Jiyao Pu

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BIOGRAPHY

Jiyao Pu received his Bachelors degree in 2016 from University of Electronic Science and Technology of China. After that, He received the M.Sc. degree from the School of Computing Science, The University of Newcastle, UK, in 2020. He is currently a Ph.D. student in the Hybrid Intelligence Lab, Department of Computer Science, Durham University. His research interests include reinforcement learning, rule generation, natural language processing, automated game design, and procedural content generation.

RESEARCH SUMMARY

My research develops an AI framework that integrates rule generation, causal inference, and reinforcement learning to model complex social systems. Based on Triadic Reciprocal Dynamics, the Strategy Evaluation Rule (SER) system comprises a neural network rule generator, a multi-agent simulation environment for strategic exploration, and an evaluator for social metrics like cooperation and fairness. Through iterative training, the system refines its predictive and optimization capabilities, contributing novel insights to AI, social modeling, and automated game design.

INERESTS AND MOTIVATION

My research interests lie in unraveling the underlying dynamics of social behavior using rule generation and behavioral data. By treating society as a dynamic system where rational agents adapt their strategies, my work investigates how variations in rules shape behavior and guide the evolution of these systems. This approach intersects with causality, reinforcement learning, and multi-agent interactions, providing a foundation for designing innovative interventions and strategic models across diverse domains.

My motivation stems from exploring how AI can design and refine rules to model complex social systems. In an early project, I leveraged GPT to generate scenarios, identify adjustable rules, and simulate these within a game environment to train AI agents for strategic decision-making. Building on this, a recent paper focused on crafting "controllable rules" that enhance cooperation among agents. I am now advancing this approach to develop adaptive, fair, and efficient rule-based systems that improve fault tolerance and provide deeper insights into societal dynamics.

EDUCATION

- **Durham University** — *March 2021 - Now*
  Ph.D Computer Science — Durham, UK

- **Newcastle University** — *September 2019 - September 2020*
  MSc Computer Science — Newcastle, UK
  ◦ Grade: 76.6%

- **University of Electronic Science and Technology of China** — *September 2012 - June 2016*
  BSc Electronic science and technology — Chengdu, China

PUBLICATION
C=Conference, J=Journal, P=Patent, S=In Submission, T=Thesis

[J.1] Pu, J., Duan, H., Zhao, J. and Long, Y., 2023. Rules for Expectation: Learning to Generate Rules via Social Environment Modelling. IEEE Transactions on Circuits and Systems for Video Technology.

[C.1] Gao, R., Wan, F., Organisciak, D., Pu, J., Duan, H., Zhang, P., Hou, X. and Long, Y., 2023. Privacy-enhanced zero-shot learning via data-free knowledge transfer. In 2023 IEEE International Conference on Multimedia and Expo (ICME) (pp. 432-437). IEEE.

PLANTED SUBMISSION
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[J.1] Triadic Reciprocal Dynamics: The AI Framework for Social Rule Evolving.

[J.2] Integrating Extrinsic and Flow Intrinsic Rewards for Adaptive Rule Generation in Dynamic Environment.

[C.1] Flow-Centric Rule Design: Evolving Rules for Optimal Difficulty and AI Skill Balance.

SKILLS

- **Programming Languages:** Python, C, C++, C#, Java, JavaScript, HTML, CSS, PHP, SQL, Shell.
- **Platform:** Linux, Unity, Unreal Engine 5, Godot Engine, SER, AWS, Windows.
- **AI:** Reinforcement learning, Zero-shot learning, Generative models, Contrastive learning, Deep learning, Few-Shot learning.