# 07431 Abstracts Collection
# Computational Issues in Social Choice
## — Dagstuhl Seminar —

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**Abstract.** From the 21st to the 26th of October 2007, the Dagstuhl Seminar 07431 on "Computational Issues in Social Choice" was held at the International Conference and Research Center (IBFI), Schloss Dagstuhl. During the seminar, several participants presented their recent research, and ongoing work and open problems were discussed. The abstracts of the talks given during the seminar are collected in this paper. The first section summarises the seminar topics and goals in general. Links to full papers are provided where available.

**Keywords.** Computational social choice, voting theory, fair division, mechanism design, coalition formation, complexity theory, preference representation, algorithms

## 07431 Executive Summary – Computational Issues in Social Choice

Computational social choice is an interdisciplinary field of study at the interface of social choice theory and computer science, with knowledge flowing in either direction. On the one hand, computational social choice is concerned with importing concepts and procedures from social choice theory for solving questions that arise in computer science and AI application domains. This is typically the case for managing societies of autonomous agents, which calls for negotiation and voting procedures. On the other hand, computational social choice is concerned with importing notions and methods from computer science for solving questions originally stemming from social choice, for instance by providing new perspectives on the problem of manipulation and control in elections. This Dagstuhl Seminar has been devoted to the presentation of recent results and an exchange of ideas in this growing research field.

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http://drops.dagstuhl.de/opus/volltexte/2007/1273

## Topological Issues in Multiagent Resource Allocation Problems

*Nicolas Maudet (Université Paris-Dauphine, F)*

Resource allocation is a typical social choice problem which consists in allocating (optimally) a set of resources to a number of agents. We present recent results and discuss issues pertaining to the topological structure of negotiation/communication graphs, when allocations are iteratively and locally negotiated by autonomous agents, in a truly distributed manner.

*Joint work of:* Chevaleyre, Yann; Endriss, Ulle; Maudet, Nicolas

*Full Paper:*
http://www.lamsade.dauphine.fr/~maudet/pubs/ChevaleyreEndrissMaudetAAAI2007.pdf

*Bibliography:* Yann Chevaleyre, Ulle Endriss, and Nicolas Maudet. Allocating Goods on a Graph to Eliminate Envy. In *Proceedings of the 22nd AAAI Conference on Artificial Intelligence (AAAI-2007)*, pp. 700–705, AAAI Press, July 2007.

## Determining Winners in Weighted and Unweighted Sequential Majority Voting

*Maria Silvia Pini (Università di Padova, I)*

In weighted sequential majority voting, preferences are aggregated by a sequence of pairwise comparisons (also called an agenda) between candidates. The result of each comparison is determined by a weighted majority vote among the agents. In this paper we consider the situation where the agents may not have revealed all their preferences. This is common in many real-life settings, due to privacy issues or an ongoing elicitation process. We study the computational complexity of determining the winner(s), given that some preferences may not be revealed and/or the agenda is not decided. We show that it is easy to determine if a candidate wins whatever the agenda. On the other hand, it is hard to know whether a candidate wins in at least one agenda for at least one completion of the agents' preferences. This is also true if the agenda can be represented by a balanced tree. The computational complexity of determining if the candidates win in at least one (balanced) agenda, for every completion of the agents' preferences remains an open question. We also consider the case of fixed agendas, and we show that in this case it is easy to determine if a candidate wins in the fixed agenda for at least a completion, or for every completion of the agents' preferences.

*Keywords:* Sequential majority voting, multiagent systems, uncertainty

*Joint work of:* Pini, Maria Silvia; Rossi, Francesca; Venable, Kristen Brent; Walsh, Toby