

Sign Language Online with Signlink Studio 2.0

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Abstract. Recent advances in web technologies and services have expanded the possibility of having a truly multimedia, interactive web experience for many users. It also means that video based content is not just possible but affordable. Online video-based sign language content is now much more prolific. However, most of the interactive functions remain text-based. We describe a tool, Signlink Studio, that allows hyperlinking functionality within video content, called signlinking, sign language-based form elements, and a sign language forum and content management system. We also present three methodologies specifically oriented towards creating sign language video materials for Signlink Studio or other video-based web applications. As a result of this focus on web functionality that is culturally and linguistically relevant, we suggest that a more equitable and inclusive web will evolve.

Keywords: sign language web accessibility, inclusive web design tools and web services.

1 Introduction

Sign language on the web is becoming a much greater possibility as the availability of high speed internet connections and high quality compression algorithms make web-based video more practical. With high speed internet, video web services such as YouTube have blossomed and as a result online sign language content is becoming more prevalent. A simple search on YouTube shows over 43,000 videos available which have some relationship to sign language including sign singing, baby sign language and tutorials for learning American Sign Language (ASL), and that number grows daily.

Sign language content is also becoming more common on web news services such as SignPost [1], web sites of deaf organizations such as the Deaf Culture Centre [2] and sites for learning sign language [3]. Finally, vlog services such as [4] and [5] are allowing sign language users to have discussions with each other and provide commentary in sign language. As a result, web designers and users alike are becoming more comfortable and familiar with the video production and editing

techniques to produce video content. Software tools such as iMovie and MovieMaker have been designed for this type of use. However, for all of this video functionality and availability, there remains almost exclusive reliance on text for much of the interactive functionality such as navigation, forms, and even reply commentary. And, while text dominates the interactive functions, it is often not provided as captions for video materials.

This reliance on text for interactivity means that sign language cannot be used exclusively and that requires sign language users to constantly alternate between their first language, sign language, and a print-based second language when accessing, using or even creating web sites, YouTube videos or a vlog. In addition, requiring written text to be combined with sign language does not provide the potential for an immersive Deaf culture online experience. Webpages are being designed with menus, help information and interactive features in many different written languages respecting the need to represent a linguistically and culturally diverse user population. Sign languages should and can be afforded that same consideration.

Finally, unlike television and film which require closed captioning to be available for access by people who are deaf or hard of hearing, online a/v material is rarely captioned even though there are numerous tools that provide this functionality (e.g., CapScribe, MAGPie, Captionate, and CC for Flash). In addition, sign language material is usually not captioned making it inaccessible to non-sign language users. Allowing designers and users to add captions to their sign language materials may promote increased accessibility to those materials, if desired.

We have developed a software tool, called Signlink Studio 2.0 (SLS), that allows users to build sign language web environments which use video-based hyperlinking (not requiring text), sign language-based forms and a closed captioning feature that can be provide access for sign language learners and non-sign language users. We have also developed a sign language-based forum and content management system, called SLS:CMS, where sign language, graphics and text-based communication can occur in the same space. In this paper, we will present all of these features and discuss how they can be used to create a more sign-language friendly web space.

2 Signlink Studio

Our technique for creating signed webpages is based on adding “signlinks” to signed video content. A signlink is a video-based hyperlink that allows users to navigate directly from video-based content to any URI (e.g., another signed webpage). The signlink technique involves: (1) indicating timed intervals of the video while it is playing; (2) indicating the location and length of links in the entire video, using a “link-density bar”; and (3) providing “thumbnail” images for each link in the video.

Using Signlink Studio, a web designer/author adds a signlink by specifying: (1) the interval of the video that comprises the signlink (time in and time out); (2) the focus of the signlink’s “thumbnail” where a thumbnail is a static image that represents part

of the signlink within the video; and (3) the link-to URL (see Fig. 1). Once all of the signlinks have been added, a Flash file (and accompanying Flash video file) is exported that is referred to as the signlink *web object*. The signlink web object can be used a signing webpage by itself or it can be added to an existing webpage. Other novel features in Signlink Studio include help and tool tips in American Sign Language (ASL), an optional text editor, a closed caption editor, and the ability to create radio button or checkbox forms. For a complete description of Signlink Studio see [6].



Fig. 1. A screenshot of the Signlink Studio 2.0 interface with one signlink created and accompanying optional text

2.1 Forms (SLS:Forms)

In order to create online sign language-based forms, a technique called SLS:forms modifies the Signlink web object to allow for the addition of two types of form controls; radio buttons, and check boxes.

Each form is comprised of a series of questions and their associated answers. Each question is presented on its own modified signing web page (see Fig. 2). The content of each question and its answers are provided to the user within a single indexed video. The user-selectable answers are provided as a series of forced-choice responses in the signlink “thumbnail” area below the video and, optionally, in the text area to the right of the video.

Answers can be replayed by clicking on the thumbnail image associated with the answer, and can be chosen by selecting the input field of the signlink or the answer within the optional text area.

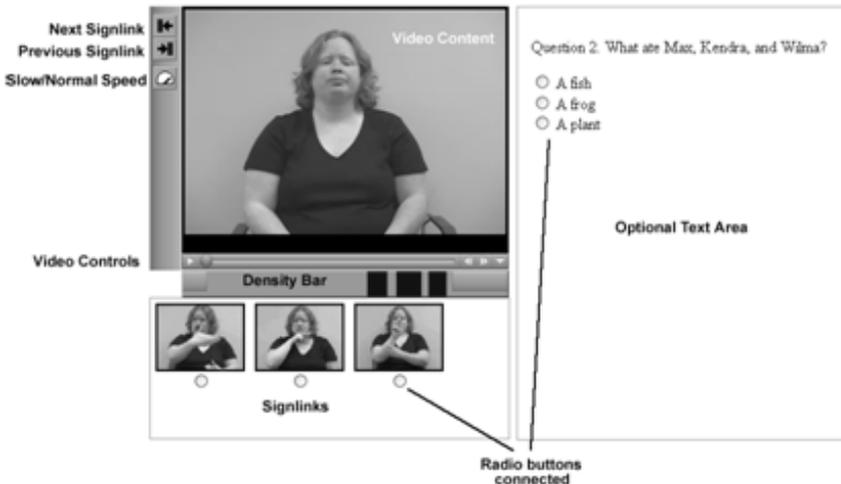


Fig. 2. A screenshot of SLS:form

The information about the questions and their answers is stored in an XML file. An XML parser is used to determine the form element information from the XML file. The information retrieved from the file includes the location of the video file, signlinks, and timing information about the questions and answers. The result of the parsed XML file is an array of question data that contains information about the question including a sub-array of answers for each question.

2.2 Best Practices for Filming and Indexing Strategies

The creation of signlinked websites using SLS requires site planning, filming and indexing particularly when creating new content for use with SLS. Site planning involves determining the overall structure of the website before scripts are created or filmed. This step is even more important for signing web pages than it is for text web pages because editing a signing page often means re-filming video.

In addition to new video, a site plan might make use of existing signed videos. To further reduce the need for potentially costly re-shooting, it is recommended that a script be created prior to filming.

Once the signed content has been planned, key signs should be identified, which can be used similarly to key words in providing markers or tags for the video content and signlinks within it.

Filming a signed webpage is a dynamic process and made successful when: the signer is familiar with the signlinking technique; the signer wears solid colours that contrast well with her skintone, and the signer uses a background with very little visual noise. The signer should be filmed using a standard appearance of the signer and standard background (e.g., blue screen) so that future changes will appear less obvious. Lighting should be positioned above the signer so that it is not reflected off the signer's face and hands. Fig. 3 shows the proper positioning for filming a signer.

We recommend that, wherever possible, signed content be filmed in small, but complete, parts (videolets) of about one page of script. Videolets can be standalone or concatenated together to form longer pre-made videos. This reduces the amount of video that needs to be re-filmed if minor changes are required. The length of a videolet should not exceed five minutes to allow for quick viewing of the video material.

There are three different methods that we consider to be best practices for filming signed content using a script; the Slideshow, the Serial Relay, and the Parallel Relay. In the Slideshow Method, a slide show tool such as Microsoft's PowerPoint is used as cue cards to prompt the signer being filmed. The slide show is prepared with one or more separate slides used to outline the content required for each videolet and the future position of signlinks can be indicated.

In the Serial Relay Method the signer signs to camera as desired with or without notes. The resulting video file is edited into the desired structure using any video editing tools available.

The Parallel Relay Method uses an "on-camera" and "off-camera" signer. The on-camera signer mirrors the signs of an off-camera signer who is signing based on a script or notes. The off-camera signer functions as a "live cue card" for the on-camera signer (see Fig. 4).

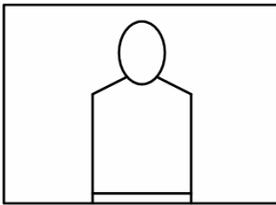


Fig. 3. Signer is positioned so that some space remains above the head, around the torso and below the waist. The signer looks directly into the camera.

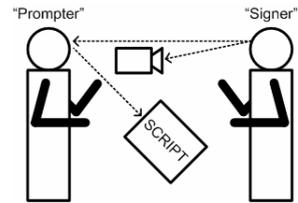


Fig. 4. An example of how to film with prompting using parallel relay method

2.3 Content Management System (SLS:CMS)

We have seen how the signlinking technique can be used to produce linked signing webpages and forms. These developments enable web-style (i.e., hyperlink-driven) interaction with sign language-based content, however the functionality of the webpages is still roughly equivalent to the plain-HTML pages that populated the print-based web of the mid-1990s. In order to narrow the gap with the more dynamic print-based web of today, signing web applications must be developed that are able to store and manage the signing content in order to support services that are useful and engaging for sign language users.

As part of the Signlink Studio 2.0 project, we developed an on-line content management system, called SLS:CMS, that provides an exemplar of how sign language-based web applications might be designed (Fig. 5). SLS:CMS is a web application, programmed in PHP, that provides three broad on-line functionalities

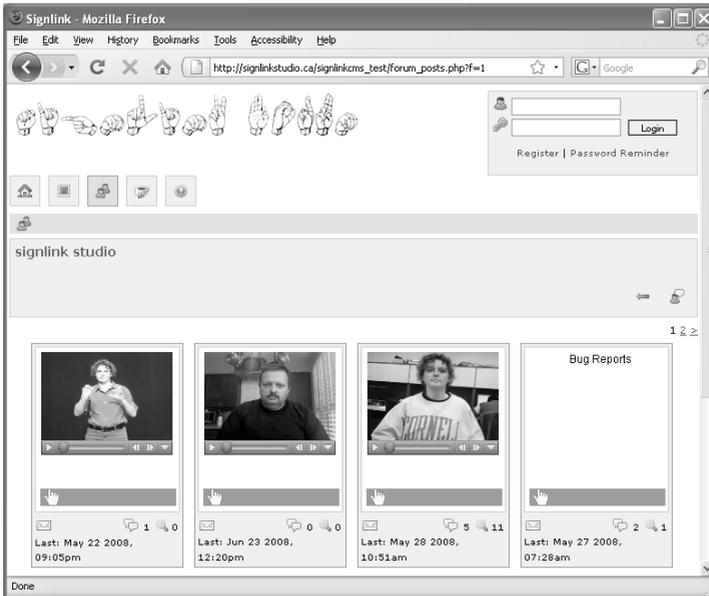


Fig. 5. A screenshot from SignlinkCMS showing the topics in a forum

using the signing webpages outputted by Signlink Studio 2.0: plain content pages (e.g., for information), forums, and vlogging (i.e., video blogging).

As with the Signlinking technique it makes use of, SLS:CMS is intended to support immersive deaf cultural use. However, attempts to maximize the use of sign language in the user interface by trying to replace all of the typical print-based controls of a web application with sign language videos yields results that are neither practical nor usable. Instead we focused on minimizing the use of print in favor of a mix of sign language video, graphical icons and print, where required for clarity.

The result is a system that is sign language-focused without being excessively rigid in its demands on users. For example, when a user creates a forum entry, they are able to choose whether they prefer to upload a Signlink Object (created using Signlink Studio 2.0), a plain video, or text (See Fig. 6). This provides more options for the user

Message

Choose what kind of message you are posting (signlink object, video, or plain text) then provide the appropriate details.

Signlink Object

SWF File

MP4 File

Video

Text

Fig. 6. A screenshot from SLS:CMS showing the various content-type options

to draw from and it increases interactivity of the forum for the user. We assume that the various user communities will set their own norms regarding the acceptable balance between sign language video and print.

In a pilot user study of the SLS:CMS forum feature (conducted in June 2008), subjects were generally positive about the idea of a sign language-focused forum and had little difficulty navigating and viewing the postings of others. At the same time, the novelty of creating and uploading the Signlink Objects proved to be an obstacle for some. Since that time, the user interfaces of both applications have been improved with additional support documents, and streamlined to address this difficulty (see [6]).

2.4 Captioning (SLS:CC)

As part of this move to a more service-driven sign web, we also want it to be more accessible to users learning sign language and non-sign language users. As a result, we have created a caption editor for SLS that follows the same interface constructs as the original SLS software. In addition, new features that take advantage of high quality digital display technologies have been included in the feature set of the captioning tool and make this tool unique compared with other online captioning tools that use the television standard for guidance. Researchers ([7], [8]) have found that caption users want non-speech audio such as music, and sound effects to be captioned. Graphical, font properties and styles as well as colour can be used to enhance the text captions to include the non-speech audio elements.

Most caption editors use a timeline expressed as typical SMPTE (Society of Motion Picture and Television Engineers) time code (hh:mm:ss:ff). To enter captions, the beginning and end time must be entered in this form. In SLS:CC, the SLS graphical timeline is used to denote the beginning and end times of a caption. Captionists can make timeline modifications by moving a set of sliders (see Fig. 7). This allows the captionist to be less precise on the initial time placement of a caption and modify the timeline as the video/caption plays.

Features of SLS:CC include: global and local properties settings, zoom in/out, 6 different positions (up, down, and left, right centre for each). Global preferences can be defined for the background colour, text colour, background opacity, font face, style and size, and caption position. When a global preference is selected, it is applied to all captions within that particular video file. Local preferences can be set for the same elements as the global settings but they will be applied only to the current caption (and override the global setting for that particular caption). Fig. 7 shows an example video with captions and the local preference settings. As captions are entered and formatted, they appear on the video directly in real time without the need to save or change to a preview screen. In addition, a spell check function is provided.

Two other features of SLS:CC of note are the zoom function and the listing of the entire set of captions as time-coded text. The zoom function allows captionists to focus in on one specific time interval in greater detail. The text listing of all captions (see Fig. 7) provides the time and some of the text of all captions for quick reference and easy jumping to captions throughout the video. These captions are also editable using the preference settings.

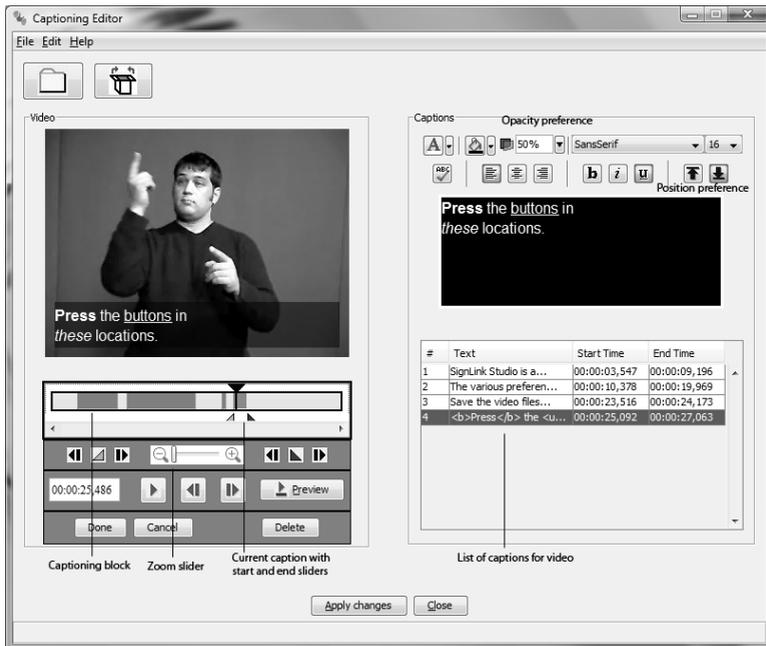


Fig. 7. A screenshot of SLS with caption editing. A live preview shows different font styles applied to one caption. Multiple captions for the video have been defined for this video and appear as caption blocks on the timeline.

3 Issues to Be Resolved

While much progress has been made in developing SLS, SLS:forms, SLS:CC and SLS:CMS with constant user input, further formal user studies remain to be carried out. Questions regarding the usability and usefulness of the closed captioning editor and whether improvements in SLS:CMS have been successful are outstanding. However, user studies to answer these questions are in progress.

Technical knowledge requirements are different for creating signed webpages than for text-based webpages. People using SLS to create signed webpages, forms, or forums must be familiar with working with, editing and managing video files. While simplified editing tools do exist, considerable effort in learning how to use them is still required. In addition, creating and editing video material can be an involved process that requires a considerable amount of time on the part of users/creators. In addition, users must be familiar with various video and compression formats, adding to the technical knowledge requirements for users.

Not only are there substantial hardware and software knowledge requirements but also there are issues regarding the creation and understanding of signed information itself. Signed information for and on the web must be clear and easy to understand and variations in signer style as well dialects in signs can lead to difficulties in understanding signed webpages. Developing training materials and help information may assist users in managing these issues.

However, from user studies carried out in the summer of 2008, current help files have been found to be too dense [3]. Participants were confused on how to download the SLS software as well how to create signed content for creating signed web page with SLS software. They were interested in using SLS software to create signed webpages or participate in signed forum by posting a signed video but they did not know how create their own signed content. Signed and print-based help or supporting documentation is required to promote learning how to created signed content. In addition, functionality to easily transfer signlinked content from SLS to SLS:CMS is required.

Signed content already created and posted on the web such as on YouTube is not searchable or tagged in sign language. Rather, text-based keywords, titles and commentary must be used in order for any existing signed content to be searchable or linkable. However, in order to maintain the cultural continuity and linguistic relevancy and consistency, signed labels and key signs should be available and used. These key signs and labels would then allow signed content to be organized and searchable in its original and most desirable form. There are numerous technical and cultural issues to resolve before this concept becomes a true reality. While there is considerable research being carried out for video indexing and searching, it is still not very accurate or complete. In addition, the concept of tagging and indexing video for deaf users is unfamiliar and work is still required to understand how people relate to and might assign key signs to video materials.

Finally, not all users have access to the high speed internet connectivity required to create and view online video material. In an attempt to minimize file size, the signlinked web object dimensions are relatively small (320 x 240 px), and H.264 compression format is used. However, high speed connectivity is still required for the video to appear smooth.

4 Conclusion

In conclusion, we have presented a brief overview of a tool, Signlink Studio, that adds video-based hyperlinking functionality, called signlinking, to sign language videos. Added functionality including sign language form features, closed captioning, a sign language forum and content management system was also described. We believe that having tools producing sign language webpages and services that are linguistically and culturally relevant is one step towards having a more accessible WWW.

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