Chapter 10

A Flexible Framework for the Knowledge-Based Generation of Multimedia Presentations

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This chapter presents an approach for the knowledge-based multimedia presentation generation. The basic idea is to clearly separate the information to be presented from its presentation and from the context in which presentation generation takes place. Therefore, we introduce an approach for modeling information and its characteristics. We describe how these characteristics can be used for presentation generation. To control the basic steps of multimedia presentation generation (content selection, media selection, media realization and layout realization), we use a context model which considers a wide range of influencing factors. Finally, we present a multimedia information system based on the ideas described in this chapter.

INTRODUCTION

The effective and appropriate presentation of information is an essential task in our information society. A very useful way for this are multimedia systems. They use different media for different messages and offer therefore powerful functionality. Before a conventional multimedia system can be used, the presentation objects and the interaction structure have to be generated by a developer. This leads to a high effort for development and a low level of flexibility.

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In contrast to this, Intelligent Multimedia Systems (IMMPS) generate multimedia presentations on the fly responding to questions asked by a user and adapting to his requirements. During this generation process, several influencing factors are considered (e.g., characteristics of the user, the application and the computing resources). Therefore, these systems realize a flexible framework for implementing individual requirements of users and situations. IMMPS are intelligent in that sense, that they are able to make appropriate design decisions based on contextual knowledge. Nowadays IMMPS are special-purpose-systems, which manage special information with known characteristics only.

In (Bordegoni et al., 1997), a general reference model for IMMPS is proposed. This reference model describes the main processes of an intelligent multimedia presentation, but it does not include any specification of interfaces (e.g. the specification of the information to be presented). This is one reason why – to the knowledge of the authors – no-one has actually tested the reference model yet by building a system conforming to its recommended structure.

In our chapter, we introduce a framework for the rule-based generation of multimedia presentations based on the proposed reference model for IMMPS (see section 2). This is based on separation of information and presentation (see section 3). We focus on the process of media selection (see section 4). Finally, we prove our ideas by a prototype multimedia information system (see section 5).

RELATED WORK

The need for intelligent multimedia information presentation on the one hand and the great variety of influencing factors and conditions on the other hand lead to extensive research in the last years (WIP (Andre, Finkler, Graf, Rist, Schauder and Wahlster, 1993), COMET (Feiner and McKeown, 1993), AIMI (Burger and Marshall, 1993), CUBRICON (Neal and Shapiro, 1994), PROMISE (Alty, Bergan, and Schepens, 1995), MMI (Wilson, 1995), PPP (Andre, Muller and Rist, 1996), (Shih and Davis, 1997)).

Known IMMPS differ, e.g., in the types of media used for presentation, the underlying knowledge, the strategies of processing and possible interactions. To avoid further replication of results and limited re-use of previous solutions, a reference model for IMMPS was proposed (Bordegoni et al., 1997). The model consists of five layers connected to a knowledge server.

Common IMMPS do not meet all the requirements of this reference model. In most cases, they are application dependent and realize only the necessary functionality. A more general approach in the sense of the reference model has the drawback that it would be inefficient because it would not consider special requirements.
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