Multimediale Präsentationen für Menschen mit Behinderungen

Multimedia presentations for people with print disabilities

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Zusammenfassung

Multimedia-Dokumente und Präsentationen, wie sie auch in Museen, Galerien und Bibliotheken eingesetzt werden können, nutzen Techniken, welche ebenso geeignet sind, sie behinderten Lesern zugänglich zu machen. Trotzdem ist es schwierig, eine Präsentation für jedermann ansprechend zu gestalten, denn die Anforderungen unterscheiden sich zwischen den Benutzergruppen (z.B. Blinden, Gehörlosen, Legasthenikern).
Mark-up Sprachen ermöglichen die Strukturierung von Inhalten und die Trennung von Inhalt und Darstellungsform. Eine personalisierte Version eines Multimedia-Dokuments kann unter Berücksichtigung der vom Nutzer bevorzugten Präsentationsformen generiert werden.

Abstract

Multimedia documents and presentations, as might be used in museums, galleries and libraries, use techniques which also can help making them accessible for people with print disabilities. Nevertheless it is difficult to create a presentation suitable for everybody as user demands differ between different user groups (e.g. blind, deaf, dyslexic people).
Mark-up languages allow for a proper structuring of the content and the separation of content from presentation. A personalized version of a multimedia document can be generated taking into account print disabled users' preferred presentation formats and also device specific aspects.

1. Introduction

Information in various electronic formats covers every imaginable topic and is easily available to everybody. Most electronic documents and presentations, as might be used in museums, galleries and libraries are created in a visually appealing way. Just think of all the web pages using images with text, graphical buttons or even Flash animations. This might well attract the majority of visitors (or users), but can put off people with visual impairments.

Blind people often use screen reader software or Braille output to gain access to the textual content of a document [1]. However, they cannot access text which is represented as a pixel image, only text stored as ASCII code, so this can present a problem for accessibility. The contents of pictures and diagrams also need to be made accessible to visually impaired people, by providing textual descriptions of them.

But further, multimedia presentations not only use text and pictures, but also audio clips. While these can be useful to blind readers, deaf people will miss that information.

To provide guidance to web authors on how to achieve accessibility, the W3C has published the Web Content Accessibility Guidelines as part of its Web Accessibility Initiative (WAI) [2]. The guidelines, and the associated techniques and checklist documents provide detailed information to authors on how to make web pages accessible to people with all print disabilities.

2. Applications and Challenges

Multimedia documents can be found in a variety of applications. However, they are constrained by their purposes, the intended audiences and the devices they are presented on.

Table 1 gives an overview of some characteristics of common systems using multimedia presentations.

Application	Device Properties	Number of Users	Content	Navigation
Electronic Books on a PC	large screen, large storage capacity	one or few, one user at a time	all kinds of information (e.g. cookbooks, novels)	free navigation
PDAs, Cell Phones as Mobile Assistants	small screen, small storage capacity	one or few, one user at a time	different kinds of information, location based information (e.g. city maps, museum guides)	free navigation, navigation on predefined paths
Kiosk Systems	large screen, limited storage capacity	many, one user at a time	dedicated to a certain purpose (e.g. tourist information, tickets)	navigation on predefined paths
Public Presentations on Large Screens	large screen, large storage capacity	many, many users at a time	dedicated to a certain purpose (e.g. advertising)	predefined flow of presentation

Table 1. Characteristics of Multimedia Presentations

Although technologies such as XML promise the ability to create different output formats from one document, it turns out that a "one for all" approach in creating a multimedia document would require a lot of effort. Hillesund discusses this problem by pointing out the multiplicity of input data structures [3].

Making content accessible for different user groups usually results in redundant information. For example for deaf users, a narrator's voice recorded in an audio file could have a written text representation as well as a sign language version. This increases the size of the whole presentation which is a problem when the target device has only a small storage capacity.

Also display size influences the way alternative content is presented.

A survey has been done with deaf people on news broadcasts on TV with sign language translation [4]. They preferred presentations where the signer was large and did not overlap other content. So each user group and even each individual user prefers certain representations and wants them to be rendered most prominently on screen.

This leads to the conclusion that multimedia presentations should be customisable both for different users and devices. So the basis is a rich multimedia document which is transformed according to the needs of the presentation environment. This also meets the WCAG requirement of separating content from presentation.

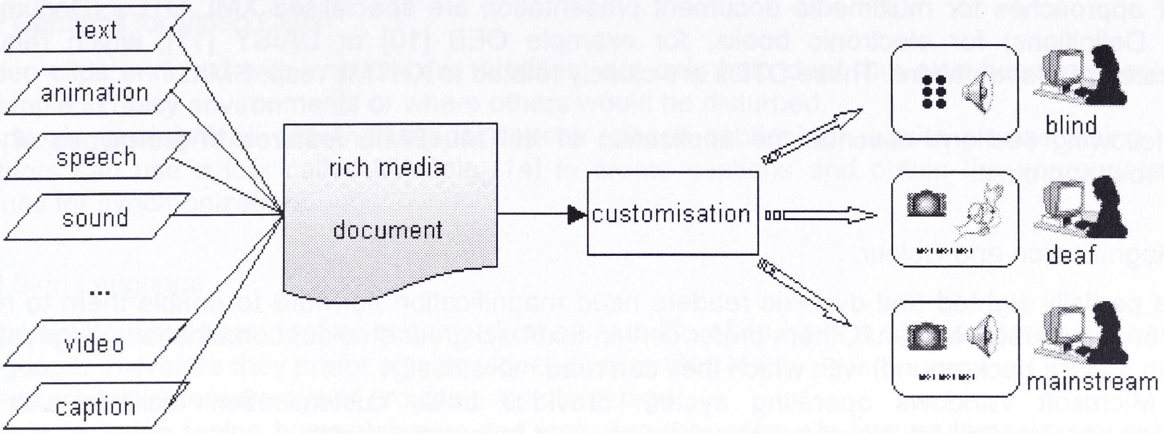

Figure 1. Customisation of multimedia documents

Personalization is done on the basis of user profiles which can be stored in the user's computer, or in the content transforming device, which could be a web server. This raises the issue of privacy. Users probably would not want personal data being stored anywhere. On the other hand, centrally stored user profiles would allow users to access their familiar 'look and feel' when working on another computer or even in an internet café.
A solution to this dilemma could be to use smart cards to store the user data. They can be taken anywhere and are under control of the user. An approach like this would certainly require standardisation in order to enable different devices to adapt to the user's needs.
First steps in this direction are being made by a European Standard (currently under development). It deals with the accessibility of devices operating with machine readable cards and specifies "the design principles for the user interface [...] and coding of user requirements for people with special needs" [5]. Although it applies to smart cards and smart card reader device themselves, this could be a basis on which personalization facilities on other devices could be built.

Personalization does not only affect the way information is presented, but also the way users navigate within that information.
Audio and video presentations usually have to be watched as a whole in order to find out what they are about, whereas it is much easier to move around in written texts, skip a paragraph or just get an overview of what and where the core information is to be found.
The MultiReader project investigates presentational and navigational mechanisms which allow all users, including those with print disabilities (visually impaired, deaf, dyslexic and mainstream users) to read multimedia documents.

3. Presentation Techniques

SMIL (pronounced “smile”) stands for Synchronized Multimedia Integration Language [6].
SMIL is an XML language for interactive multimedia presentations which includes mark-up for layout, timing and synchronisation of media objects.
It also supports content control, which means that only appropriate parts of the document are presented to certain users or on specific devices. For example, screen size and bit rate can be checked and used as a criterion to decide whether an image should be displayed instead of a video clip.
Content control also includes accessibility elements, for example the enabling of captions (for deaf users) or audio descriptions (for blind users). The accessibility features of SMIL1.0 have been summarized in a W3C Note [7].

HTML+TIME is a Microsoft Internet Explorer implementation of SMIL which combines HTML with the time dependent features of SMIL [8]. Internet Explorer versions 5.5 and above support HTML+TIME, so multimedia documents of this type can be viewed easily by a large group of (web) users. The implementation is close to the W3C Note on XHTML+SMIL [9].

Other approaches for multimedia document presentation are specialised XML DTDs (Document Type Definitions) for electronic books, for example OEB [10] or DAISY [11], which require dedicated reader software. These DTDs are closely related to XHTML resp. SMIL.

The following sections describe the application of XHTML+SMIL features in prototypes of the MultiReader project.

3.1 Magnification and Colour

Some partially sighted and dyslexic readers need magnification software to enable them to read texts on a computer screen. Others prefer certain text/background colour combinations (e.g. yellow text on a black background) with which they can read more easily.
The Microsoft Windows operating system provides basic customisation facilities with its Accessibility Options. Additional software can be used to improve these.
With XHTML+SMIL it is possible to use CSS (Cascading Style Sheets), offering more degrees of freedom to change the visual presentation of a document.
SVG is "a language for describing two-dimensional vector and mixed vector/raster graphics in XML" [12]. SVG stands for Scalable Vector Graphics and the 'scalability' makes them interesting for people with low vision as they can zoom in and move around the image any way they want, without loosing image quality.

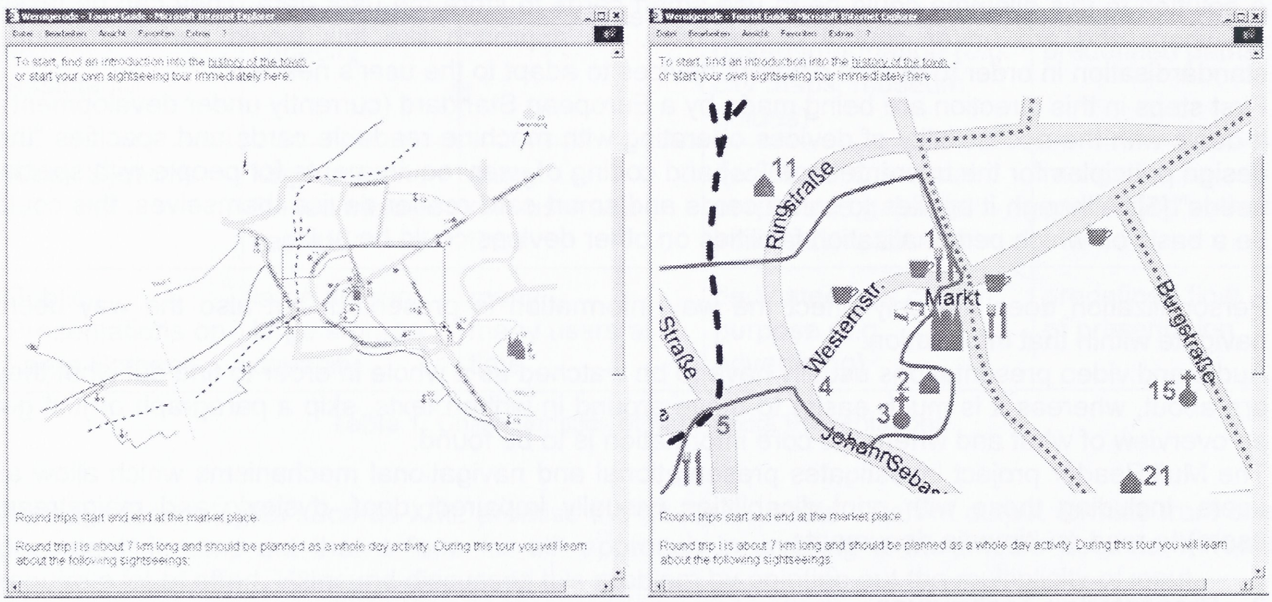

Figure 2. Zooming SVG graphics

SVG is very well suited for the display of maps, both maps of physical locations such as cities or web site maps.
SVG elements can have a title and a description which is usually not displayed by graphic viewers. However, this information can help visually disabled users in understanding the meaning of the image.
The Science Access Project is developing an Accessible SVG Viewer which uses this additional information and "permits multi-modal access to SVG graphics through visual, haptic, tactile, voice, and non-speech audio modes" [13].

More and more multimedia applications and software offer built-in adaptation facilities instead of relying on 'external' tools such as the assistive devices currently used by print disabled people. In a future 'all-inclusive' world assistive devices might disappear altogether and the computer system itself would no longer present any kind of barrier to accessing information.

3.2 Captions for Video Clips

Video clips enriched with captions (or subtitles) not only help deaf, but also hearing people, for example in noisy environments or where others would be disturbed.
Captions synchronized with the original speech (closed captioning) require precise timing. SMIL authors can use a tool called MAGpie [14] to create captions and obtain the appropriate time values for synchronization.

3.3 Sign Language

People who were born deaf or became deaf early in life often have a sign language as their first language. Therefore they prefer signing videos over written text.
There are two different ways of providing sign language.
One is by video taping human signers and including the video clip in a multimedia presentation. But video files are usually large and therefore they are not suitable for presentations on the web.

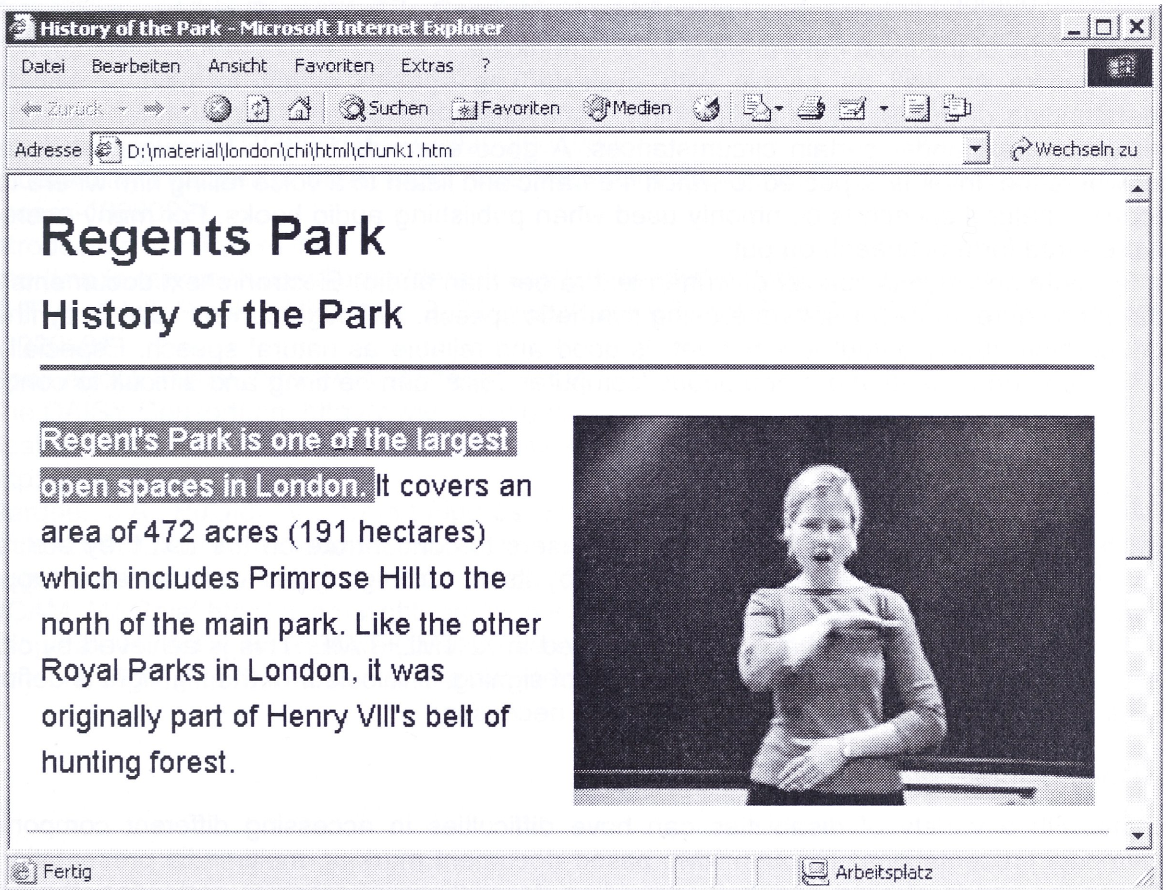

Figure 3. Sign language translation and highlighting

Another more flexible approach is to use signing avatars. In the VSign project students of the Utrechtse Hoge School voor de Kunsten have developed a gesture editor and viewer [15].

Figure 4. Signing avatar in VSign

With such a system an experienced signer is able to create lots of reusable signs with little effort.

3.4 Speech output

Speech is one of the most natural ways to communicate.
Blind readers as well as people with dyslexia use speech output to gain or improve the understanding of the text they are reading. Again mainstream users might prefer speech output over written text under certain circumstances. A good example for this is navigation systems in cars where the driver is expected to watch the traffic and listen to a voice telling him where to go.
Recorded natural speech is commonly used when publishing audio books. For many users this is the preferred form of speech output.
But far more documents consist of written text rather than audio. Electronic text documents can be read out by screen reader software using synthetic speech. Although current speech synthesizers produce high quality output it is not yet as good and reliable as natural speech. Especially when reading long documents the monotonous 'computer voice' can be tiring and difficult to concentrate on.

3.5 Highlighting

Highlighting can improve the ability of certain users to concentrate on the text they are reading. This technique can be used as a reading aid by itself, but highlighted text can also support the presentation of sign language or speech.
As shown in Figure 3 highlighting can be realized in XHTML+TIME. This is achieved by changing the class attribute of a piece of text for the time of signing. The colour of the highlight is defined in a CSS stylesheet and so can be easily changed if necessary.

4. Conclusions

People with a variety of disabilities can have difficulties in accessing different components in multimedia presentations. Through XML based document mark-up multimedia presentations may address the needs of blind people by providing descriptions of graphics and video, the needs of deaf people by videos of signers and dyslexic people by highlighting and colouring text. Therefore personalization of multimedia documents is required. User profiles need to be gathered, but the resulting privacy issues need to be addressed. Based on such user profiles, transformations of documents based on the appropriate redundant contents may take place shortly before reading time and result in documents readable by browsers for HTML+TIME based documents.

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