COST Action IC1205 on Computational Social Choice: STSM Report

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Purpose of the STSM:
We intended to work on voting with rank dependent scoring rules, as defined by N. Mattei et al. (AAAI14). A Vote is a strict order over a set of alternatives. One can attribute a score to each rank. A Voting rule aggregates a set of votes into a single winner, or into multiple winners.
In positional scoring rules, this is achieved by computing the overall (sum over votes) score of each alternative: The alternative(s) valued the highest win. These include plurality, Borda, and k-approval. Instead, one can compute the overall scores using more refined operators than the sum. For a fixed weight vector, given an alternative, the ordered weighted average (owa) sorts the scores of the alternative in each vote, from the lowest to the highest, and then scalarizes the sorted scores by a linear combination with the weight vector. For instance, one can put less weight on the more extreme ranks, in order to obtain an extreme-averse voting rule. Or one can put more weight on the lowest scores to obtain a fair distribution of the scores among the votes. We intended to study the computation of the winners and manipulations in rank dependent scoring rules with multiple winners. There are also other operators to study, like the Choquet discrete integral which enables interactions between voters.

Description of the work carried out:
Edith gave references to enrich my literature on multi-winner voting rules (e.g. N. Betzler, et al.), and pointed the Chamberlin-Courant (CC) multi-winner voting rule as a good starting point. Then we addressed the computation of the winner of rank dependent scoring rules on CC. Assuming single-peaked preferences, we discussed several particular cases of owa, for which one could generalize the existing algorithms on sum. In fact, as long as the weight vector of owa has a bounded number of distinct weights, it is easy to compute the winner of a rank dependent scoring rule. The same kind of results hold for single-crossing preferences. The so-called owa-CC problem inherits from the hardness of sum-CC on general preferences. We failed to provide more hardness results. Finally we explored approximation algorithms for the so-called owa-CC problem. I'm currently writing out all these results, for our pairing.