Yan-Ru Ju

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Institute of Information Science, Academia Sinica, Taiwan

Education

- **National Tsing Hua University** — *Feb 2021 - Aug 2023*
  M.S. in Computer Science (Institute of Information Systems and Applications) — Hsinchu, Taiwan
- **National Taiwan University** — *Sept 2020 - Feb 2021*
  Graduate Coursework in Electrical Engineering and Computer Science — Taipei, Taiwan
- **National Taiwan University** — *Sept 2014 - Feb 2019*
  Bachelor of Science, Department of Life Science — Taipei, Taiwan

Experience

- **Institute of Information Science, Academia Sinica [🌐]** — *Aug 2023 - Present*
  Research Assistant in the Reinforcement Learning and Gaming Lab of Prof. Ti-Rong Wu — Taipei, Taiwan
  - Published a first-author paper accepted at IJCAI 2025
  - Published a paper on analyzing MuZero planning in IEEE TAI
  - Conducting regret-based AlphaZero research projects currently under review at ICLR 2026
  - Designed and implemented game environments for the 2024 Computer Olympiad; won 5 gold medals and 1 silver medal
  - Participated in the NeurIPS 2025 Theory-of-Mind Challenge for LLMs; won a gold medal and a silver medal
- **Agricultural Biotechnology Research Center, Academia Sinica [🌐]** — *Aug 2019 - Aug 2020*
  Research Assistant, Epigenetics and Bioinformatics Lab of Prof. Shau-Ping Lin — Taipei, Taiwan
  - Developed bioinformatics pipelines for microRNA and piRNA analysis
  - Built a web tool integrating Google Maps API for estimating profits, costs, and transportation fares for egg-layer companies

Publications

An asterisk (*) indicates primary or equal contribution.

[1] **Yan-Ru Ju***, Tai-Lin Wu, Chung-Chin Shih, Ti-Rong Wu (2025). **Bridging Local and Global Knowledge via Transformer in Board Games**. In *Proceedings of the 34th International Joint Conference on Artificial Intelligence (IJCAI 2025)*. DOI: 10.24963/ijcai.2025/828.

[2] Hung Guei, **Yan-Ru Ju**, Wei-Yu Chen, Ti-Rong Wu. (2025). **Demystifying MuZero Planning: Interpreting the Learned Model**. In *IEEE Transactions on Artificial Intelligence (TAI)*. DOI: 10.1109/TAI.2025.3591082.

[3] **Yan-Ru Ju***, Long-Shang Cho, and Chin-Lung Lu. (2025). **A More Efficient Dynamic Programming Algorithm for Designing a Coding Sequence by Jointly Optimizing Its Structural Stability and Codon Usage**. In *IEEE Transactions on Computational Biology and Bioinformatics (TCBB)*. DOI: 10.1109/TCBBIO.2025.3596771.

[4] Hung Guei, **Yan-Ru Ju**, Wei-Yu Chen, Ti-Rong Wu. (2024). **Interpreting the Learned Model in MuZero Planning**. In *Proceedings of Technologies and Applications of Artificial Intelligence (TAAI 2024)*. DOI: 10.48550/arXiv.2411.04580. (Runner-up for the Best Paper Award)

[5] Shu-Cheng Liu, **Yan-Ru Ju**, Chin Lung Lu. (2022). **Multi-CSAR: A Web Server for Scaffolding Contigs Using Multiple Reference Genomes**. In *Nucleic Acids Research, Volume 50, Issue W1, Pages W500–W509*. DOI: 10.1093/nar/gkac301.

Manuscripts Under Review

[1] Yun-Jui Tsai, Wei-Yu Chen, **Yan-Ru Ju**, Yu-Hung Chang, Ti-Rong Wu (2025). **Regret-Guided Search Control for Efficient Learning in AlphaZero**. Submitted to ICLR 2026 (under review).

[2] Yu-Shen Liu, **Yan-Ru Ju**, Kai-Wei Chang and Chin Lung Lu. (2025). **LinearCDSfold: a tool for co-optimizing secondary structure stability and codon usage in coding sequence design**. Submitted to *Bioinformatics* (under review).

[3] Pin-Jui Kung, Yi-Tzang Tsai, Gabrielle Marie Chungunco, Kai-Wei Chang, Hsien-Hen Lin, Sheng-Jia Zhou, Yen-Tzu Tseng, Luca CW Cheng, **Yan-Ru Ju**, Ching-Yu Chuang, Hung-Chih Kuo, Satoshi Namekawa, Hong-Nerng Ho, Hsin-Fu Chen, Diana Laird, Shau-Ping Lin. (2025). **Conserved enhancer association of piRNAs and the implication in germ cell fate surveillance**. Under revision at *Genome Biology*. DOI: 10.21203/rs.3.rs-6314689/v1.

[4] Shau-Ping Lin, Hsiang-Hsuan Lin Wang, Jing-Wen Huang, Mingche Kuo, Yi-Tzang Tsai, Chia-Chen Lu, Yan-Hong Chen, Frederick Kin Hing Phoa, Pin-Jui Kung, Yan-Han Lin, Yung-Tsai Chu, **Yan-Ru Ju**, Tang-Long Shen, Chien-Tai Hong, Takahiro Ochiya, Koji Ueda, and Ruey-Meei Wu. (2024). **Cholesterol homeostasis and oxidative stress-relatednovel plasma biomarkers for MSA patients**. Under revision at *NPJ Parkinson's Disease*. DOI: 10.21203/rs.3.rs-3839744/v1.

Technical Reports

[1] Yu-Chi Cheng, **Yan-Ru Ju**, Ti-Rong Wu (2025). **RLGaming at the NeurIPS 2025 MindGames Generalization Track**. In *Theory-of-Mind Challenges for LLM Agents Competition*, NeurIPS 2025.

[2] Yu-Yu Yang, **Yan-Ru Ju**, Ti-Rong Wu, I-Chen Wu (2025). **RLGaming at the NeurIPS 2025 MindGames Social Deduction Track Open Division**. In *Theory-of-Mind Challenges for LLM Agents Competition*, NeurIPS 2025.

[3] I-Hsuan Chu, **Yan-Ru Ju**, Ti-Rong Wu (2025). **RLGaming at the NeurIPS 2025 MindGames Social Deduction Track Efficient Agent Division**. In *Theory-of-Mind Challenges for LLM Agents Competition*, NeurIPS 2025.

Awards

- **COMPUTER OLYMPIAD 2024** *Aug 2024*
  International Computer Games Association [🌐]
  - Gold Medals: Santorini, Connect6, Dots and Boxes (5x5), International Draughts, Outer-Open Gomoku
  - : Silver Medal: Breakthrough
- **NeurIPS 2025 Theory-of-Mind Challenges for LLM Agents Competition** *Aug 2025*
  RLGaming team [🌐]
  - Gold Medal: Mafia Game Efficient Agent Division
  - Silver Medal: Generalization Track Open Division
  - Bronze Medals: Mafia Game Open Division, Generalization Track Efficient Agent Division

Research Interests

- Reinforcement Learning and Planning
- Model-based Reinforcement Learning (AlphaZero, MuZero)
- Algorithm Design and Optimization
- Computational Biology, Bioinformatics, Biomedical Informatics

Technical Skills

- **Programming Languages:** Python, C++, Bash, Arduino, HTML, CSS, JavaScript, Google Apps Script, R
- **Operating Systems & Scripting:** UNIX-like Operating Systems, Bash Scripting, Arduino Project Implementation
- **Biomedical Informatics:** Biomedical Data Analysis
- **Algorithms:** Reinforcement Learning, Dynamic Programming, Graph Theory, Computer Vision
- **Frameworks and Libraries:** PyTorch, TensorFlow, OpenAI Gym
- **Tools:** Git, LaTeX, Docker

Projects

- **ResTNet** *Sept 2023 - Jun 2025*
  Tools: Python and C++ [GitHub]
  - IJCAI 2025
  - A network that combines residual networks and Transformers to bridge local and global knowledge in board games.
  - Link: https://rlg.iis.sinica.edu.tw/papers/restnet/
- **MuZero Decoder** *Sept 2023 - Jun 2025*
  Tools: Python and C++ [GitHub]
  - IEEE TAI
  - Interpretable MuZero with a decoder that reconstructs observations from hidden states for demystifying planning.
  - Link: https://rlg.iis.sinica.edu.tw/papers/demystifying-muzero-planning/

- **LinearCDSFold** *Jan 2022 - Apr 2023*
  Tools: C++. [GitHub]
  - IEEE TCBB
  - A tool to design protein-coding sequences (CDSs) by maximizing CAI and the structure stability of sequences in linear time by dynamic programming algorithm.
  - Link: https://github.com/SodiumJu/LinearCDSfold
- **Multi-CSAR** *Aug 2021 - Apr 2022*
  Tools: PHP, HTML, JavaScript, CSS, and Python. [Web]
  - Nucleic Acids Research
  - A web server for scaffolding contigs using multiple reference genomes.
  - Link: http://genome.cs.nthu.edu.tw/Multi-CSAR/
- **A Two-stage Algorithm for Technology Mapping in FPGA Design** *Apr 2021 - June 2021*
  Tools: C++, LEDA library, and ABC tool. [GitHub]
  - Project of Advanced Logic Synthesis
  - Implemented an algorithm composed of minimum level two-input decomposition step and delay optimal FPGA technology mapping with K-input LUTs.
- **FP Growth Algorithm for Frequent Pattern Generation** *Apr 2021 - July 2021*
  Tools: C++. [GitHub]
  - Project of Data Science
  - Implemented FP growth algorithm and FP tree construction.
- **Bluetooth-control Spherical Robot with Temperature and Moisture Sensors** *2022*
  Tools: Arduino Uno board, L298N, HC05, ATH10, and DC motors.
  - It can roll into a layer house and monitor the temperature and the moisture.
- **Remote Wi-Fi platform controlling the micro environment for caring plants and hamsters** *2021*
  Tools: ESP8266, relays, DC fans, lights, wires, and other materials for the customized hamsters cages.
  - The project contains a Wi-Fi platform which can remotely control the equipment looking after the plants.
  - It has multiple connected large customized clear acrylic cages with electric-control fans system.

Teaching Experience

- **Computer Science Department, National Tsing Hua University** *Feb 2022 - July 2022*
  Teaching Assistant in Algorithms Hsinchu, Taiwan
  - Graded and provided feedback on students' algorithm assignments.
  - Designed algorithm-focused programming assignments.

Extracurricular Activities

President, Art Club in National Taiwan University

- Procured art supplies and managed the club's budget effectively.
- Taught drawing techniques and guided members in improving their artistic skills.
- Designed and organized workshops and lessons to engage and educate club members.

Interests

- **Painting:** Sketching, Watercolor, Oil painting, and Digital illustration
- **Scuba-diving:** Enriched Air Diver License, Advanced Open Water License