Media Enrichment on Distributed Displays by Selective Information Presentation: A First Prototype

Michael Krug, Fabian Wiedemann, Martin Gaedke

Chemnitz University of Technology, Germany
{firstname.lastname}@informatik.tu-chemnitz.de

Abstract. The Internet offers a wide range of information and media content. Currently, users who are watching a video and look for related information have to search for it by themselves. In our recent work we focused on how to enrich video content with additional related information. This paper presents an approach to extend media enrichment to support the presentation of additional content on multiple distributed displays. Our approach focuses on real time synchronization between a video on one display and the presentation of related information on the same or any other display with a web browser.

Keywords: Media enrichment, mashups, mobile web applications, HTML5.

1 Introduction

While consuming media, the users' need for additional content is becoming increasingly important. Users often inform themselves about the currently watched show on television using the Internet on their mobile devices [1]. For example, the discovered information about the currently watched program can be a list of actors or statistics related to a sportscast. This inspires us to provide the viewers directly with related information instead of having them search for it on their phone or tablet.

The purpose of this paper is to demonstrate our approach for enriching videos with additional related content, while not limiting the presentation of this content to the display that is showing the video. We extend the second screen approach [2] to present information on distributed displays, such as TV, tablet, smartphone or PC. This offers users who are watching a video the opportunity to interact with the additional information. As an example, a map, showing coordinates related to the video content, is displayed on a tablet, thus the users can interact with the map much better compared to displaying it on the screen playing the video.

The rest of this paper is structured as follows: We give an overview of our approach for media enrichment in Section 2. In Section 3, we describe our planned demonstration. Finally we conclude the paper and provide an outlook to further developments.

Demonstration: The prototype presented in this paper is available for testing at: **http://vsr.informatik.tu-chemnitz.de/demo/chrooma/icwe13/**

2   Approach for Media Enrichment on Distributed Displays

Our approach for media enrichment on distributed displays uses three components implemented as JavaScript classes: *SmartScreen*, *MessageCenter* and *SmartTile*.

A *SmartScreen* is an abstract representation of a web browser window. It is the host for multiple *SmartTiles* and contains a *MessageCenter* for communication purposes. The *SmartScreen* provides a mashup environment for *SmartTiles* and is responsible for adding, removing and arranging them in a device-specific grid. Fig. 1 illustrates the process of media enrichment on two displays using our components.
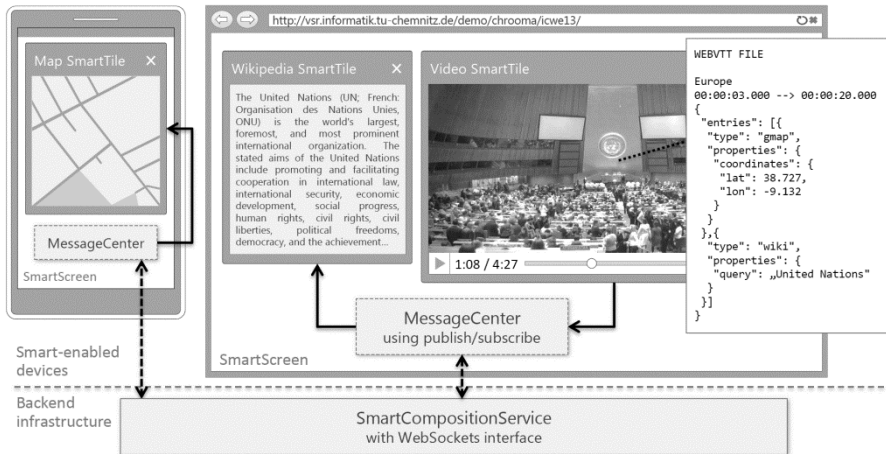

Fig. 1. Media enrichment using SmartTiles

SmartTiles are widgets that can process and display a certain kind of information. They have a unique name, which describes their type, a method for initialization and one for processing an event. *SmartTiles* can be created and removed on runtime. Users can rearrange them using drag-and-drop. New types of *SmartTiles* are derived from a basic *SmartTile* class using prototype-based inheritance and can be added like plug-ins. When a *SmartTile* is added to the *SmartScreen* it can subscribe to one or more topics, which can be changed at any time. A special type of *SmartTile* is the video *SmartTile*. Using metadata attached to the video, the tile is publishing events on various topics synchronized to the current time of the playing video. The metadata modeling and processing is described in our recent work [3]. We implemented other *SmartTiles* that can display a map, Tweets containing a word, tagged images or an extract from Wikipedia. There are also *SmartTiles* that process the information and publish it in a converted form, like translation or geocoding.

The *MessageCenter* manages the information exchange using a publish/subscribe mechanism. This offers loosely coupled, asynchronous communication. Information is encapsulated within an event as structured or unstructured data. To support publication to other *SmartScreens*, a synchronization mechanism is necessary. Thus, we implemented a WebSockets server as a part of the *SmartCompositionService*, which distributes all events it receives to all connected clients except the sender. Therefore,

we extended the publish/subscribe mechanism as follows: on every publication the event is sent to the server. If an event from the server is received, the *publish* method is called without sending it back to the server to prevent a loop. This approach assures that each client behaves equally regardless of where the event was published.

An event has a lifetime defined by the metadata of the video. Thus, an "information is not relevant anymore" event is published, which admits the *SmartTiles* to remove their content. A *SmartTile* that is currently displaying information will not get a new event to assure that the content is displayed as long as it is valid. To prevent redundant display of the same information in the same kind of way, an event is not published to multiple *SmartTiles* of the same type on the same *SmartScreen*.

3   Demonstration of Media Enrichment

In the demo session we are presenting our first prototype for media enrichment on distributed displays. We are using a video clip of the German newscast "tagesschau", which is annotated with metadata. The video will be displayed on a large display like a PC and related additional content on the same display and on a smaller one like a tablet. This will demonstrate the real time synchronization between both displays. Further on, the demo illustrates the selective information presentation by showing additional content only on the display where the corresponding *SmartTile* is present.

4   Lessons Learned and Outlook

With this first prototype we built the basis for achieving media enrichment on distributed displays by selective information presentation. We provide several widgets, called *SmartTiles*, which form a mashup to enrich media on multiple displays. The prototype supports distributing information to multiple *SmartTiles* using a publish/subscribe mechanism and across multiple *SmartScreens* using WebSockets in real time. This works on desktop as well as on recent mobile browsers using standardized Web technologies. Our future work will focus on extending the prototype to support widget exchange between multiple *SmartScreens*. Additionally, we will conduct user studies to examine human information perception while using multimedia mashups.

References

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