

Virtual Campfire - Collaborative Multimedia Semantization with Mobile Social Software

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Abstract. Apart from automated techniques, collaborative multimedia semantic annotation by people, in particular communities of domain experts, are and will be powerful contributors to multimedia semantization. Recently, we extended our LAS server towards an XMPP server, thereby enabling the real time intertwining of communication and the collaborative utilization of remote services, in particular MPEG-7 multimedia semantic annotation and retrieval services. Within the context of the UMIC Virtual Campfire scenario, this contribution presents a set of mobile multimedia semantic annotation services and tools and their usage in a collaborative multimedia annotation scenario for cultural heritage documentation. In particular NMVX, an MPEG-7 multimedia semantic annotation tool in conjunction with a standard XMPP IM client are demonstrated, both powered by the same LAS XMPP server.

Keywords: Multimedia semantic annotation, MPEG-7, mobile social software, SOA, XMPP, community information systems

1 Introduction to Virtual Campfire

In recent years, great progresses have been made in technologies of mobile network technologies, mobile applications and services, mobile user interfaces, and mobile devices. Like the Linux developer communities in the early years, developers have paid attention to applications and services running on mobile devices such as Java ME devices, iPhones, Google Android devices, etc. User generated services and applications on mobile devices are going ahead together with user generated content on the Web 2.0.

Challenges in developing mobile services and applications are multifold. There is a great variety of mobile standards, operating systems on different devices. Often unfortunately, one application can work on one cell phone well, while it does not work on the other. Meanwhile, Social Software allows users to be content prosumers (consumer and producer in parallel) anywhere at any time. Web 2.0 and Social Software result in a great amount of multimedia content which should be used by mobile communities. How well the mobile services and applications work is also hard to measure.

Virtual Campfire is an approach to providing cross-media and cross-community support for the management of multimedia contents. It serves as a framework for various services enabling communities to share knowledge about multimedia contents.

The core of this framework is a Lightweight Application Server (LAS) [3] serving as the backbone of the Virtual Campfire framework to show its applicability in various application scenarios (cf. Figure 1). It provides communities a set of core services and MPEG-7 semantic multimedia metadata and content processing services to connect to heterogeneous data sources. Furthermore, storytelling services [4], context-aware search services [1] etc. use MPEG-7 services to re-contextualize multimedia content via a non-linear storytelling approach and to search multimedia by giving spatiotemporal and community context information.

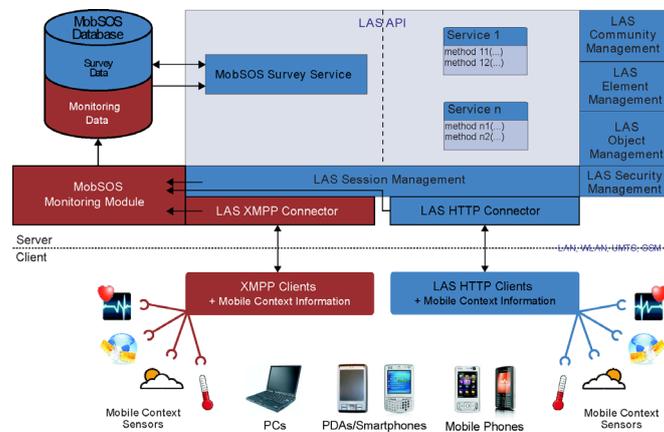


Fig. 1. The LAS Service Architecture for Mobile Applications

Recently, we extended LAS by a connector for XMPP [5], a bidirectional XML-streaming protocol with built-in pull/push/broadcast and server-to-server communication, TLS/SASL encryption, etc. Currently, the protocol core and the standard Jabber RPC XEP were implemented. A LAS XMPP Extension Framework enables the integration of arbitrary extension protocols by the implementation of connection and namespace handlers. The current implementation allows simultaneous utilization of direct user-to-user communication, remote service invocations, etc. Such a scenario is presented in Section 3 with NMVX, a LAS MPEG-7 application enabled to connect over XMPP.

The MobSOS testbed is an extension of LAS primarily designed for the measurement of multimedia service success. The underlying homonymous success model combines qualitative and quantitative measures and takes into account modern requirements for mobile multimedia communities. Model data is collected using the two techniques of monitoring and user surveying. Besides the usage for service success measurement, monitoring data transmitted by mobile devices, in particular context information is used for context-aware services such as automatic MPEG-7 based semantic tagging (e.g. location, time).

The scenario we present here is a cultural heritage documentation scenario of the giant Buddha statues in the Bamiyan Valley. While an on-site researcher team is

actively collecting multimedia with mobile capturing and annotation tools, off-site researchers use desktop applications to immediately access the captured media in order to semantically enrich annotations from their colleagues and to re-contextualize the media using non-linear storytelling tools. All scientists coordinate their work with each other remotely, using synchronous communication tools such as XMPP chat clients.

The following sections present a selection of our prototypes for the demonstration.

2 Mobile Multimedia Capturing & Annotation

NMV Mobile (cf. Figure 2, left) is a multimedia capturing, sharing and annotation system powered by LAS MPEG-7 services. It supports free text annotations, plain keyword tagging as well as MPEG-7 standard compliant community-based semantic tagging to enhance semantic multimedia search and retrieval. *NMV Mobile* demonstrates the access to mobile context sensors (e.g. GPS) for automatic semantic tagging. The application is realized for J2ME enabled devices compliant with MIDP2.1/CLDC1.1 and demonstrated on a Nokia N95.

ACIS is a GIS enabled multimedia information system hosting diverse user communities [2] and facilitates the intergenerational cooperation among communities on an international level. Similar to *NMV Mobile*, *iNMV* (cf. Figure 2, right) uses the iPhone GPS sensor to automatically tag photos with spatiotemporal information and upload and retrieve multimedia incl. MPEG-7 metadata using our services.



Fig. 2 *NMV Mobile* on the Nokia N95 (left) & *iNMV* on the iPhone (right)

3 Collaborative Multimedia Annotation

The LAS XMPP extension was recently demonstrated in a collaborative multimedia annotation scenario using *NMVX*, an XMPP enabled version of the *NMV* desktop version in conjunction with the standard XMPP instant messaging client Pidgin (cf. Figure 3). Both tools connect to the same LAS server via XMPP. While direct communication among users is performed as a chat in Pidgin, multimedia semantic annotations are assigned using *NMVX*. In further versions of *NMVX* we intend the integration of direct communication with service invocation in one tool.

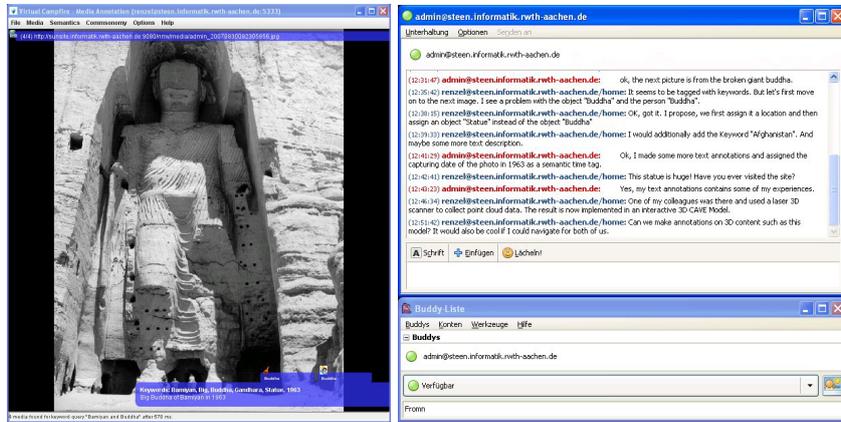


Fig. 3. Collaborative Multimedia Annotation with NMVX/Pidgin

4 Innovative Aspects of Virtual Campfire

Virtual Campfire offers an open architecture that helps professionals flexibly create information systems in versatile application domains. It combines advanced multimedia standards and database technologies that support the creation of mobile information systems on heterogeneous devices.

Acknowledgments. This work has been supported by the UMIC Research Centre, RWTH Aachen University and the EU FP7 IP ROLE. We would like to thank our colleagues for the fruitful discussions.

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