COMPLEXITY AND ALGORITHMIC GAME THEORY

March 21st and 22nd, 2017, Amphi Painlevé, École polytechnique

Constantinos DASKALAKIS (MIT)

PGMO and M2 Optimisation

http://www.fondation-hadamard.fr/fr/pgmo/presentation-pgmo
https://webens.math.u-psud.fr/-optimiz

March 21-22: 10h00 - 12h00,
13h30 - 15h00 and 15h15 - 16h45

Computational complexity provides a fruitful perspective through which to study rational behavior and to design economic systems. Indeed, computation is an integral part of economic activity as rational agents are ultimately computationally bounded, while economic systems are often complex and implemented on computational platforms such those enabled by the Internet. I will showcase important insights of complexity theory to Economics focusing on solution concepts and mechanism design.

On the first day, I will talk about the complexity of Nash equilibrium and other solution concepts, the intimate relationship between equilibria and linear programming, online learning and fixed points. I will define the class PPAD and overview the proof that Nash equilibrium is PPAD-complete, concluding with approaches for overcoming this computational intractability result.

On the second day, I will turn to mechanism design. I will overview classic mechanisms from Economic theory such as the Vickrey-Clarke-Groves mechanism and Myerson’s auction. I will review intractability results for welfare optimization in combinatorial auctions, and describe an analytical framework for overcoming these intractability results using online learning. I will then turn to revenue maximization in multi-item settings, presenting how duality theory has lead to exciting progress on this front.

Organizers:
P. Carpentier (ENSTA)
S. Charouset (EDF)
S. Gaubert (INRIA and École polytechnique)
V. Perchet (CMLA, ENS Paris-Saclay)
F. Santambrogio (LMO, Université Paris-Sud)
T. Tomala (HEC)

This lecture series is organized by Fondation Mathématique Jacques Hadamard and École polytechnique, in the framework of the Gaspard Monge Optimization Programme supported by EDF.

Lectures are open to researchers and graduate students.
Registration (free of charge) on https://www.fondation-hadamard.fr/fr/pgmo/seminarcourses

Image: S. Schoenherr