Computational Social Choice

From Arrow's impossibility to Fishburn's maximal lotteries

Course for the Graduate Program "Collective Decision-Making"
University of Hamburg
April 25th to April 27th, 10-12am and 3-5pm

Prof. Felix Brandt (Technical University of Munich)

Social choice theory deals with the aggregation of individual preferences into a collective choice. This course focusses on the analysis and comparison of aggregation functions that are based on simple majority rule. Particular attention will be paid to computational aspects, probabilistic social choice, and computer-generated impossibility theorems.

Tentative List of topics:

- Common voting rules
- Rational choice theory (rationalizability, consistency)
- May's theorem
- Arrow's impossibility theorem
- Scoring rules, Kemeny-Young-rule
- McGarvey's theorem
- Condorcet extensions
  - Top cycle
  - Uncovered set
  - Banks set
  - Tournament equilibrium set
  - Bipartisan set
- Computational complexity of voting rules
- Gibbard-Satterthwaite theorem
- No-show paradox
- Preference extensions
- Probabilistic social choice

Literature (available online for free)

- F. Brandt, V. Conitzer, U. Endriss, J. Lang, and A. D. Procaccia. **Handbook of Computational Social Choice**, Cambridge University Press, 2016.
- F. Brandt, V. Conitzer, and U. Endriss. **Computational Social Choice**. In "Multiagent Systems" (G. Weiss, ed.), MIT Press, 2012.
- U. Endriss. **Trends in Computational Social Choice**. AI Access, 2017.

Recommended books

- D. Austen-Smith and J. Banks: Positive Political Theory I, University of Michigan Press, 1999.
- W. Gärtner: A Primer in Social Choice Theory, Oxford University Press, 2009.
- J. Laslier. Tournament Solutions and Majority Voting, Springer-Verlag, 1997.
- H. Moulin. Axioms of Cooperative Decision Making, Cambridge University Press, 1988.
- S. Nitzan. Collective Preference and Choice, Cambridge University Press, 2010
- A. Taylor. Social Choice and the Mathematics of Manipulation, Cambridge University Press, 2005.