Circuit Fix-It Shop: The Sequel—Exploring Issues in the Detection, Prevention, and Repair of Miscommunication

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1 Evaluating a Dialog Processing Model

The original Circuit Fix-It Shop spoken natural language dialog system was developed in order to validate an integrated model of dialog processing that enabled the following behaviors: (1) collaborative problem solving, (2) subdialog completion and movement, (3) contextual interpretation, (4) user-dependent response generation, and (5) mixed-initiative interaction.

The goal of empirically validating a dialog processing model necessitates an awareness of computational constraints and robust error handling techniques as well as familiarity with past experimental studies on discourse behavior (usually of the human-human or simulated human-computer variety). Empirical study is beneficial in acquiring knowledge about how human linguistic behavior during interaction with a computer may differ from what would occur if the interaction was with another human.

A similar approach is being attempted in followup work on the prevention, detection, and repair of miscommunication. The biggest deficiency of the original model (and reflected in the performance of the Circuit Fix-It Shop) is its general inability for dealing with miscommunication. In the current project we have studied previously recorded human-human and human-computer dialogs in order to investigate strategies for reducing miscommunication in natural language dialog. The following ideas have been or are being explored:

1. Developing a context-based model for selective verification of user inputs whose meaning is in question.
2. Developing a context-based model for automatic production of speech recognition subgrammars.
3. Developing strategies for permitting either computer or user-initiated subdialogs for resolving miscommunications and potential miscommunications.
4. Developing strategies for improved grounding of context as the interaction proceeds.
5. Implementing these theories and evaluating their performance under both simulated and experimental conditions.

The current instantiation of the Circuit Fix-It Shop incorporates some of these recently developed ideas about miscommunication handling. Prototype testing took place in November 1998. While still in development, the more robust interaction capabilities of the current system allow users more flexibility in what they say with reduced chance of faulty performance when misunderstandings occur.

Project references include (Smith, 1998), (Smith and Gordon, 1997), (Smith et al., 1995), (Smith and Hipp, 1994), and (Smith, 1994).

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