TOWARD A SEARCH ENGINE OF MULTIMEDIA PRESENTATIONS

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Abstract: Facing to the multi-media explosion, it is necessary to develop new information access methods which allow both fast and natural information access. To take into account this aspect for multimedia presentations, it needs to implement a graphical interface facilitating the cross, the search and the visualization of the medias. Moreover, this interface must answer the readers aspirations for both conviviality and easy use. This article presents an interface paper for multimedia presentations and proposes an indexing method for exploration on the WEB.

1 INTRODUCTION

The research of video is a difficult task because it is essentially about a time-dependent media. At one instant 't', its visualization gives access to a part of information, and doesn't permit to deduct the global context. On the other hand, the sequential searching on a video proves to be expensive in terms of time (the length of the sequence can go until several hours) and in resources (CPU time, bandwidth…). It is therefore necessary to offer mechanisms permitting a fast and efficient access to the information contained in a video, without having to cover it entirely.

Therefore, the implementation of a diffusion video environment must take into account the following points: the primitives of description of the video, the organizational methods and the implementation of a convivial interface.

Our solution, called "paper interface" was developed in this way. It is a Web interface whose appearance is inspired strongly from the principle of the classic newspaper. A "paper interface" is a Web page permitting to organize the videos in several themes. The page associated to a given theme contains, for every video, an image capture of this video as well as the first lines of an associated explanatory text. The organization and the page setting of the interface are inspired from the principle of the classic newspaper (setting in columns, choice of the police of the text and titles…), from where the appellation of paper interface. This resemblance to the newspaper confers to the interface a familiar and convivial aspect.

Section 2 presents our solution and its implementation. In order to complete this solution, section 3 provides a draft for indexing multimedia presentations. We finish by a conclusion in section 4.

2 THE PAPER INTERFACE

The paper interface comprises a main Web page permitting to present the different themes, and containing some links toward the Web pages associated to every theme. To every theme is associated a folder containing the recordings video, the associated explanatory texts, as well as the set of the files necessary to the good performance of the interface.

The choice of a Web solution is motivated by the evolution of Internet and the success of the World Wide Web making it a universal platform for multimedia diffusion with least cost. On the other hand, one of the advantages of the Web is its capacity to separate the presentation of the information from its content, in order to better secure the system.

The proposed solution uses the HTML language, jointly to ActiveX technology permitting to integrate the ActiveX of RealOne Player to the paper interface.

A language of scripts permits to manipulate the methods of the ActiveX. Our choice was about the language Java Script because it permits to manipulate the methods of the ActiveX of RealOne Player, and assure a portability (inherited of the Java language) on all platforms.

2.1 Why SMIL Language?

The format of specification used by the authoring environment has an important role in the implementation of the system, since the popularity of the chosen language affects the possibilities of diffusion of these presentations on a large scale, notably on the Web, that's what justifies the choice of the HTML language. However, the absence of synchronization mechanisms makes that HTML is inappropriate to the modelling of synchronized multimedia presentations where the temporal component is predominant.

The interface paper integrates several synchronized multimedia flows; it is obviously this aspect of synchronization that justifies the choice of the SMIL language (W3C recommendation) (W3C, 1998) as specification language within our application.

2.2 Implementation of the Paper Interface

The principle of the paper interface consists in presenting a description of the video in order to give
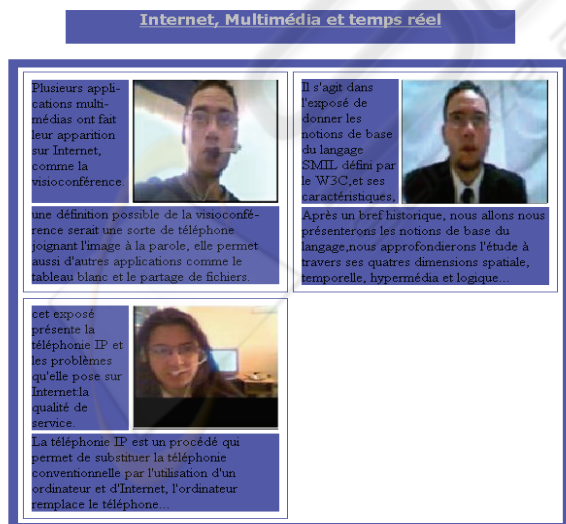

Figure 1: An example of the paper interface.

a preview on its semantic content. The chosen primitives of description are a segment of the

explanatory text associated to the video and a picture extracted from this video sequence.

The extraction of the text consists in extracting automatically the first lines of the text associated to the video, and to integrate them to the paper interface.

However, we don't have a mechanism to capture automatically the video picture. The proposed solution is to create this picture artificially, using the SMIL language and ActiveX technology. The zone of the picture is in fact the display window of the ActiveX integrated to the Web page. The principle consists in starting, for every video, a specific SMIL presentation (noted VideoCap) permitting to play the video during one sufficiently short time interval (of the order of 0.2 to 0.7 seconds) to capture the first picture of it. We will keep this picture displayed thereafter on the screen, what permits to get a frozen picture. The VideoCap presentation is a SMIL presentation generated automatically at the level of the interface according to a preset model that will be given thereafter.

These operations requires the automatic generation of HTML code, jointly to Java Script commands, and the integration of this code in the Web page. The internal data structure of a page associated to a given theme is a dynamic chart defined in HTML. The internal organization of the interface is illustrated by Figure 2.

The general mechanism of working is illustrated by the following sequence:

- The HTML document representing the paper interface contains an ActiveX control of RealOne Player permitting to launch automatically a specific SMIL presentation permitting to capture a picture of the video, noted "VideoCap.smi".
- The SMIL document "VideoCap.smi" permits to play the video sequence "video.rm" during a very short time (here 0.7s), and to keep the last picture displayed on the screen thanks to the attribute fill = "freeze." It contains a link (element area) toward a Ram file "Lien.ram."
- The file "Lien.ram" is a RAM file whose first line makes reference to the main SMIL presentation permitting to play the selected video.
- The main SMIL presentation "Presentation.smi" permits to play the selected video. It contains a link (element area) toward an external HTML page (informations.html) containing informations concerning the video.

The files necessary to the interface working are generated automatically by a software module "the interface generator".

The interface generator is a software tool permitting, from a video and an associated explanatory text, to generate a new entry automatically in the interface paper.
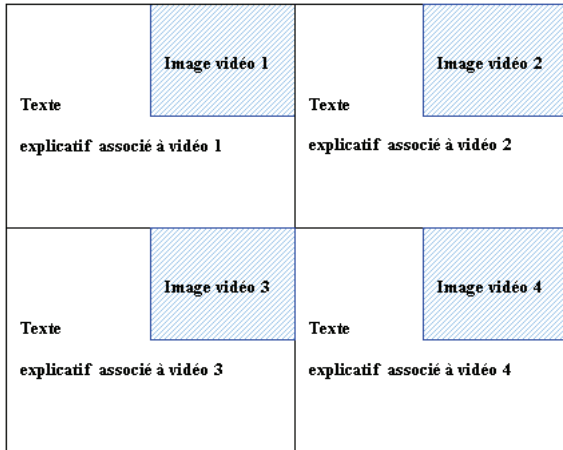

Figure 2: Organisational structure of the paper interface.

This module allows the creation of themes and the addition of new presentations to an existing theme. The solution rests on mechanisms of automatic generation of HTML or SMIL code.

The implementation has been achieved in a SMIL presentations diffusion system on demand, where the customer can have a restricted right of consultation, or have in more, a right of creation, addition and deletion of presentations in the interface paper, according to the type of terminal used and to his statute. The spreading of our interface paper in client/server architecture is based on the requests exchange and SIP answers (Handley, 1999), which contain some SDP messages (Handley, 1998) that transport the useful information.

The integration of the paper interface to a wireless video diffusion platform permitted to get a complete video diffusion system on demand answering the needs of the authors (insertion of new presentations) and of the readers (paper interface facilitating research and the visualization of the medias). The layout and the choice of the fonts, inspired from the classic newspaper, permit a good legibility of the text, in order to adapt it to the reduced display surface of the PDA.

However, in order to allow the users to reach these presentations via the Web, it is necessary to propose indexing mechanisms of these presentations on the Web, and to permit their reference by searching engines.

We will propose an approach of indexing of the SMIL presentations within the interface paper.

3 INDEXING THE PAPER INTERFACE PRESENTATIONS

Since some years, the progress in data processing made that the Web became an immense field of knowledge (Sénac, 1996). The important volume of the numeric data and the diversity of their formats makes that it becomes more and more difficult to find information on the Web, even when this one exists. In general, specialized software "the searching engines", permit to explore the Web and to automate the process of research. In order to make the numeric data accessible to the users, it is necessary to have information on the documents and their semantic content. In the case of multimedia documents, these information become indispensable; otherwise these medias would be inexploitable by the search engines (Hunter, 1998) (Hunter, 2001). The solution proposed by the W3C is to use the Meta data to describe the data contained in the Web. The Meta data are used by the systems of content management (CMS: Content Management Systems) to publish, manage, search for, reuse, distribute and to publish multiple contents (texts, pictures, video, etc.) (Hunter, 2001).

The research made in this sense led to the RDF recommendation of the W3C (Lassila, 1999). RDF (Resource Description Framework) is a tool to encode, exchange and reuse of the Meta data structure. It provides the inter-operability between the applications that exchange non comprehensible information by the machines on the Web. It increases the easiness of automatic treatment of Web resources (Lassila, 1999) (Hunter, 1998). However, RDF has some limitations: In the one hand, it's cannot refer to a portion of a media object; In the other hand, the Meta data are defined in an external file to the resource, whereas it would be preferable to have some information at the level of the resource, as in the case of the SMIL language.

3.1 Integration of the Meta Data in the SMIL Documents

One of the major contributions of SMIL is the possibility to integrate some Meta data within the SMIL document.

We have seen that RDF didn't permit to reference portions of continuous medias. The SMIL language permits to get round this problem using the links of navigation (the "anchor" element of SMIL 1.0 and "area" of SMIL 2.0) with attributes "begin" and "end" permitting to delimit the portion of the wanted media. The use of these elements permits to assign a

reference toward a segment of presentation while using the attribute "id" to identify the segment, and the attribute "href" for referencing the segment.

SMIL permits in addition to refer to a temporal part of the presentation, this part can be either a simple media element (audio, video, text), or composite (element "par" or "seq"), by associating it to a unique identifier.

SMIL permits to reference the multimedia content in an efficient manner, by permitting to segment a media in several portions and associating a description to each of them. However, the list of attributes of the "meta" element stills open, therefore this information cannot be exploited efficiently by any search engine. The ideal would be to be able to describe these informations in a standard manner independently of the application domain.

We opted for a hybrid approach based on the use of the attributes defined by the Dublin Core Metadata Initiative (or rather one subset of these attributes), in order to describe the Meta data in a SMIL 2.0 document. The Dublin core is a set of Meta data attributes defined in order to permits the exchange of Meta data and the interoperability between several domains of application.

The interface generator translates the informations given by the author to Meta data, and inserts them in the SMIL document thanks to the use of the module of Meta data of SMIL 2.0. We defined a model of Meta data containing a subset of the elements of Dublin core.

Every Meta data will be translated to a meta element, where the name of the property is an element of the Dublin Core, preceded by "DC: " in order to signal that it is about an element of the Dublin Core (Powell, 2001).

The SMIL language being drifted from XML, the integration of the elements of the Dublin Core passes by the integration of the corresponding name space.

The elements of the Dublin Core permit to define the Metas data associated to any domain of application. These elements are both comprehensible by the machines and by the users. However, in order to assure a maximal compatibility, the Dublin Core should integrate sets of predefined values associated to every element. Some research are in progress at the level of the DC (Hillmann, 2003) in order to solve this problem.

4 CONCLUSION

The originality of our solution resides in its simplicity of use. Indeed, thanks to a good organization and a suitable layout, the user's attention is carried quickly on the picture representing the video; thereafter, the reading of some lines of the associated text can help him to decide, while giving him a global view of the content. The use of this interface is intuitive, and doesn't require any particular knowledge. Besides, the proposed solution contains an automatic mechanism permitting the generation and the automatic update of the interface paper to a software tool: the interface generator.

We also proposed a new approach of description of the multimedia resources, based on the use of the elements of the Dublin Core jointly to the SMIL language. This solution, applied to the interface paper, permits the indexing of the presentations and their reference by the search engines, notably on the Web.

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