

Computational Social Choice*

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Abstract

Over the past few years there has been a lively exchange of ideas between computer science, in particular *theoretical computer science* and *artificial intelligence*, on the one hand and economics, in particular *game theory* and *social choice*, on the other. This exchange goes in both directions and has produced active research areas such as *algorithmic game theory* and *computational social choice*.

Social choice theory concerns the formal analysis and design of methods for aggregating possibly conflicting preferences such as in voting, assignment, or matching problems. Much of the work in classic social choice theory has focused on results concerning the formal possibility and impossibility of aggregation functions that combine desirable properties.

This tutorial provided an overview of central results in social choice theory with a special focus on axiomatic characterizations as well as computational aspects. While some aggregation functions can be easily computed, others have been shown to be computationally intractable (e.g., NP-hard or #P-hard). Topics that were covered in this tutorial included

- (i) rational choice theory,
- (ii) Arrow's impossibility theorem,
- (iii) tournament solutions (such as the top cycle, the uncovered set, the Banks set, or the tournament equilibrium set), and
- (iv) randomized social choice functions.

The overarching theme were escape routes from negative results such as Arrow's impossibility theorem.

1998 ACM Subject Classification F.2 Theory of Computation: Analysis of Algorithms and Problem Complexity, J.4 Computer Applications: Social and Behavioral Sciences – Economics

Keywords and phrases social choice theory, economics, algorithms, theory

Digital Object Identifier 10.4230/LIPIcs.STACS.2015.19

Category Tutorial

* This work was partially supported by the Deutsche Forschungsgemeinschaft under grant BR 2312/7-2.

