Huaiguang Cai

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Education

2022 – 2025 **Institute of Automation, Chinese Academy of Sciences**, Beijing, China.
Master Student, Advisor: Dr. Wensheng Zhang.
Major: Pattern Recognition and Intelligent System, GPA: 3.83/4.00.

2018 – 2022 **Sun Yat-Sen (Zhongshan) University**, Guangzhou, China.
Bachelor Degree, Advisor: Dr. Zhi Zhou & Dr. Chang-Dong Wang.
Major: Computer Science, GPA: 3.9/4.0.

Research Interests

My research aims to develop **reliable**, **explainable**, and **practical** decision-making algorithms. My interests include algorithmic game theory, online algorithms, ad auction, and online learning theory.

Publications

INFOCOM 2024 **Huaiguang Cai**, Zhi Zhou, and Q. Huang, "Online Resource Allocation for Edge Intelligence with Colocated Model Retraining and Inference," in IEEE Conference on Computer Communications, Vancouver, Canada, May 20–23, 2024. (CCF-A).

Working Paper **Explainable Decision-making: Attribute model performance to training data**. CHG Shapley: Efficient Data Valuation and Selection towards Trustworthy Machine Learning.

Working Paper **Explainable Decision-making: Attribute model prediction to input features**. CAMs as Shapley Value-based Explainers.

Project

2021 – 2022 **Recommendation System**, Bachelor Thesis, Sun Yat-Sen University.
A Bipartite GNN-based Recommendation with Dynamic Multi-negative Sampling.

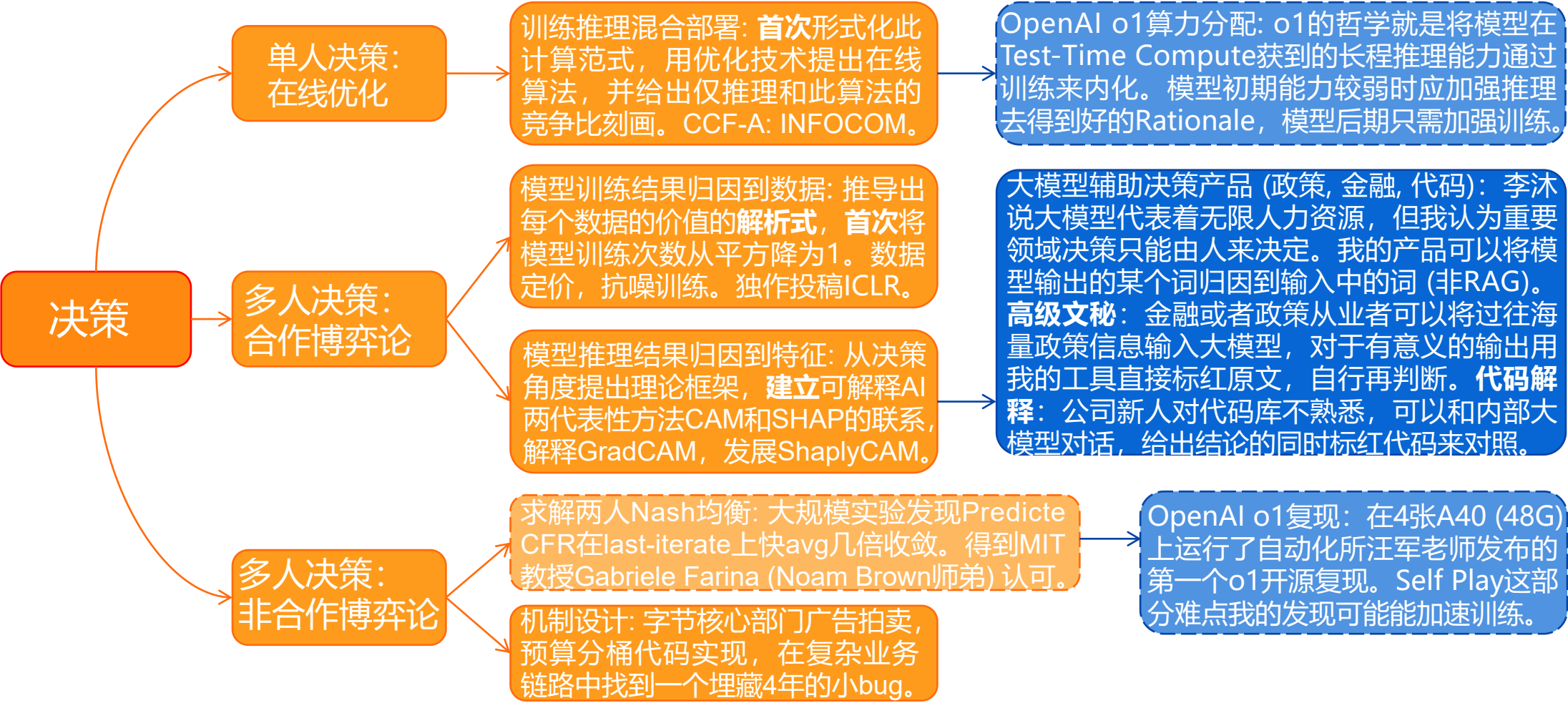
2022 – 2023 **Online Learning and Game Theory Review (in Chinese)**, *19 pages*.
Link: `https://caihuaiguang.github.io/my_summary/OL/OL_GT2.pdf`

2023 – 2024 **Ad Auction**, *Brand Advertising*, Intern, ByteDance, Ocean Engine.

2022– Now **Learning in Games**, Independent Researcher.
Experimentally observed that predictive CFR algorithms converge faster in last-iterate than average-iterate in non-HUNL two-player zero-sum games; acknowledged by Prof. Gabriele Farina, MIT. Ongoing theoretical investigation will further explore this finding.

Skills

Programing C/C++, Python, LaTeX, MATLAB.
Language Chinese (native), and English (fluent).
Other Guitar, Rowing.


决策
单人决策：在线优化
训练推理混合部署: 首次形式化此计算范式，用优化技术提出在线算法，并给出仅推理和此算法的竞争比刻画。CCF-A: INFOCOM。
OpenAI o1算力分配: o1的哲学就是将模型在Test-Time Compute获到的长程推理能力通过训练来内化。模型初期能力较弱时应加强推理去得到好的Rationale，模型后期只需加强训练。
多人决策：合作博弈论
模型训练结果归因到数据: 推导出每个数据的价值的解析式，首次将模型训练次数从平方降为1。数据定价，抗噪训练。独作投稿ICLR。
模型推理结果归因到特征: 从决策角度提出理论框架，建立可解释AI两代表性方法CAM和SHAP的联系，解释GradCAM，发展ShaplyCAM。
大模型辅助决策产品 (政策, 金融, 代码)：李沐说大模型代表着无限人力资源，但我认为重要领域决策只能由人来决定。我的产品可以将模型输出的某个词归因到输入中的词 (非RAG)。高级文秘：金融或者政策从业者可以将过往海量政策信息输入大模型，对于有意义的输出用我的工具直接标红原文，自行再判断。代码解释：公司新人对代码库不熟悉，可以和内部大模型对话，给出结论的同时标红代码来对照。
多人决策：非合作博弈论
求解两人Nash均衡: 大规模实验发现Predicte CFR在last-iterate上快avg几倍收敛。得到MIT教授Gabriele Farina (Noam Brown师弟) 认可。
机制设计: 字节核心部门广告拍卖，预算分桶代码实现，在复杂业务链路中找到一个埋藏4年的小bug。
OpenAI o1复现：在4张A40 (48G)上运行了自动化所汪军老师发布的第一个o1开源复现。Self Play这部分难点我的发现可能能加速训练。