User Modelling as an Aid for Human Web Assistants

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Abstract. This paper explores how user modelling can work as an aid for human assistants in a user support system for web sites. Information about the user can facilitate for the assistant the tailoring of the consultation to the individual needs of the user. Such information can be represented and structured in a user model made available for the assistant. A user modelling approach has been implemented and deployed in a real web environment as part of a user support system. Following the deployment we have analysed consultation dialogue logs and answers to a questionnaire for participating assistants. The initial results show that assistants consider user modelling to be helpful and that consultation dialogues can be an important source for user model data collection.

1 Introduction

Previous research and recent commercial developments have highlighted the importance of so-called *web assistant systems* [1]. A web assistant system is a user support component that can be added to any kind of web information system (e.g. for electronic commerce, digital libraries, or home banking). The system is a collaboration between computer-based and human-based support, for example forcing the computer-based support to handle routine user support problems, and thus allowing the human assistants to deal with more complex issues.

Information about a user can allow a human assistant to provide high quality support by tailoring the consultation to the individual user. Having such information readily available can also make consultation dialogues more efficient and thus save time and other resources. A step towards a more efficient and personalised support could be to provide the human assistants with a user modelling tool. This kind of tool should present the assistant with relevant information about the user when it is needed in the consultation dialogue.

The aim of this paper is to explore the value and feasibility of user modelling for web assistant systems. We have chosen to implement and deploy a simple user modelling tool for human assistants and study it in a real web environment. The system was deployed at a non-profit site called Elfwood, with a focus on science-fiction and fantasy related art and literature. Voluntary assistants from around the world participated and made use of the user modelling tool when assisting

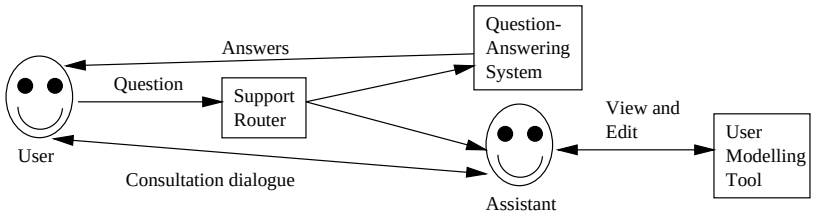

Fig. 1. Overview of the web assistant model

users during a period of three weeks. Apart from testing technical feasibility our study focuses on two questions: 1) What are the subjective opinions of assistants towards the concept of such a user modelling tool? 2) What kind and amount of user model data can be collected from consultation dialogues?

2 Web Assistant System

An overview illustration of our web assistant model is presented in Fig. 1. The user's support process is initiated when the user asks a question in natural language. The user's question is fed to the automatic question-answering system (analysed further in [3]). FAQ items which closely match are returned as potential answers to the user's question. If the user does not find the returned answers satisfactory, the support router will connect the user to a human assistant with expertise matching the topic of the question. If all the appropriate assistants are currently busy, the user can choose to wait in a queue. Once an assistant is available the user is connected to that assistant and can proceed with a consultation dialogue via textual chat.

In the user modelling component, information about a user is stored in a predefined attribute hierarchy, in an overlay style. The attribute structure was defined in cooperation with several expert artists and writers that were members of Elfwood. A user's model is displayed for an assistant as soon as a consultation dialogue starts. The assistant can then make use of the information in the model to tailor the consultation to that individual user. No automatic inference is performed on the data in the user model, although the assistant is of course free to make inferences as a part of his or her interpretation of the user data. The assistant can also update the model by filling in attribute values based on what is learned from the consultation dialogue with the user.

3 Field Study and Results

The overall objective of our work on web assistant systems has been to explore this kind of system in a real-world application. Thus a field study is a natural research method. During the period of deployment at Elfwood, 636 users

registered with the support system, and 129 of these users worked through the system to have consultation dialogues with assistants. The collected data that we have analysed in this paper is: 1) the results from a questionnaire for the participating assistants, and 2) the logs from the text chat consultation dialogs that took place. For more information about the field study, please refer to [2] where we present complementary results from other questionnaires for users and assistants considering the usability of the web assistant system as a whole.

The questionnaire for assistants regarding the user modelling tool was sent out via e-mail directly after the deployment period. The questionnaire contained questions about the tool and about the process of working with the tool. Respondents had to express their agreement or disagreement with statements on a scale from 1 to 10. We also asked for textual explanations for the quantitative answers. A total of 14 assistants responded with completely filled out questionnaires (response rate of roughly 47%). The main result here is that the assistants did indeed find the user modelling tool helpful. If we disregard the scores of three assistants who never got to assist users with any information in their model, we got a mean of 8.27 with a standard deviation of 1.35, where a 10 indicates that the tool was helpful and a 1 indicates that the tool was of no help.

In our initial analysis of the consultation dialogue logs we have considered in what conversational circumstances user model information becomes available. Following the circumstances identified in [4] we have counted each occurrence of user information that could possibly be useful for the user tasks that we supported, and associated each such occurrence with a corresponding conversational circumstance. The main result from this analysis is that the assistants have an important role to play in gathering personal information about the user. Approximately half of all the user information came up from a direct question by the assistant. In the remaining cases users volunteered personal information, or volunteered information as background information for a problem description. On average, around 1.5 pieces of new user information came up in each consultation dialogue.

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