Dimensions of Dialogue

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Extended abstract

Dialogue systems is one of the important applications of Natural Language Processing (NLP), in which a user and a system interact through natural language. Most of the past research on dialogue systems has focused on so called *task-oriented dialogue* or *information seeking dialogue* where the user has a specific information need and the system helps to fulfill it by providing necessary information. When consulting with information systems, however, the user's information needs are not necessarily so specific and certain. Taylor classified the user's information needs in information seeking activities into the following four stages (Taylor, 1968).

(1) *Visceral need*: users notice only a vague sort of dissatisfaction.

(2) *Conscious need*: users can describe their problem with only ambiguous and rambling statements.

(3) *Formalized need*: users can describe their problem with qualified and rational statements.

(4) *Compromised need*: users know where the necessary information is.

As the number increases, the user's information need becomes more concrete, thus easier to be handled by computers. In terms of Taylor's classification, information seeking dialogue targets *compromised needs* and a part of *formalized needs*.

When dealing with less concrete information needs like *visceral* and *conscious needs*, information systems cannot expect users to provide comprehensible descriptions of his problems. Taylor claims that adding information helps to mature visceral needs in terms of its form, quality, concreteness and criteria. For conscious needs, talking to someone else will sharpen the focus of the problem. It is expected that his counterpart will
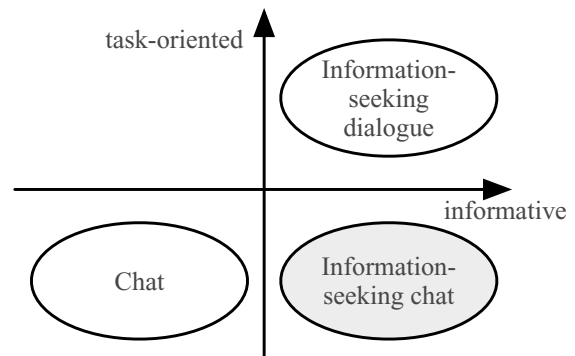

Figure 1: Dimensions of dialogue

understand the ambiguities of the problem, and thus the ambiguities will gradually disappear in the course of the dialogue.

To sum, the important thing in Taylor's first two stages of information need is to continue interaction on related topics, aiming to let the user notice his problem. Through this interaction, we can expect the user to elaborate and concretise his problem. The nature of this kind of interaction is different from that of information-seeking dialogue. It might be called *information seeking chat* (Stede and Schlangen, 2004) which is characterised by its more exploratory and less task-oriented nature, where the user does not have a specific goal but obtains useful information of interest through interaction with the system. Figure 1 illustrates the classification of dialogue in terms of two dimensions: task-orientedness and informativeness.

Information-seeking dialogue, which has been a main focus of dialogue research in NLP, is task-oriented and informative, that is, users obtain useful information satisfying their goals through dialogue. Information-seeking chat is less task-oriented than information-seeking dialogue, but still provides users with some useful information. In this respect, information-seeking dialogue contribute to elaboration and concretisation of user's information needs as discussed above. Chat is

characterised as non task-oriented and less informative dialogue. ELIZA (Weizenbaum, 1966) is a typical system targeting this sort of interaction. It is difficult to figure out task-oriented and non informative dialogue in the vacant quadrant.

Through information-seeking chat, users' information needs would be concretised, and once they reach the compromised stage, the system can utilise the techniques which were developed in past information-seeking dialogue research. This process is shown in the left-hand side of Figure 2.
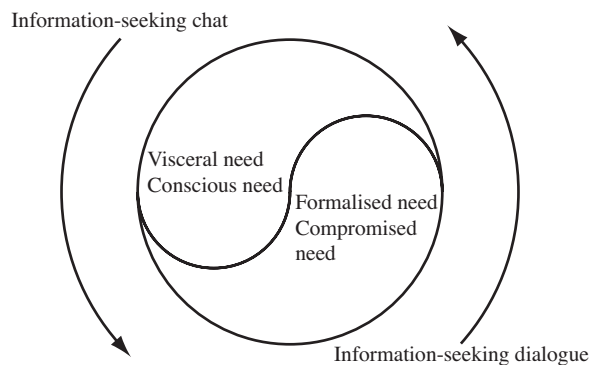

Figure 2: Modes of dialogue/information needs

Even after the user's information needs are concretised enough, other information needs might emerge during the course of information-seeking dialogue. Clarification questions are a typcial phenomenon occurring in such situations. The right-hand side of Figure 2 illustrates this process. A really intelligent dialogue system should have an ability to move back and forth between these different dialogue modes, as human does.

In the rest of the talk, the author's recent research results will be presented, which will be twofold. The first topic concerns a dialogue system with embodied agents (Funakoshi et al., 2006a). Figure 3 shows a snapshot of the system in which a user can interact with the agents in the virtual world through speech dialogue. The challenges of this research include handling various phenomena in dialogue with embodied agents, such as handling spatial vagueness (Tokunaga et al., 2005), repair utterances (Funakoshi and Tokunaga, 2006) and referring expressions (Funakoshi et al., 2006b).

The second topic concerns information-seeking chats (Ichikawa and Tokunaga, 2007). We have built a prototype system which provides various kinds of information collected from Web news
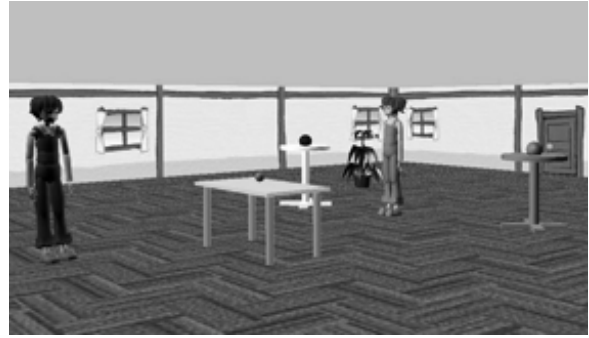

Figure 3: Snapshot of the dialogue system

sites. We particularly focus on detecting and predicting topic shifts in the interactions.

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