Does social pressure affects the outcome of sequential deliberation?

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1 Introduction

This manuscript records the thoughts on the deliberation process, based on the works of Fain et al. [2017]. In summary, we consider the following possible extensions. We first briefly list them then we will discuss the concrete settings in the latter sections.

- Due to peer pressure, the agents may not participate in the deliberation (nash bargaining) using their true stance. Does the deliberation still yields a constant distortion guarantee under this new setting?
- Extend the current setting to the case that there are multiple winners.
- Consider the social cost function to be more general, for instance, the 1-center or the 1-median problem (or even more general). Does the current approach still obtains constant distortion guarantees under these new social cost functions?

2 Sequential deliberation under social pressure

We will use the following notation. We consider a set of n agents, denoted by N, indexed by $u \in [n]$. Consider a set of m alternatives, denoted by M, indexed by $i \in [m]$. Now, we consider each agent has a bliss point in the set of alternatives, denoted by $a_u^* \in M$. The bliss point is not involved in the deliberation process, instead, we assume that the agent may uses another stance. Suppose at the t-th round of the deliberation, the agent u uses the stance $a_u^t \in M$. Let o^t be the outcome of the t-th round of the deliberation. The deliberation process is as follows.

1. Iteration over $t = 1, 2, \ldots, T$:
   (a) Uniformly randomly selects a pair of agents i and j from N. Let a_i^t and a_j^t be the stances that the agents i and j use at the t-th round for deliberation.
   (b) The outcome of the previous round of deliberation is o^{t-1}. The outcome of the current round of deliberation is o^t is the result of the Nash bargaining between the agents i and j using the stances a_i^t and a_j^t for deliberation, i.e., $o^t = Median(\{a_i^t, a_j^t, o^{t-1}\})$ in the median graph setting.
   (c) Agent i updates its stance to $a_i^t = Median(\{a_i^*, a_i^{t-1}, o^t\})$; and agent j updates its stance to $a_j^t = Median(\{a_j^*, a_j^{t-1}, o^t\})$. For all the other agents $u \in N \setminus \{i, j\}$, their stances are not updated, i.e., $a_u^t = a_u^{t-1}$.
2. The final outcome is o^T.

In the above setting, we assume that the stance that the agent ultilizes in the bargaining is the outcome of both the agent's true stance (bliss point), the current alternative in the bargaining, and the stance that the agent uses in the previous bargaining.

2.1 Research questions

- Can we define the transition matrix of the random walk defined in the following way?
- Can we define the stationary distribution of the process?
- Can we compute the distortion guarantee of the process?

References

Brandon Fain, Ashish Goel, Kamesh Munagala, and Sukolsak Sakshuwong. 2017. Sequential deliberation for social choice. In *International Conference on Web and Internet Economics*. Springer, 177–190.