Adapting multi media information for internationalization and for users with disabilities

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Abstract: There is considerable pressure to make information more accessible, both to users with disabilities, and to users around the world. One focus of information dissemination and adaptation is the WWW. Current changes to browsers and content mainly effect HTML text, not multimedia. HMML is the proposed WWW standard for synchronised multimedia including video, audio, and media which are themselves static. The Chameleon editor produces HMML and provides conditionals on the selection of channels for a particular presentation. This provides support for the adaptability of multimedia by rules to select the one appropriate for the users language, presentation and other adaptation needs.

INTRODUCTION

We live in an international world where the multilingual policy adopted by Europe is a critical test for system developers to support global information dissemination. The World Wide Web still has a bias toward English and the western-european writing system. But modern business, research, and interpersonal communication is increasingly conducted in other writing systems and languages. Web connectivity and use is continuing to grow rapidly all around the world, including countries and communities that have a low tolerance or understanding of English. While English remains prevalent on the Web, many companies are today investing - or considering investing - time and money into localizing content on the Web for non-English speaking audiences. The Web must and is being enhanced to meet the needs of a global community.

The first step to a global web, is to support HTML internationalisation, which is initially being addressed by W3C through widening the character set to incorporate Unicode to present a wide range of character sets (see the draft HTML internationalisation standard at ftp://ds.internic.net/rfc/rfc2070.txt). Obviously once this mechanism is in place, many further layers of internationalisation are required in order to address different cultures and styles of interaction.

An Internationalized & Multilingual Web should have the traditional facilities of Internationalization and more advanced facilities needed for Language Engineering. For example, clients should have a language menu that shows in which other linguistic versions the currently displayed document is available; or clients should be capable of displaying and moving in sync side by side, two linguistic versions of the same document.

Parallel Hypertext is an extension of the hypertext paradigm to natural languages. For example, a user looking at a document in English should be able to obtain the Spanish

translation in a transparent way; i.e., just by selecting the Spanish option in a language menu and not by selecting an anchor embedded in the English version. For this, the system must know about languages; i.e., the same in another language. The same property of alignness in Parallel Texts applied to Parallel Hypertext.

As well as internationalisation, there is also pressure on the WWW to address the information needs of users with disabilities. The motivation for addressing accessibility for the disabled in the US is the "Americans with Disabilities Act" of 1990 (gopher://trace.wisc.edu/00/ftp/PUB/TEXT/ADA_INFO/LAW/ADA.TXT). This was drafted in order to establish a clear and comprehensive prohibition of discrimination on the basis of disability

W3C has its own Web Accessibility Initiative (http://www.w3c.org/WAI/) while other bodies are already establishing an active infrastructure, such as the US National Centre for Accessible Media Symbol for the WWW (http://www.boston.com/wgbh/pages/ncam/symbolwinner.html) awarded to sites conforming to the Unified Web Site Accessibility Guidelines (http://www.trace.wisc.edu/text/guidelns/htmlguide/htmlguide.htm). Several large funded projects investigating accessibility of the Web at University of Toronto (http://www.toronto.ca/atrc/), Yuri Rubinsky Insight Foundation (http://www.yuri.org/webable/), as well as work undertaken at the major browser developers to make their browsers voice accessible (e.g. Microsoft at http://www.microsoft.com/ie/most/howto/access.htm, or Mosaic at http://www.staff.uiuc.edu/~jongund/access-browsers.html) or making them more usable by screen readers (e.g. http://www.trace.wisc.edu/text/guidelns/browser/screen.html). In addition to basic browsers and htm page design accessibility is also being investigated for richer multimedia formats including the virtual reality language VRML (http://www.toronto.ca/atrc/rd/vrml/main.html) and the hypermedia language HMML.

HMML - SYNCHRONISED MULTIMEDIA LANGUAGE

The Sychronised Multimedia working group of W3C has developed the specification of a new language for synchronising audio, video and other media presentations on the web (HMML). HMML is the proposed WWW standard for presenting Synchronised Multimedia Information (see http://www.w3c.org/AudioVideo/Activity.html). The current HTML based web technology is limited when it comes to creating continuous multimedia presentations. For these applications, content authors need to express things like "five minutes into the presentation, show image X and keep it on the screen for ten seconds". More generally speaking, there must be a way to describe the synchronization between the different media (audio, video, text, images) that make up a continuous multimedia presentation.

HMML is a declarative format for time representation and media synchronisation which, when supported by real time transport protocols between client and server, such as RTSP (see http://www.cs.columbia.edu/~hgs/rtsp/) calling RTP (see http://www.cs.columbia.edu/~hgs/rtp/), supports the synchronisation of media channels. The current draft of HMML (see http://www.w3c.org/AudioVideo/Group/WD-symm-format.html) is based on the CMIF format originally developed by CWI [1] and further refined in the Esprit Chameleon project [2].

The Chameleon project has developed an editor and viewer for the HMML format, and explored various options for layering choice mechanisms on top of the transport and synchronisation layers which will support the options required for internationalisation and accessibility.

ADAPTING SYNCHRONISED MULTIMEDIA

Much of the work done on adaptation in the web is text, or HTML based, more work is needed in the area of multimedia in general. A system should be capable of supporting different cultures, natural languages, disabled users and Language Engineering facilities such as Parallel Texts. Internationalization permeates most subsystems: client, transmission, server, data and authoring. (Language Engineering is the application of informatics to natural languages).

There are also yet other, wider issues of adaptive multimedia, which also need to be addressed.

If one is producing a document accessible to different languages or to users with different presentation needs it is possible for the author at editing time to produce different editions for each identified group of end users. This requires considerable authoring effort, but also requires storage of each edition, and the identification of the end user group for which the edition is appropriate. When documents are updated, all editions must be updated together in order to maintain consistency. This approach is required to produce paper text documents in multiple languages, but for multimedia documents, where the costs of producing media such as video are considerably more than for paper text it is both more complex and expensive.Films and videos can be dubbed in many languages, and like texts, editors can produce multiple versions of the film and associated national soundtrack which must be stored and distributed to their respective markets. However, the production, inventory and distribution costs for multiple editions of multimedia documents are prohibitive for all but the most expensive end-user product - best selling feature films and games.

The alternative approach is to have a mechanism where one document base can exist and then be tailored at the time of presentation. For multimedia, a single digital video can be stored, with many associated, labelled national soundtracks, and the national version of the audio-video edition only comes together at presentation time, when a user has identified their language requirement.This makes sense in terms of product costs and presentation maintenance for multimedia. It therefore makes the model attractive to the people who ultimately will need to foot the bill. The Chameleon system [2] through this mechanism supports parallel language facilities [3].

For multimedia Chameleon provides presentation time synchronisation as supported by HMML. Presentation time synchronisation of channels allows Chameleon to offer the ability for authors & publishers to keep a single copy of the document and vary it at presentation time in the same way that style sheets [4][5] offer support for run time variation of HTML textural documents.Through the approach of producing a single multimedia document containing many channels the Chameleon editor is able to support both many national versions as well as those for differently-abled users through the use of adaptation rules to select the appropriate channels.

User requirements need to be gathered for the version to be presented to the individual user, though this can be carried out through a minimally intrusive dialogue or from the users stored profile. Chameleon provides the author with control of the available resources, the channels provide a view of the media objects mapped onto the available logical resources. By supplying an extra layer above the physical resources the author is able to describe the presentation in a system-independent way. It is up to the player, optimized for a particular hardware configuration, to interpret the logical channels and assign the media objects to the available physical output devices. It is possible for the author to add channels to Chameleon if the one they need does not exist. The author can then produce a document that can be configuered by the user. For example a blind user may chose to use the sound channel to present the text rather than the display text channel. These choices can be made at run time by the user.

The trivial adaptation rules introduced so far are of the form:

1) for visually handicapped users -

    a) increase font sizes, and use san-serif fonts for text

    b) select the audio channels for text

    c) do not present images

2) For internationalisation -

    a) select text & audio channels using national language & typography.

Obviously, a scale of visual and auditory handicaps exist, for which different triggers and rules are required. There is no current agreement on a universal set of trigger tags for nationality or disability, although these are under negotiation by the XML community.

Since different browser manufacturers (e.g. Netscape and Microsoft) have chosen to implement cascading style sheets in different ways, which derive information from system wide profiles on some platforms, and require information to be stored in browser's own user profile on others it is not possible to state a general method by which users will select the tags to be used as triggers to the conditional statements in the HMML structure. However, all browser implementations will provide the tags to support the conditionals through their style sheets.

FURTHER ADAPTATION ISSUES

Chameleon can solve the run time selection of channels for information presentation side of the problem, but more work is in progress to provide solutions to other adaptation problems to meet the needs of an international or disabled audience of multimedia presentations. Some of these problems are listed here so that adaptation rules to solve them for synchronised multimedia systems such as Chameleon [1] can be discussed at the workshop.

Multilingual Aligned Text (MAT)

A MAT is a record with one Linguistic Object per language field (English, Spanish, German, etc) that are the equivalence (usually the translation) of each other. MAT's give rise to many

problems of alignment and presentation since the translations do not occupy the same space or orientation.

Date & Time and other structural conventions

Example, the internal representation could be 19951231 and the external representation could be December 31th 1995, or 31-12-1995 [6].

Multilingual Typography

It can be difficult to present some languages as the typography does not exist on the presentation machine. For example bidirectional formatting control is important for languages such as Hebrew and Arabic. Although Chameleon would adapt to the appropriate channels if they are available on the end-user machine for various exotic typographic conventions, it is not able to introduce all such channels itself.

General Cultural Problems

Many of the deeper cultural problems relate to the content of what is being presented, as well as to conventions of comprehending it. Obviously, the acceptability of multimedia presentations for violence, sexual pornography or political content varies with culture, but so do many of the conventions used within the presentations. Although the cinema distribution is global for Hollywood films, they use different conventions to those Indian films from Bollywood, which make each incomprehensible to the wrong audience. The selection of content defined by pragmatic conventions is outside the scope of Chameleon, since it relies on PICS servers to rate the content. However, once again the use of multiple channels can support the run-time selection of the most appropriate content for a particular user - if any is available.

CONCLUSION

Chameleon suppports the editing and presentation of distributed multimedia documents through HMML. HMML describes the structure of a multimedia document, supporting binding at run time rather than at creation time. Chameleon introduces conditional statements which allow channels to be selected at run time depending on the user nationality, presentation station capabilities, and ultimately, user abilities, thereby accommodating disability. The conditional statements select the channels appropriate for the user at presentation time based on information available to the browser through cascading style sheets, browser or system wide user profiles.

We are currently developing guidelines for authors to state the appropriate selection tags for the conditional statements, and the appropriate conditional statements for internationalisation and the support of users with different disabilities. It is hoped that the workshop will provide further guidance on the details of these tags and selection rules for continuous media beyond HTML.

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