Using Multimedia Content in Intelligent Mobile Services

Fernando Koch  Liz Sonenberg
Institute of Information and Computing Sciences
Utrecht University, Utrecht, The Netherlands
Department of Information Systems,
University of Melbourne, Parkville, Australia
Email: fkoch@acm.org, l.sonenberg@unimelb.edu.au

Abstract
This work presents a demonstration application where Multimedia Messaging Service (MMS) was used to create a pervasive museum guide system. We present the framework to create a context-aware mobile application and show the importance of using Multimedia content and commercially available infrastructures.

1 Introduction
Let us consider the scenario where a Museum wants to provide intelligent guidance to its visitors by delivering a contextualized explanation of its exposition. The common solution requires the use of rent-out head-phones and the user selects manually the content he wants to hear. Examples of such systems can be found in the Louvre Museum in Paris and the Van Gogh museum in Amsterdam. However, this solution makes few or no use of Multimedia capabilities and it is neither pervasive nor ubiquitous. It requires the use of proprietary devices, specific content deliver technology and user intervention.

One solution is to create a system that delivers content to the visitors’ own mobile phones. In order to be pervasive, the application must be able deliver relevant content to the device based on visitor’s context (location and interests, for example). To create a viable application, the system must use commercially available telecommunication services. Finally, to make the content interesting and reduce communication costs, the tiny amount of transmitted data must contain as much information as possible.

In light of the challenge discussed above, this work presents a context-aware application [1] that infers the visitor’s interest based on his profile and physical location. For the content creation and deliver, we present a solution using the now (popular) Multimedia Messaging Service (MMS) [2]. This service is available in today’s mobile phones and is commonly used to send messages with pictures taken by the camera embedded on the device.

1.1 Related Work
Several context-aware guide systems are being researched by other groups. For example, the CyberGuide project [3] focuses on how portable computers can assist in exploring physical spaces and cyberspaces, and the project CRUMPET [4] has as goal to implement, validate, and trial tourism-related value-added services for nomadic users.

However, these works do not address the problem of the content format and how to deliver it. Our solution complements the existing research by making use of available devices and technologies for context inference and content delivery.

This work focuses on the problem of Mobile Multimedia content creation and the use of pervasive technologies. We will overlook details about the location system, knowledge representation and context resolution.

The section 2 presents a description of the problem and the support and infrastructure technologies; the section 3 presents our approach, and the Conclusion we analyse the results and point out future developments.

2 Problem
The problem is how to create a museum guide system that delivers contextualized information material
to commercially available portable communication devices. To enrich user’s experience the content will contain multimedia elements such as a picture and voice explanation. Moreover, the system delivers the content without user’s intervention based on previously configured preferences and location. Finally, the user should be able to retrieve a personalized brochure of his visit later on from his Internet connection at home. The Figure 1 shows the intelligent museum scenario.

The infrastructure involves: a positioning system manageable by the museum; a representation system for the user’s preferences; a representation system for the museum portfolio; a method to compose and deliver multimedia material to mobile phones, and; a storage system to record the generated mobile brochures and interactions with visitors. For the sake of briefness, this work will overlook the details on the location service operations and about pre-loading the user preferences.

3 Approach

In our Location System architecture the Point of Presence (PoP) are Bluetooth enable receivers. When the PoP detects a device in its range it sends an event to the Location Server informing the device’s identification and distance. By combining the events from several PoP it is possible to triangulate the device’s position.

For composing and delivering the multimedia material, we used the Multimedia Messaging Service (MMS). MMS extends text messaging (SMS) to include longer text, graphics, photographic imagery and audio and video clips.

The system architecture is presented in the Figure 2. Its operation is described as:

1. The visitor is detected stepping in the museums by a Point of Presence in the entrance and this information enables the visitor’s profile in the museum (previously loaded);
2. During the visitation, the system detects the visitor’s position as standing in front to a exposition; then the Location Server sends the event to the Context Solver;
3. The Context Solver check the visitor’s profile and infers if he would be interested in receiving information about that exposition; the Context Solver can also have rules about the curator’s interest on the content to deliver and deliver orientations;
4. In case of a positive context, the system sends an event to the Multimedia Mobile Brochure Gener-$
ator; this component access the information from the museum’s database, composes the MMS message and sends it to the mobile network;

5. The visitor will receive the MMS notification and has the option to download the Multimedia message; the message is composed by a text, a picture and a voice explanation.

To implement the Mobile Brochure Composer we used the Openwave MMS SDK 1.0 (http://www.openwave.com). MMS messages are RFC822 files with a special content called Synchronized Multimedia Integration Language (SMIL). The graphics are created using GIF files and the audio are Adaptive Multi-rate Codec (AMR) files [2].

The Figure 3 shows the received Mobile Multimedia brochure. Although the size limit for a MMS messaging is device-dependent, for practical and cost-related reasons the created brochures must be as small as possible. In our application, the average message size is 25KB distributed as: text and headers are 2KB, image is 6KB and audio is 17KB (for a 60 words explanation).

4 Conclusion

It is feasible to create a simple guide system using common life devices and commercially available infrastructure. The components are very simple and modularized. We used standard development libraries, emulators and hardware what facilitated the development.

Despite the simplicity of this prototype it is possible to visualize the potential of the technology. The files are small and offer a simple but interesting Multimedia experience. The information is enough to provide a basic explanation about the exposition. Moreover the user interaction is reduced to a minimum making the system pervasive and simple to operate.

Finally, this application motivates the use of the Multimedia Mobile Services contributing towards the technology penetration.

Future works involve:

- **improve data modelling**: on how to represent the multimedia content and create better presentations; further research is under its way;

- **improve the user modelling and context resolution**: through the use of personalization and situated technologies such as software agents; by better modelling the user’s mental states it is possible to make better assumptions on its interests and deliver only the relevant information.

Acknowledgements

This work was conducted while Fernando Koch was a visitor to the Department of Information Systems, University of Melbourne. The authors are grateful to Iyad Rahwan and Kattan Anton for the discussions surrounding the paper topic.

References


