Adaptation in Multimedia Systems

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Abstract. Multimedia systems can profit a lot from personalization. Such a personalization is essential to give users the feeling that the system is easily accessible especially if it is done automatically. The way this adaptive personalization works is very dependent on the adaptation model that is chosen.

We introduce a generic two-dimensional classification framework for user modeling systems. This enables us to clarify existing as well as new applications in the area of user modeling. In order to illustrate our framework we evaluate push and pull based user modeling in user modeling systems.

Keywords: multimedia adaptation, user modeling, adaptive systems, adaptation models, hybrid adaptation

1. Introduction

Multimedia documents are often time based and mono-directional. As such it can be hard to isolate those parts from the multimedia document which are relevant to the user. This in contrast to text documents in which one can easily scan the document for the interesting parts.

To alleviate these problems one can identify scenes in the document. This allows searching on a higher granularity level than time-unit based searching. Without a scene description however it is still hard to know which scene a user is interested in. We believe that user modeling can help here by offering a user-adapted path through the document. This belief is supported by [2] and other publications.

This paper focuses on the ways one can perform the modeling and personalisation. Both modeling and personalisation are described by the adaptation model. This adaptation model can be seen as describing how the user models need to be created, maintained and used.

We distinguish two kinds of adaptation models: a push adaptation model and a pull adaptation model. Those models are based on the direction of inference in the system. Further it is possible to combine both models into a hybrid adaptation model that combines aspects of both models.

While publications have described the use of both kinds of models and combinations of them, they have not explicitly evaluated the advantages and disadvantages of those models. We believe that this is important to be able to design user modeling systems better.
In this paper we analyse the differences between the push and pull adaptation models. For that it is important to first define what a user modeling system actually is, and which parts of a system can be seen as a part of the adaptation system.

**Multimedia case:** In this paper we aim to explain the theories based on the following case: We have a multimedia document that is composed of various media components. Those components are for example video or audio fragments. For some fragments there are also alternatives. Those alternatives can be used to personalize the presentation. In this case we suppose that we have much more material than can reasonably be presented to any one person. It is also unlikely that every user is interested in all fragments.

2. **Overview of user modeling systems**

A user modeling system is a system that shows adaptive behaviour concerning its interaction with the user. For explaining the difference between conventional systems, i.e., interactive systems that do not employ user modeling, (see figure 1(a)) and user modeling systems (see figure 1(b)) we first need to describe conventional systems in a suitable way. Then we need to describe user modeling systems, and compare them. In the next two sections we will describe both conventional and user modeling systems.

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**Figure 1.** Comparison of normal and user modeling interactive systems.