ADS project proposal

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Our project will consist of an algorithm section and a theoretical section. Each of these sections will have one part about offline algorithms and another part about online algorithms. In this document we have outlined what we are planning to do the coming weeks.

1 Offline algorithm

First we will write an ofline algorithm that solves the base case. The algorithm will try all the possible timeslots for all the borrels. Then it will find the optimal times for the people to work on the obligations. For this we don't need to go through all possibilities. This is because it is always better to go to a borrel then no borrel at all.

1.1 Social matrix

Later, we will introduce a social (non-negative) matrix S. If i and j are two people, S_{ij} will tell us how much person i likes person j. Our program will now favour people going together with people they like. This makes sense, because people generally prefer to attend a borrel that their friends are also attending.

2 Theoretical section

We want to proof the non-constant competitiveness of a few iterations of the online problem setting by finding a problem competitive ratio lower-bound. We want to do this by dividing the possible algorithms in 2 catagories, one that would plan a borrel on timeslot X and one that would not plan a borrel on timeslot X. Then show that a potential adversery can always create a case that would not make the algorithm constant competitive. Some possible iterations are:

1. The algorithm can see k timeslots into the future to determine whether to plan a borrel.
2. Every person has at least r free timeslots where they will be able to attend any borrel.
3. Every person has at least 1 free timeslot between obligations.
4. Obligations don't overlap.
5. There are at most N different timeslots ($T < N$).

3 Interesting papers

- Proof social event scheduling is strongly NP-hard (even with big restrictions), and introduction of a greedy algorithm. https://ieeexplore.ieee.org/document/8509349
- Paper about Team forming problem (Which will be handy for social matrix optimization problem https://dl.acm.org/doi/abs/10.1145/3465399
- Global event-participant arrangement with conflict and capacity https://ieeexplore-ieee-org.utrechtuniversity.idm.oclc.org/abstract/document/7113329?casa_token=eIGRzu0yHrQAAAAA:AhxXD5ezx0R5GJ0jrPSOOiLidot48JwYMj_Ux0xr_nano01zW2QJPRJB3wHDMlQfWTNxcogj3w
- https://ieeexplore-ieee-org.utrechtuniversity.idm.oclc.org/abstract/document/7930031?casa_token=pApqJvAsEhsAAAAA:6CLp5hzaMp3DEecHVwMO2cNuP5EC43hVcWRp_o28k23L5193kkk4df3tAMe
- Attendance maximization taking in account a set of probabilities of each person being available at a time and the "event interest" of each person in each event. https://dblp.org/rec/conf/edbt/BikakisKG19.html
- Discrete social event planning. Compares their greedy algorithm to the random and another. https://ieeexplore.ieee.org/abstract/document/8509349
- Attendance "utility" maximization with 2d locations of events and attendees. Comparison between Conflict-Adjustment algorithm, Greedy algorithm and 3 others. https://ieeexplore.ieee.org/abstract/document/7930031
- Attendance "utility" maximization with 2d locations of events and attendees. Comparison between greedy heuristic algorithm and local-search-based algorithm https://link.springer.com/article/10.1007/s11280-015-0377-6
- Attendance "utility" maximization with 2d locations of events and attendees and maximum capacity of events. Comparison between 3 greedy algorithm and 2 others. https://dl.acm.org/doi/abs/10.1145/2723372.2749446
- Attendance "utility" maximization with event proximity solved with the Markov random field model https://dblp.org/rec/journals/ijis/LiSF21.html
- Attendance "utility" maximization with event capacity and event/attendee distance. Comparison between dynamic programming and greedy programming approach. https://ieeexplore.ieee.org/abstract/document/8788821
- Proof social event scheduling is strongly NP-hard (even with big restrictions), and introduction of a greedy algorithm. https://ieeexplore.ieee.org/document/8509349