COST Action IC1205 on Computational Social Choice:

STSM Report

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During this STSM, together with my host Prof. Edith Elkind, we initiated the study of the following social choice problem. There is a set of issues, a set of voters, and a set of candidates. Candidates approve or disapprove issues, whereas voters have cardinal valuations for the issues; the valuation of a voter for an issue indirectly implies whether the voter wants the issue to be approved or not. A committee consists of some fixed size subset of the candidates. An issue is approved by a committee only if the majority of the committee members approve it, otherwise it is disapproved. The utility of a voter can be defined in several ways. For example, it could be defined as the number of issues to which the voter agrees with the committee's decision or it could be defined as the distance of the voter's valuation from the decision in some metric space. The social welfare is defined as the total utility of the voters. The problem is to select the committee members so that the social welfare is maximized.

Our goals are several. First, we want to study the computational complexity of this optimization problem which we conjecture that is NP-hard. Second, we want to quantify the efficiency loss occurred when voters elect the members of the committee. I.e., voters vote for candidates (this can be done if, for example, each voter ranks the candidates based on the number of agreements they have on issues) and a voting rule is used to aggregate these ranking and produce the committee. In order to quantify this efficiency loss, we will try to provide tight bounds on the ratio of the maximum social welfare over the minimum social welfare induced by the decision of a committee elected by the voters. Some of our preliminary results suggest that this ratio is at least 3. Finally, we would also like to find out how easy it is for a voter to manipulate the election process by changing her vote as less as possible. We will continue our research in order to provide answers to these questions.