ETH
Eidgenössische Technische Hochschule Zürich
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Distributed Computing

Prof. R. Wattenhofer

Topics in Game Theory

Are you intrigued by how incentives shape decision-making and cooperation in multi-agent systems? Game theory provides a robust framework for analyzing strategic interactions between "players" with diverging goals. This analytical lens helps address both prescriptive and descriptive questions.

Prescriptive inquiries focus on optimal strategies and outcomes, asking how one should play, whether equilibria exist, and how to achieve them. In contrast, descriptive questions delve into real-world behaviors, exploring how people actually engage in these interactions and whether their dynamics naturally lead to stable outcomes. Additionally, one can also investigate how altering the rules or incentives can shape equilibria, and foster cooperation or promote fairness among players.

We invite you to explore projects, whether theoretical or applied, in areas such as (but not limited to):

1. *Incentive & Mechanism Design:* Analyzing the effects of existing mechanisms and exploring ways to optimize them for desired outcomes.
2. *Cooperation in Multi-Agents Systems:* Developing algorithms that enable agents to collaborate effectively while ensuring provable performance guarantees.
3. *Learning in Games:* Investigating how agents adapt their strategies in repeated games through learning dynamics in competitive or cooperative settings.
4. *Social Phenomena & Behaviors*: Analyzing behavioral heuristics for strategic interactions in social settings.

Requirements: Strong motivation, ability to work independently, and interest in conducting exciting theoretical research. Solid mathematical background (ability to write valid proofs). Although not required, prior exposure to game theory is a substantial plus. Depending on the breadth of the project, coding skills might prove themselves useful. Coming up with your own original ideas is highly appreciated.

Interested? Please get in touch for more details!

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