MODELLING SIMPLE DIALOGS

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Introduction

A problem that is currently of some interest in connection with the development of conversational systems is that of dealing with the context m which the individual utterances of a dialog are embedded. As researchers like Bruce (Bruce(1975)), Deutsch (Deutsch(1975), and Schank and Abelson (Schank and Abelson (1975)) have pointed out, the plans of the speakers are a crucial element of the context of a dialog.

Knowledge of how speakers communicate <u>intentions</u> via their utterances seems, then, to be important to the success of a conversational system. *This* problem has been addressed by workers in disciplines other than Artificial Intelligence. Iftc encoding of speaker intention in single utterances has been studied by Searle (Searle(1975)) in his work on 'speech acts'. Communication of speaker intention via larger discourse units has been studied by the linguists Sinclair and Coulthard (Sinclair and Coulthard(1975)) in their work on the structure of pedagogical dialogs.

Our effort involved applying the work of Searle and that of Sinclair and Coulthard to the problem of understanding the speaker intention communicated in utterances of actual dialogs from a simple domain.

The Dialog Model

We developed and tested a model for about one hundred dialogs which we recorded between passengers and a clerk at an information booth in a train station. *By* inspection of the dialoq transcripts, wc discovered a small set of discourse 'acts', each of which indicates a well-defined speaker intention. For instance, one such act, called an 'ack.heard.ok', indicates that the speaker believes he correctly heard the immediately preceding utterance.

Tn general, the definition of an act may involve preceding utterances, and may express expectations about the acts to follow. We describe these interrelationships in terms of higher-level discourse units, called 'moves', which are themselves interrelated and described in terms of each other. Many of these moves consist in the speaker uttering an act and then listening for a response, to determine whether the act in fact achieved the purpose for which it was intended. Our description, then, leans strongly to the view, suggested especially by the work of Pruce, that the structures we observe in our dialogs result from the structures of the interacting plans of the participants in those dialogs. Utterances are intended either to further the speaker's own plan or to provide feedback to the other participant on the status of his (inferred) plan.

The system of description can be presented using a 'grammar' which describes the structure of each of our moves in terms of acts and other moves.

We represented the individual utterances of the dialogs by specifying their Illocutionary point and propositional content. Then, using the grammar, we developed a computer program which generates detailed expectations about both these features of the next utterance in the dialog. Itie program uses the success or failure of these expectations to determine what role the utterance plays in its dialog (i.e. what act it represents, and where it falls in the hierarchy of moves). Ihe program maintains simple models of both the clerk's knowledge and the passenger's (inferred) knowledge.

Results

Several test dialogs were translated by hand into the representation expected by the model. The output from the dialog model in each case was a dialog history, with comments appended to each utterance indicating the role it played in the dialog. A brief sample of the output follows (Note that the utterance representation is not shown here.) :

(1) P: 'What gate is the train to London at?' // Question asked in process of acquiring information.
(2) C: 'It's at three—at two fifteen.' // Question asked in process of acquiring information—begins clarification dialog on utterance at index 1.
(3) P: 'Yeah.[1] // Reply to previous question at index ?.
(4) C: 'Gate eight.' // Reply to previous question at index 1.

The model performed well on a set of test dialogs representative of the variations permitted by the grammar. Some dialogs among those recorded did not fit into any structure described by the grammar, and so wore incomprehensible to our model. Ncverthcless, the sort of dialog on which the model could perform successfully seemed to comprise the majority (about two thirds) of the transcribed dialogs; this would seem to indicate that our approach to modelling discourse structure holds promise as a basis for future research.

References

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