

GoDiS - QUD-based dialogue management in a multi-domain dialogue system*

ABSTRACT OF TECHNICAL CONTENT

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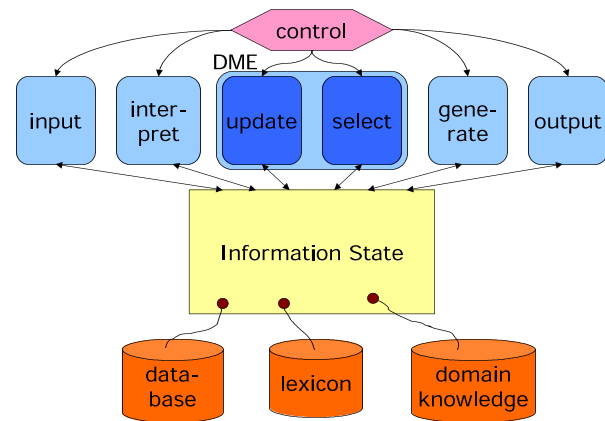
1 Introduction

GoDiS is a dialogue system utilizing dialogue management based on Ginzburg's concept of Questions Under Discussion (QUD). GoDiS is implemented using the TrindiKit, a toolkit for implementing dialogue move engines and dialogue systems based on the Information State approach. While originally built for fairly simple information exchange dialogue, it is being extended to handle action-oriented and negotiative dialogue. One of the goals of the information state approach is to encourage reusability and plug-and-play; to demonstrate this, GoDiS has been adapted to several different dialogue types and domains, including information exchange dialogue in travel agency and autoroute domains, and action-oriented dialogue when acting as an interface to a mobile phone or computerized agenda. GoDiS is also being enhanced with speech input and output.

2 GoDiS architecture

GoDiS (Gothenburg Dialogue System) is an experimental dialogue system built using TrindiKit, and the GoDiS architecture shown below is an instantiation of the general TrindiKit architecture.

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The components of the architecture are the following:

- the Information State (IS)
- domain-independent modules, operating according to module algorithms
- the Dialogue Move Engine (DME), consisting of two modules (Update and Select); the DME is responsible for updating the IS based on observed moves, and selecting moves to be performed by the system.
- a controller, wiring together the other modules, either in sequence or through an asynchronous mechanism.
- three domain-dependent resources: Database, Lexicon, and Domain Knowledge

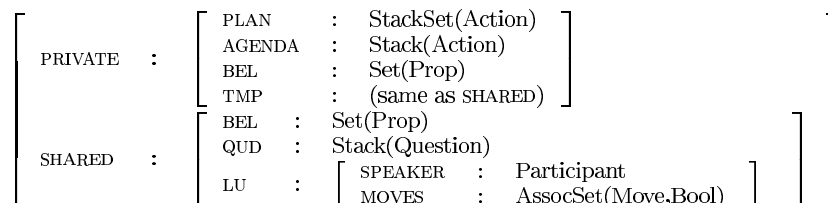


Figure 1: GoDiS information state type

The TIS is accessed by modules through conditions and operations. The types of the various components of the TIS determine which conditions and operations are available.

3 GoDiS information state

The notion of information state we are putting forward here is basically a modified version of the dialogue game board which has been proposed in [Ginzburg(1996)]. We represent information states of dialogue participants as records of the following type:

The main division in the information state is between information which is private to the agent and that which is shared between the dialogue participants. The PLAN field contains a dialogue plan, i.e. is a list of dialogue actions that the agent wishes to carry out. The TMP field keeps track of shared information that has not yet been grounded. QUD is a stack of questions under discussion. These are questions that have been raised and are currently under discussion in the dialogue.

4 Features

Adaption to new domains and languages is simplified by the clear separation of domain-dependent and domain-independent components. Given a DME which can handle the dialogue type required by the domain, e.g. information exchange, adaption to a new domain amounts to building resources for that domain. Adaption to a new language only requires adaption of the lexicon resource. Also, resources can be switched on-line, in principle allowing the system to change domain and language during dialogue.

Question and task accommodation allows GoDiS to adapt to the users utterances, e.g.

allowing the user to answer questions before they have been asked, and providing information before any task has been established. Given a simple schema specifying the reimplementa-tion of menu-based user interfaces in the form of dialogue plans, these mechanisms allow a more natural and flexible interface than a simple menu.

The information state update rules include rules for question and task accommodation, as well as rules for handling grounding and rules for integrating the latest move with the DIS. As an example, the u-rule for accomodating questions (which is necessary when the user answers a question that the system has yet to ask) is shown below. U-RULE: accommodateQuestion

```

PRE: {
  val(shared.lm.speaker, usr)
  in(shared.lm.moves, answer(A))
  empty(shared.qud)
  in(private.plan, raise(Q))
  domain: relevant_answer(Q, A)
}
EFF: {
  del(private.plan, raise(Q))
  push(shared.qud, Q)
}

```

These features rule allows the system to handle dialogue such as this one:

```

system> Phone interface speaking, how can I help you?
user > Jim
system> Do you want to activate,divert, add a new
number, change a name, delete one, give a
ringing tone, search, send a name, or send to
a name ?
user > add new number
system> what number?

```

The text-based WWW demo of GoDiS allows inspection of the dynamic information state and the rules applied to it between each utterance in the dialogue. The demo can be accessed via a web browser at www.ling.gu.se/demo/.

References

[Ginzburg(1996)] Ginzburg, J. (1996). Interrogatives: Questions, facts and dialogue. In *The Handbook of Contemporary Semantic Theory*. Blackwell, Oxford.