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Satisfying User Preferences While Negotiating Meetings

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We have built a distributed meeting scheduling (Sen & Durfee 1994) system which is a collection of agents, responsible for scheduling meetings for their respective users. Users have preferences on when they like to meet, e.g. time of day, day of week, status of other invitees, topic of the meeting, etc. The agent must balance such concerns, proposing and accepting meeting times that satisfy as many of these criteria as possible. For example, an user might prefer not to meet at lunch-time unless the president of the company is hosting the meeting. We apply techniques from voting theory to arrive at consensus choices for meeting times while balancing different preferences.

When several possible alternative times for a meeting have to be ranked, preferences for each dimension are used to rank the alternatives. A consensus alternative can be chosen by viewing each dimension as a voter and the alternative that is most preferred by the set of voters or dimensions is first considered for scheduling a meeting. If this alternative cannot be used for any reason, for example an invitee to the meeting can not meet at this time, then the next most preferred alternative is used, and so on.

Each user assigns a value between 0 and 1 for each option of each dimension (we actually provide a default set of preferences, so that the system works even if a naive user does not change the preferences; we also plan to investigate learning of preferences to adapt the scheduler behavior to the preferences of its associated user). For example, in Figure 1, an user has determined his/her preferences for meeting on days of the week. If the value of the option falls below the user-specified threshold, then for that dimension the user would prefer not meeting over meeting. The user can also rate dimensions relative to each other. Thus some of these options are given greater weight than others, e.g., who is hosting the meeting may be more important than whether the meeting is being held in the morning or in the afternoon. Each user can then completely customize his/her scheduler according to his/her preferences.

We assign votes to each preference in proportion to their weight against each other. Each meeting proposal (alternative) can then be voted on by the preferences as to whether the user wishes to meet given the meeting criteria. For each option above (below) a dimension's threshold, yes (no) votes in proportion to the weight of that dimension are recorded. Suppose a given meeting can be scheduled either at Monday, 10am (alternative 1) or Wednesday 3pm (alternative 2). The alternatives used in voting are alternatives 1 and 2 and not meeting (alternative 3). Though we use continuous values to rate the options, only the order of the options are used in the actual voting scheme. We use Black's voting rule (Straffin, Jr. 1980) to decide the winning alternative. This particular voting scheme was used because it honors desirable characteristics of voting outcome such as the Pareto and the Monotonicity criteria.

Besides using voting by the preferences to decide among several alternatives for a meeting, we plan to utilize voting for: choosing between competing meetings for the same calendar slot, canceling a previously accepted meeting in favor of a new proposal, and counter-proposing a new time for a rejected proposal.

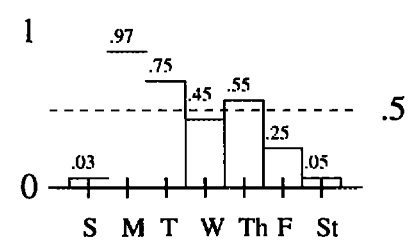

Figure 1: Example preferences for days of the week. The minimum threshold is the dotted line.

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References

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