CHAPTER 2

USER MODELLING IN KNOWLEDGE-BASED SYSTEMS

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I. INTRODUCTION

Computational models for interactive communication have been a growing area of activity in the last decade, both in theoretical investigation and as in practical implementations. Within this framework, we will pay attention to situations where different agents collaborate to solve a problem. In particular, we will now focus on the simplest form, considering two participants; a computer system and a user. Let us suppose they can communicate by formal, (restricted) natural language, graphics or any other means in order to achieve a given goal.

A major problem for cooperative communication is providing computer systems with capability to adapt themselves to each user so that on the one hand, they can offer support adapted to the user’s competence and, on the other hand, they can inform accurately about their own knowledge and problem solving ability.

The purpose of this paper is twofold; first describe the type of necessary knowledge about a user in order to enable a computer system to carry out an effective communication. Second, to present different approaches to acquire and formalize this knowledge so that it can be handled in an automatic way.

In the second section some interactive situations are overviewed. A typologie is proposed for them in terms of the role played by the user in the communication process. Next, in section three, the content of a user model and some classification criteria are discussed. After that, two components of the model are studied; domain knowledge in section five, goals and plans in section six. Techniques to build models of different complexity are explored in more detail in section seven and eight. Finally, current results and guidelines for future research are summarized in the conclusion.
II. SITUATIONS OF INTERACTIVE COMMUNICATIONS

Question-answering systems are one of the fields where cooperative communication was first considered. Data Base Systems are a typical example. In this case the scenario consists of a user asking for information about the particular domain described in the data-base. The user formulates his requirements in a formal consulting language.

Then, the system processes the question and outputs either an affirmative answer consisting in the enumerations of the elements in the data-base verifying the properties required, or a negative statement.

This kind of interaction is based on several assumptions; first, the user knows what can be asked to the data base, and, therefore, all his questions are expected to be answered; second, the user knows how to ask questions about what he wants to know; and third, he should be able to interpret the answers correctly, specially the negative ones. In practice, the previous hypothesis demands that the potential users have a strong background on the database structure and content and therefore queries are usually formulated by data-base technicians.

According to Weber [Web–86], a question is a request to the interlocutor so that he provides the desired information and carries out the necessary actions to guarantee an effective communication. These actions will sometime consist in conveying supplementary information, as in example 1.

Example 1
Q- Where is the key to the secretary’s office?
A- In the little cupboard, but it’s closed.

Others, such as the one in example 2, offer a correcting answer which explains why the question (the way it has been formulated) has not had the expected answer.

Example 2
Q- Which is today’s index?
A- Today, the stock market session in Barcelona has not finished, yet.