

## Computational Perspectives of Judgment Aggregation Workshop

How can a group of agents aggregate their individually assigned truth-values to a collection of logically related propositions into a consistent aggregate? This is a social choice problem studied by the theory of [judgment aggregation](#). A relatively new problem of social choice, much is unknown about the theory, methods, implementation and application of judgment aggregation.

In the past decade we witnessed the role of a computer shifting from the computer being a self contained machine for executing software, a "personal computer", to being a "net-book", a global communication tool and an access node for disseminating information. As computers and computing become more distributed, pervasive and invisible, the need is created for aggregating information from various sources into a consistent aggregate. Can judgment aggregation fill this need? This is the topic of the workshop organized by University of Luxembourg with the support of the Agreement technologies COST Action IC0801 and the BNVKI .

To answer the workshop question, researchers need to work on both the judgment aggregation theory side and multiagent system side. Both of these disciplines are highly interdisciplinary, reflected in the research interests of the invited speakers. The workshop featured seven invited speakers each with a distinct view on the problem. The presentation slides and some of the papers are available from the workshop webpage <http://icr.uni.lu/JAWorkshop/program.html>

**Franz Dietrich** is a Research Fellow of the CNRS CERSES, at the University of Paris-Descartes and a part-time Professor of Economics at the University of East Anglia, Norwich. He presented his recent work on developing judgment aggregation rules. He studied a class of judgment aggregation rules, to be called scoring rules after their famous counterpart in preference aggregation theory and showed that these rules generalize the classical scoring rules of preference aggregation theory.

**Ulle Endriss** is an associate professor at the University of Amsterdam. He presented his joint work with Danielle Porello on the problem of merging several ontologies. The problem of merging several ontologies has important applications in the Semantic Web, medical ontology engineering, and other domains where information from several distinct sources needs to be integrated in a coherent manner. In his talk Ulle suggested that ontology merging may be viewed as a problem of social choice and I will discuss some of the issues that arise when we adapt the standard framework of judgment aggregation to this new problem domain.

**Elad Dokow** is a post-doctoral research fellow at the Hebrew University of Jerusalem, Einstein Institute of Mathematics. He presented his joint work with

Dvir Falik. They studied a general aggregation problem in which a society has to determine its position on several issues, based on the positions of the members of the society on these issues. An important notion in aggregation of positions is strategy-proofness. Elad discussed several definitions of strategy-proofness and presented the three most natural and general ones. He analyzed the possibility of designing an anonymous, strategy-proof aggregation rule under these definitions.

**Sebastien Konieczny** is a CNRS director of research at the Center of Research in Informatics of Lens (CRIL). He gave a presentation on his recent work on the jury theorem under uncertainty. Condorcet's Jury Theorem is an important result that allows justifying the use of majority rules for taking decision. The hypotheses of this Theorem are quite restrictive. Some of them have received some attention, but it is only recently that a generalization to more than two issues has been proposed. Sebastien looked at this Jury Theorem from the belief merging perspective. This means that each agent should be allowed to be uncertain about which is the true issue. He proposes a Jury Theorem under Uncertainty and studies what are the merging methods that are justified by this result.

**Gabriella Pigozzi** is an associate professor at the University Paris-Dauphine. She presented a joint work with Martin Caminada and Umberto Grandi. They explored the issue when aggregation rules produce a combination of logically consistent collective opinions that has not been supported by any agent individually, the so-called illegitimate outcome. Gabriella and her co-authors aim to providing aggregation procedures that ensure a consistent and legitimate outcome. They define a number of rules that draw inspiration from the literature on argumentation theory, social choice theory and belief merging and provide several definitions to formalize the notion of a legitimate outcome. For each of the rules defined they investigate their behavior with respect to legitimacy and consistency and study their social choice theoretic properties.

**Michael Regenwetter** is a professor at the University of Illinois. He presented an overview on his work on behavioral social choice. While social choice theory in Economics and Political Science has highlighted that competing notions of rational social choice are irreconcilable and presented many impossibility theorems, hypothetical voter profiles, exemplar disagreements between different voting rules, and paradoxes of aggregation, such as the Condorcet paradox, warn society of potential drawbacks in collective choice. This leads to the overall theoretical prediction that mathematically different voting rules are expected to disagree heavily on outcomes. The theoretical literature, has also led to the policy recommendation that one should avoid the Condorcet rule in real elections because a Condorcet winner is unlikely to exist. However, as Michael presented, real election data do not seem to reveal much evidence of such a conundrum.

**Marija Slavkovic** is a research assistant at the University of Luxembourg. She presented the problem of implementing judgment aggregation in robots. Marija discussed the technical challenges of implementation, as well as the design challenges for judgment aggregation rules that can be used on robots.