THE UNIVERSITY OF HONG KONG

DEPARTMENT OF COMPUTER SCIENCE

Research Seminar

Generalized Principal-Agent Problem with a Learning Agent

Speaker: Mr. Tao Lin, Harvard University

Date: 1 Aug 2024 (Thu)

Time: 11:00, HKT

Venue: RM308, Chow Yei Ching Building, HKU

Abstract:

Generalized principal-agent problems, including Stackelberg games, contract design, and Bayesian persuasion, are a class of economic problems where an agent best responds to a principal's committed strategy.

We study repeated generalized principal-agent problems under the assumption that the principal does not have commitment power and the agent uses algorithms to learn to respond to the principal. We reduce this problem to a one-shot generalized principal-agent problem with an approximately-best-responding agent. Using this reduction, we show that: (1) if the agent uses contextual no-regret learning algorithms, then the principal can guarantee a utility that is at least the principal's optimal utility in the classic non-learning model minus the square root of the agent's regret; (2) if the agent uses contextual no-swap-regret learning algorithms, then the principal cannot obtain any utility more than the optimal utility in the non-learning model plus the agent's swap regret. But (3) if the agent uses mean-based learning algorithms (which can be no-regret but not no-swap-regret), then the principal can do significantly better than the non-learning model. These general results not only refine previous results in Stackelberg games and contract design with learning agents but also lead to new results for Bayesian persuasion with a learning agent.

Joint work with Prof. Yiling Chen. Link to the paper: https://arxiv.org/pdf/2402.09721

Bio:

Tao Lin is a PhD student in Computer Science at Harvard University, advised by Prof. Yiling Chen. Before that, Tao was an undergraduate at Peking University, advised by Prof. Xiaotie Deng. Tao's research interest lies in the intersection between economics and machine learning. He is particularly interested in mechanism design and information design problems (e.g. Bayesian persuasion) involving learning agents.

All are welcome!

For enquiries, please call 3917 2180 or email enquiry@cs.hku.hk