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# Predicting Breakdown Situations over the Instant Messaging through Analyzing Conversational Structures

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## Introduction and background

Current trends in distributed scientific collaboration focus on developing effective Web-based communication tools, such as the instant messaging (i.e., IM) for supporting informal communications. Our work focuses on one specific software application used during the EleGI (EleGI, 2004) scientific collaboration: BuddySpace IM (Eisenstadt & Komzak & Cerri, 2004). We aim to build an assistive system that help users cope with discrepancies between their expectations and the BuddySpace IM they use. This paper discusses the implications of cognition theory to the creation of software and its application interface.

## Methods and results

We decided to use a rule-based analysis method as a springboard for determining the best possible method of *context recognition* and *punctuation* (i.e., the begin and end of a breakdown situation). Our observational unit starts from measuring duration of *pause time* and frequency of pause. Based on the data, whenever chat reply is $>= 2$, and $<= 5$ minutes, it is somewhat likely that a user has (physically or mentally) become detached from the conversation at hand and attempts to rectify this problem signifies a *breakdown situation*. Time was used as a rule of thumb to narrow down the conversations- those that are belonging to breakdown contexts. Conversational contexts are defined as the following using the pseudo-algorithm:

1) Start by collecting all items, called "primitives," in the content argument of the start of a context (e.g., 'if', 'c', 'press', 'icon', and 'sailboat' from message (26) above).

2) Current message = next message

3) If a primitive in the now current message has been repeated in the current context,

    (a) The primitive is labeled a dominant primitive for that context.

    (b) The current message is added to the context

    (c) Current message = next message

    (d) GOTO Rule 3)

4) ELSE

    (a) Context has ended

Dominant primitives signify the *focus/object* of that particular context. Each response is equivalent to the theoretical idea of a *signal* (Bateson, 1972). The non-dominant primitives are those that are 'evoked/produced' from associating the *focus* to the actor's memory/experience. We applied this algorithm to 20 conversation files. The 20 files include the conversations that were originally analyzed for breakdown situations.

Refer to (Binti Abdullah & Cerri, 2005) for sample of the conversation files. We took the results and then looked back at the conversations to determine if the output truly was a breakdown situation. We show results in Table 1.

Table 1: number of correctly analyzed breakdown situations.

|  | # breakdowns | # output | % correct |
|---|---|---|---|
| w/ *irregulars* | 6 | 26 | 23.1 |
| w/o *irregulars* | 4 | 7 | 57.1 |

The first row in Table 1 represents all outputs while the second row represents all outputs that are not labeled as *irregular* (see Rule 4 in the algorithm above). The rule-based algorithm above finds many situations that are not actually breakdown situations. However, it also found three breakdown situations that we had not previously known about. This indicates that the rules do actually generalize, though to a very limited extent.

## Conclusion and perspectives

Timing shows that it is not sufficient to capture breakdown information. A conversation that is categorized solely based on the element of 'focus' (i.e., dominant primitives) may be useful as a guide, regarding the topic of conversation (e.g., giving instructions, discussions). But gives us no clue which context houses breakdown context. The challenge we face is to allow the program to identify at *what point the breakdown situation* has occurred during chat conversations. Much of the future work would be geared towards this direction for analysis. We suggest looking deeper into the *re-sequencing of the conversation patterns*- the association between communicative acts and its contents (Binti Abdullah & Cerri, 2005). Employing the full gambit of the hierarchy of learning and communication theory (Bateson, 1972).

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