

# Generic Support for Personalized Mobile Multimedia Tourist Applications

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## ABSTRACT

Mobile applications such as mobile tourist guides that provide tourists with location-based information today mostly aim to adapt the multimedia content to the different end user devices. More and more, these applications also exploit positioning information like GPS to guide the user on the trip. What is still lacking, however, is a *personalization* of the content to the interests and preferences of the individual tourist and the characteristics of the used end device. However, such a personalization increases the application's complexity since every individual alternative has to be considered and implemented. To provide substantial support for the development of personalized (mobile) multimedia applications, we developed a domain independent software framework for an efficient and cost-effective development of personalized mobile multimedia applications. We illustrate the framework in the specific domain of personalized mobile tourist information.

**Categories and Subject Descriptors:** H.5.1 [Information Interfaces and Presentation]: Multimedia Information Systems; H.5.4 [Information Interfaces and Presentation]: Hypertext/Hypermedia

**General Terms:** Design, Experimentation, Human Factors

**Keywords:** travel and tourism, multimedia presentation generation, personalized multimedia, mobile multimedia

## 1. INTRODUCTION

In the area of mobile applications, e.g., tourist guides, we find systems that provide orientation and navigation information and more and more systems that provide location based (multimedia) information. However, typically each and every person receives the same information. A more individual selection and personalized presentation of the sightseeing information, however, would provide an added value for the users, since this would take the user's needs, interests, and preferences into account.

The general creation chain for personalized multimedia content is illustrated in Figure 1. In a first step, media elements like audio, video, text, and image are selected according to the user profile information and composed in time and space using an internal multimedia model. In the subse-

quent transformation phase the final presentation format is created and delivered to the client for the actual rendering.

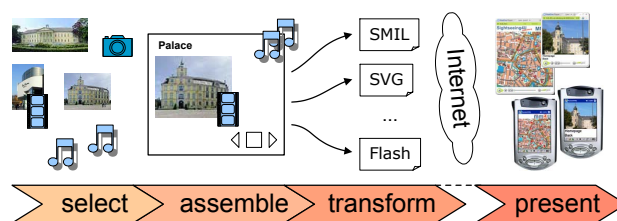


Figure 1: Personalized content creation chain

In the field, we find interesting research approaches with the Cuyppers system [7] and the OPERA project [3]. Even though dealing with personalization, mobile devices are not in their research focus. The dynamic creation of mobile multimedia content can be found, e.g., with the research approaches [5, 4], which use among other things constraints and transformation rules to generate the personalized multimedia content. However, our observation is, that these approaches are limited when it comes to more complex or very application specific personalization tasks and need additional programming to solve the problem. In this paper, we present our approach for an efficient development support for personalized multimedia applications based on a software framework. To proof its applicability, we developed a generic (mobile) tourist application employing the framework to provide personalized sightseeing information on demand. In the following, we first introduce our multimedia personalization framework before we come to our illustrative tourist application.

## 2. THE MULTIMEDIA PERSONALIZATION FRAMEWORK

The generic tourist guide is a concrete instance of our multimedia personalization framework MM4U [2]. This framework supports the dynamic generation of personalized multimedia content in respect of the user's interests and preferences, his or her current location and environment, as well as the used end device. It provides abstract interfaces to access different storage solutions for user profile information and media databases. To serve different presentation formats, the personalized multimedia content is first assembled and composed in time and space using an internal multimedia document model. For the transformation, the framework provides generic support to transform the composition into different presentation formats like SMIL, SVG, MPEG-4,

Macromedia's Flash, and (X)HTML as well as presentation formats targeted for mobile devices, e. g., the Basic Language Profile of SMIL and Mobile SVG. Additionally, upcoming versions of the presentation formats can be easily integrated and the framework is extensible in regard of new ones. The overall goal of the flexible and extensible multimedia personalization framework is to simplify and to cheapen the development of arbitrary personalized multimedia applications.

The components, classes, and interfaces of the framework are specified using the Unified Modeling Language and have been implemented in Java. The framework implements the different aspects of the multimedia personalization process like the mobile aspect [6], the multimedia composition, and the transformation to different presentation formats.

### 3. THE GENERIC TOURIST APPLICATION

The aim of our tourist application is to provide a generic support for personalized (mobile) multimedia applications for travel and tourism. It exploits our multimedia personalization framework and serves at the same time as one example to proof its applicability. The application not only employs the framework but also forms a new module in the extensible framework. The generic tourist module is applicable to any city and place. The provided tourist information consists of a map of the relevant area together with a set of points of interests (POIs) or sightseeing spots on it. When the user clicks on one of these sights, he or she receives a multimedia presentation with further information about it. In terms of personalization, the multimedia content is created according to the following aspects:

The proper sights that are presented on the map are automatically selected depending on the specific sightseeing interests and preferences of the user. This is realized by category matching of the user's interests with the meta data associated to the sights. As additional preference, the user can, e. g., select the preferred language.

Since not all multimedia players are available on all end devices and not all presentation formats are suitable for all of these devices, the generic tourist guide supports different output formats such as SMIL and SVG as well as their profiles for mobile devices. This enables the tourist application to deliver personalized multimedia content for different types of end devices.

To meet the limitations of mobile devices, media objects of lower resolution are used for the presentation generation on PDAs and mobile phones. If an end device or presentation format does not support videos, the personalized tourist guide automatically selects relevant pictures instead and generates a slideshow for the user. The same is done, if there is no video of a sight available at all.

The limitations of mobile devices also effect the layout of the mobile presentation. Consequently, not only media elements of lower resolution and size are selected, but also the layout of the multimedia presentation is changed, e. g., the heading line of the sight's presentations is removed for the mobile devices.

Utilizing the generic tourist application, we developed a concrete demonstrator for our home town Oldenburg for about 25 sights in the city centre. Personalization is supported in regard of the user's interests, e. g., churches, museums, and theaters, and preferences regarding his or her favorite language. Also media elements of different resolution

are selected, the layout adopted, and different presentation formats supported. Figure 2 shows selected screenshots from the sample application that illustrate the creation of different content in different formats for different devices. The left side of Figure 2 shows the tourist guide of a user who is interested in culture (Desktop PC with SMIL), whereas the right side presents the selected POIs of a user who is hungry and searches for a good restaurant (PDA with Mobile SVG). The Desktop PC version is used for pre-trip and post-trip planning, whereas the PDA is actually guiding the tourist on the trip.

We set up a test site [1] of the tourist guide of our home town for demonstration purposes. This page allows visitors from the Internet to dynamically retrieve their personalized multimedia tours in our home town. It has been designed such that one can experiment with all the different application's features and presentation options and by this experiment with the framework's features.



Figure 2: Screenshots of the city guide application.

### 4. CONCLUSION

In this paper, we motivated the need for an efficient and cost-effective development of personalized (mobile) multimedia tourist applications. Based on our framework for personalized multimedia content creation, we developed a generic tourist application that is applicable to any city and place. With the framework, we contribute to a more efficient, simpler, and cheaper development of personalized (mobile) multimedia applications. To show the applicability of our framework in other areas, we are currently developing a personalized sports news ticker and interactive instruction manuals on mobile devices.

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