Multimodal Menu-based Dialogue in Dico II

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Abstract

We describe Dico II, a multimodal in-vehicle dialogue system implementing the concept of Multimodal Menu-based Dialogue. Dico II is based on the GoDiS dialogue system platform, enabling flexible dialogue interaction with menu-based in-vehicle applications.

1 Introduction

Dico II is a multimodal in-car dialogue system application. DICO (with capital letters) is a research project involving both industry and academia[1]. Dico II is built on top of the GoDiS dialogue system platform (Larsson, 2002), which in turn is implemented using TrindiKit (Traum and Larsson, 2003). In the original Dico application (Olsson and Villing, 2005), (Villing and Larsson, 2006), the dialogue system was able to control a cellphone. The main goal was to develop an interface that is less distracting the driver, and thus both safer and easier to use than existing interfaces. A subsequent version (Larsson and Villing, 2007) included also a Driver Information Display (DID) and a radio in order to o show how a multimodal dialogue system can help when controlling several devices. This paper describes the Dico II system resulting from work in the DICO project.

2 In-vehicle dialogue systems

An obvious advantage of spoken dialogue in the vehicle environment is thath the driver does not have to take her eyes - and the attention - off the road. In an in-vehicle environment, it is cruicial that the system is intuitive and easy to use in order to minimize the cognitive load imposed on the driver by the interaction. The GoDiS dialogue manager allows the user to interact more flexibly and naturally with menu-based interfaces to devices.

3 GoDiS and TrindiKit

In GoDiS, general dialogue management issues such as feedback, grounding, question accommodation

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[1]www.dicoproject.org

and task switching are handled by the application-independent dialogue manager. Re-using these technologies in new applications enables rapid prototyping of advanced dialogue applications.

4 GoDiS features in Dico

To enable flexible dialogue interaction, GoDiS supports (among other things) accommodation, task switching and grounding.

4.1 Accommodation

The applications in Dico II are based on existing menu interfaces, so it is possible for the novice user to let the system take initiative and guide the user through menus. For expert users, *accommodation* strategies enables skipping through the menus and getting right to the point.

Ex. 1: "Call Lisa's home number"

4.2 Multiple simultaneous tasks and task switching

GoDiS enables arbitrarily nested subdialogues. It is possible to start one dialogue to perform a task, and then start a subdialogue before the first task is completed. When the second task is completed the system automatically returns to the first task, and explicitly signals this. This gives the user freedom to switch task at any time:

Ex. 2:
U: "Change Lisa's home number."
S: "Okay. Let's see. What phonenumber do you want instead?"
U: "Check my messages."
S: "You have got this message. Hi! I have got a new home number, it is (031)234567. Best regards, Lisa."
S: "Returning to change an entry. What phone number do you want instead?"
U: "oh three one twentythree fourtyfive sixtyseven."
U: "Okay. Changing Lisa's home number to oh three one two three four five six seven."

4.3 Feedback and grounding

The GoDiS dialogue manager provides general feedback strategies to make sure that the dialogue partners have contact, that the system can can hear what the user says, understands the words that are spoken (semantic understanding), understands the meaning of the utterance (pragmatical understanding) and accepts the dialogue moves performed in utterances.

As an example, the single user utterance "Lisa" may result in positive grounding on the semantic level but negative on the pragmatic, resulting in a system utterance consisting of two feedback moves and a clarification question: "Lisa. I don't quite understand. Do you want to add an entry to the phonebook, call a person, change an entry in the phonebook, delete an entry from the phonebook or search for a name?"

5 Multimodal menu-based dialogue in Dico II

While previous versions of Dico did include some multimodal interaction, Dico II is our most ambitious attempt yet at implementing fully the concept of multimodal menu-based dialogue (MMD). Technologies for MMD in menu-based applications have already been developed for other GoDiS applications (Hjelm et al., 2005) and the ideas behind these solutions have been re-implemented and significantly improved in Dico II.

The idea behind MMD is that the user should be able to switch betweem amd combine modalities freely across and within utterances. This should ideally make it possible to use the system using speech only, using traditional GUI interaction only, or using a combination of the two.

MMD enables *integrated multimodality* for user input, meaning that a single contribution can use several input modalities, e.g. *"Call this contact [click]"* where the [click] symbolises haptic input (e.g. amouse click) which in this case selects a specific contact. For output, MMD uses *parallel multimodality*, i.e., output is generally rendered both as speech and as GUI output. To use speech only, the user can merely ignore the graphical output and not use the haptic input device. To enable interaction using GUI only, speech input and output can be controlled using a "push-to-talk" button which toggles between "speech on" and "speech off" mode.

Acknowledgments

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