OVERVIEW OF "PLANNING SPEECH ACTS"

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We are developing and testing a computer model of conversation by constructing a program that engages its user in purposeful conversation to help him perform some task. Conversation is viewed as a sequence of actions performed by the participants, intentionally affecting each other's model of the world, primarily their beliefs and goals. These actions can only be performed if certain conditions hold.

We show here how some of these speech acts (Searle [1969]) can be described as operators In problem-solving systems such as STRIPS (Fikes and Nilsson[1971]), and how they can be incorporated into plans with non-linguistic acts such as scheduling trips or opening doors. Language analysis and generation can thus be related to problems of plan generation, execution, and recognition. Our work so far has concentrated on the speech act generation aspect.

Consider for example a REQUEST from a speaker SP to a hearer H that H should perform a certain action ACT. SP would like H to make ACT one of his goals by having him recognize that SP wants him to. Certain conditions must be satisfied before the REQUEST can be usefully performed:

1) SP believes that H can do ACT
2) SP believes H believes H can do AcT,
3) SP wants to perform the REQUEST.

Condition 2) excludes requests when H may be lacking necessary information although he may be familiar with all the necessary procedures. Want preconditions like 3) will appear on all actions performed "by human agents. If one agent SP is planning for another agent H to perform ACT, SP cannot assume that ACT is a goal of H; this want precondition of ACT is precisely what a REQUEST is meant to satisfy. (In fact, we assume that H's believing that SP wants him to do ACT is the effect of the REQUEST, rather than just H's wanting to do ACT, and we postulate an intermediate act to bridge this gap.) As well as REQUEST, our system includes a speech act INFORM whose effect is that the hearer believes the speaker believes some proposition P is true. Again, a mediating act is used to produce the hearer's believing P.

System Overview.

Our current system uses an object-centered representation developed by Levesque [1977] , implemented using partitioned semantic networks (hendrix [1975]), a semantic network interpreter that executes programs in the net, and an interactive network definition package. The system is coded in SPITBOL on an IBM 370/165 II under TSO.

Memory Organization.

We use Hendrix' spaces both as manipulable objects and as contexts for procedure execution. A space is identified as representing the "belief" or "want" of an agent S by placing it as the value of a case in a proposition stating "S believes" or "S wants". The space representing the system's beliefs (SB) includes spaces containing the system's beliefs about the system's wants (SBSW) and the system's beliefs about the user's beliefs (SBUB) that in turn contains the user's wants (SBUBUW). These spaces can share information, and the interpreter can add new levels of nesting as necessary, and test arbitrarily deeply nested propositions. Plans for the various agents are created in the want spaces.

An Example

Let the world consist of a room with a swinging aoor and a lock. System is outside and user is inside. Assume acts to move through an open door, push an unlocked door, unlock the door with a key, and" fetch a key. Also assume that the system believes that both it and the user know the state of the world. Our current system can plan the following utterances to achieve its being inside:

1. I request you to unlock the door.
2. I request you to push the door.
3. I want you to unlock the door.
4. I want you to push the door.

Utterances 1. and 2. are REQUESTS to perform actions, and 3. and 4. are INFORMS of WWTs. If the system did not believe the user knew the location of the key, it would issue an appropriate INFORM. Further details are available in Perrault and Cohen [1977]

Concluding Remarks.

Other natural language systems possess the means for generating utterances (e.g. ATN's) but not the motivation. Ours, on the other hand, plans what it should say, but currently does not decide how to say it. We are investigating the interactions this approach has with plan recognition and strategies for being helpful, and trying to extend it to the planning of references.

References

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