPublication Biology Journal*, 2023.
- Po Ying Law, Chia-Cheng Tsai, Tsz Wun Fok, Ching-Ting Wang, **Chi-Hsien Chang**, Tsung-Yu Chin, Yi-Chen Liao, Jen-Kuang Lee, and Chung-Wei Lin. Secure Medical Data Management Based on Homomorphic Encryption and Secret Sharing. In *the IEEE International Conference on Smart Cloud (SmartCloud)*, 2023.

- **Chi-Hsien Chang**, Tu-Chin Chiang, Tzu-Hao Hsu, Ting-Shuo Chuang, Wen-Zhong Fang, and Tian-Li Yu. Taylor Polynomial Enhancer using Genetic Programming for Symbolic Regression. In *the proceedings of the Companion Conference on Genetic and Evolutionary Computation (GECCO)*, 2023.

- Wen-Zhong Fang, **Chi-Hsien Chang**, Jung-Chun Liu, and Tian-Li Yu. GP with Ranging-Binding Technique for Symbolic Regression. In *the proceedings of the Companion Conference on Genetic and Evolutionary Computation (GECCO)*, 2023.

RESEARCH EXPERIENCE

Massachusetts Institute of Technology (MIT) Visiting Student June 2024 – May 2025

- Developed **fully-interpretable simulators for pre-mRNA splicing** to better understand splicing processes for improving the interpretation of genetic variants and facilitating therapeutic interventions in gene expression. Focusing on applying algorithms to identify suboptimal parses and establishing a quantitative metric for the robustness of predictions for exon and intron.

National Institute of Informatics (NII) Research Intern February. 2024 – April 2024

- Developed **molecular generation algorithms** with model-based genetic algorithms, linkage learning, and clustering techniques. This approach aims to enhance the representation and analysis of molecular structures, facilitating advancements in computational chemistry and drug discovery.

United States Department of Agriculture (USDA) Research Intern February 2023 – August 2023

- Developed **Linkout plugin for JBrowse 2**, enhancing the accessibility and utility of genomic data. Additionally, developed a **machine learning model capable of predicting images in insect databases based on single nucleotide polymorphisms (SNPs)**, which holds potential for improving pest identification and management strategies.

National Taiwan University Research Assistant September 2016 – March 2024

During the doctoral program

- **Research on Model-based Genetic Programming Applied to Symbolic Regression**: Guided master's students through in-depth research discussions on genetic programming, specifically applied to symbolic regression, and conducted comprehensive code reviews to enhance project outcomes.

- **Development of Model-based Real Number Optimization Techniques - Subspace Exploration Combining Characteristics of Discrete and Real Number Domains**: Led the experimental design discussions and co-authored the research report for a pioneering study on model-based real number optimization techniques.

- **Learning with Limited Data** : Successfully improved the accuracy of a semi-supervised learning model from 77.4% to 81.2% on the MIT-BIH Arrhythmia Database. This enhancement was achieved by integrating data augmentation techniques, including both feature space and instance space augmentation, demonstrating advancements in learning with limited datasets.

- **Research on the Social, Ethical, and Legal Aspects of Artificial Intelligence**: Conducted a comprehensive survey and synthesis of existing research related to the social, ethical, and legal implications of artificial intelligence, aiming to highlight key challenges within the field.

During the master's program

- **Comprehensive Improvement of Interdisciplinary Teaching/Research Facilities**: Provided guidance in statistical analysis, encompassing experimental design, non-parametric analysis, and post-hoc testing, to significantly enhance the capabilities of interdisciplinary teaching and research infrastructures.

- **Development of Phytosanitary Treatment and Risk Assessment Techniques - Research of Automated Detection Technologies for Significant Quarantine Pests**: Leveraged statistical analysis using Python to advance the research and development of automated detection technologies for identifying significant quarantine pests.

- **Digital Spectral Mammography Tomography Reconstruction Combining Scatter and Angular Correction**: Employed statistical analysis using R to refine digital spectral mammography tomography reconstruction techniques.
- **Development of Phytosanitary Pest System Management and Quarantine Treatment Techniques - Development of Plant Quarantine Treatment Technologies**: Utilized statistical analysis using SAS to facilitate the optimization of plant quarantine treatment technologies.

TEACHING EXPERIENCE

Information System Training Program, Department of Computer Science and Information Engineering, NTU, Lecturer (Designated as an Outstanding Lecturer in 2025) July 2025 – Current

- **Object-Oriented Programming with Java**: Taught core OOP concepts and underlying logic using Java, emphasizing memory management through diagramming and reinforced learning through mandatory project implementation; earned 5.0/5.0 instructor rating from student feedback.
- **Fundamentals of Statistics and Python Data Analysis**: Delivered foundational statistical principles and integrated them with practical, hands-on Python implementation for data analysis and core logic comprehension; earned 5.0/5.0 instructor rating from student course evaluations.

National Taiwan University Teaching Assistant September 2019 – December 2025

- **Python**: Mentored 100+ students in their team projects and contributed to designing assignments. Earned 4.35/5.0 score from students' feedback on the teaching assistant's course evaluation.
- **C#**: Received the National Summer College Excellent Teaching Assistant Award. Earned 4.89/5.0 score from students' feedback on the teaching assistant's course evaluation.
- **Genetic Algorithms**: Actively engaged in note-taking during lectures and made these notes available for student review post-class, facilitating deeper understanding and retention of course material. Earned 4.96/5.0 score from students' feedback on the teaching assistant's course evaluation.
- **Artificial Intelligence and Machine Learning**: Taught in English, this course required a nuanced understanding of both subject matter and language to effectively communicate complex concepts. Earned 4.0/5.0 score from students' feedback on the teaching assistant's course evaluation.

HONORS & AWARDS

- **Vice President**, MIT Taiwan Student Association (ROCSA) 2025
- **Reviewer**, Asian Conference on Machine Learning (ACML) 2024
- **Outstanding University Youth Award**, NTU-EECS 2023
- **Student Altruism Award** at College of Electrical Engineering and Computer Science, NTU-EECS 2023
- **Excellent Teaching Assistant Award** at National Summer College, NTU 2022
- **Commencement Speaker** for the Master's Degree in Statistics, NTU 2018
- **Awarded U-stat Plan** at National Taiwan University of Science and Technology (NTUST) 2018
- **Awarded 1st Place** in 2nd Yunus Prize on Social Innovation/Entrepreneurship Competition 2017