

Mechanisms for participatory budgeting and fair public decision making.

The study of participatory budgeting (PB in the sequel) has become in the last ten years an important research field both in political sciences and in urbanism.

The vast majority of the articles (around 300) with a title including the keyword "participatory budgeting" (Google Scholar source) lie in the fields of political sciences, urbanism, environmental studies and sociology.

Yet, the design and the study of mechanisms which are relevant for participatory budgeting naturally call upon the toolkits of algorithmics, social choice theory, game theory as well as decision support. The articles dealing with PB on these fields are scarce and, with the exception of two of them (Rios et al.

2008; Gomez et al. 2013), extremely recent (Fain et al., 2016; Benade et al., 2017; Aziz et al., 2017; Faliszewski and Talmon, 2018).

In more general terms, the questions at hand in the study of PB are part of the new "Fair public decision making" (Conitzer et al., 2017)

The thesis proposal wants to contribute to this novel area and aims to propose answers to the following questions:

1. Which mechanisms are more suitable for PB and more generally for fair public decision making? Which normative criteria allow to characterize the different mechanisms and allow to select among them?
2. How should one elicit voters' preferences in this context? Is there a trade-off expressivity vs. communication complexity?
3. Which impact has strategic voting in PB? Can we reduce the vulnerability of mechanisms to such behavior?
4. How to define a notion of "group fairness" which ensures that the different groups (working conditions, living conditions, residence area, gender, ethnicity, age, etc.) are treated fairly by the mechanism, and how to practically implement mechanisms that respect this fairness to the highest possible extent?
5. Which algorithms are needed to compute the outcome of this mechanism?

This Ph.D. subject is strongly interdisciplinary. We are primarily looking for a candidate with a background in computer science and an interest in economic models of collective decision. Yet, candidates with a background in mathematical economics with at least basic knowledge in algorithmics (and an interest in it), will also be considered. If you are not sure if your scientific background fits, please ask us. Finally, ideally, the candidate should have some interest in political science and a motivation to work in an interdisciplinary field.

Supervision :

Jérôme Lang (DR CNRS, LAMSADE) and Matias Núñez (CR CNRS, LAMSADE, HDR)

Some references:

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A framework for participatory budget elaboration support
Journal of the Operational Research Society, 2008

J Gomez, D. Rios Insua, J.M. Lavin, C. Alfaro
On deciding how to decide: Designing participatory budget processes

European Journal of Operational, 2013

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The Core of the Participatory Budgeting Problem
Web and Internet Economics (WINE) 2016.

G. Benade, S. Nath, A. Procaccia, N. Shah
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AAAI 2017

H. Aziz, B. Lee and N. Talmon
Proportionally Representative Participatory Budgeting: Axioms and Algorithms
AAMAS 2017

V. Conitzer, R. Freeman, N. Shah
Fair Public Decision Making
Economics and Computation (EC), 2017.

P. Faliszewski, N. Talmon
A Framework for Approval-based Budgeting Methods
Arxiv, 2018.