Supporting Deaf Sign Languages in Written Form on the Web

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Abstract

The SignWriting system is a writing system for deaf sign languages. SWML (SignWriting Markup Language) is an XML-based format that we are developing for the storage and processing of SignWriting texts and dictionaries, allowing the interoperability of SignWriting savvy applications and promoting web accessibility to deaf people in their own natural languages. This paper presents the SignWriting system and reports on the state of the work being done on the development of SWML and SignWriting-based web applications using SWML to render sign languages.

Keywords: Deaf sign languages, SignWriting, SignWriting Markup Language, SWML, Accessibility, Multilingual support

Introduction

The SignWriting system was developed by Valerie Sutton, of the Center for Sutton Movement Writing (Ca., USA), as a writing system for deaf sign languages. As is widely know, deaf people have not yet established a standard way for putting their various national sign languages in written form, and the SignWriting system is one of the systems that are currently being proposed for such end.

As deaf people don't get tired to explain, the implication of deafness is as linguistic and cultural difference between deaf and hearing persons: deafness implies a particular way of people developing their communication functions, and with that come other differences (cognitive, etc.) (see papers in the SignWriting education forum). Moreover, communication in sign languages implies particular ways of dealing with social interactions, so that deaf people naturally organize deaf communities within the hearing societies in which they live, and naturally build a culture of their own (the so-called Deaf Culture [1, 2]).

2. The SignWriting System

The SignWriting system was conceived within the general program of the Sutton Movement Writing initiative, aiming at representing signs as they are visually perceived (as opposed to other systems for writing sign languages, which emphasize linguistic features of sign languages). This makes SignWriting suitable for common deaf (and hearing) people, that have no technical training in sign language linguistics.

A typical sign written in the SignWriting system is the following:
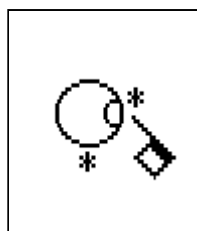
The sign for "deaf"

3. SWML - SignWriting Markup Language

SWML, the SignWriting Markup Language, is an XML-based format for the storage and processing of sign language documents written in the SignWriting system, and for insertion of sign language texts in HTML documents. The current version of the defining DTD can be reached at http://swml.ucpel.tche.br/swml-version1.0-draft2.htm. A sample SWML file is the following:

```
<?xml version="1.0"?>
<swml version="1.0-d2" symbolset="SSS-1995">
```

```
<generator>
    <name>Sign Writer</name>
    <version>4.3</version>
</generator>
<sw_text>
    <sw_text_defaults>
        <sign_boxes>
            <unit> pt </unit>
            <height> 60 </height>
        </sign_boxes>
        <text_boxes>
            <box_type> graphic_box </box_type>
            <unit> pt </unit>
            <height> 60 </height>
        </text_boxes>
    </sw_text_defaults>
    <new_line/>
    <sign_box>
        <symbol x="20" y="9">
            <shape number="215" fill="1" variation="0"/>
            <transformation rotation="3" flop="0" />
        </symbol>
        <symbol x="15" y="33">
            <shape number="114" fill="1" variation="1"/>
            <transformation rotation="7" flop="0" />
        </symbol>
    </sign_box>
</sw_text>
</swml>
```

4. Rendering signs with SVG

The symbols of the SignWriting system are usually rendered in the Web as GIF files, obtained by screen capture from the SignWriter program (the sole SignWriting aware program existing up to now !). Given an SWML representation of a SignWriting file, using vector graphic formats for rendering the file may be much more interesting, due the greater flexibility allowed by such format. SSS.svg (http://swml.ucpel.tche.br/sss-svg) is a reference file that assigns an SVG symbol for each SignWriting symbol, thus allowing the rendering of signs in vector format.

5. Matching procedure for searching in sign language texts

The main problem in searching sign languages texts is to deal with the small variations people can introduce in the way they write the same signs. The SignWriting system distinguishes some graphical properties of the symbols, like rotation and flop, for example, but does not distinguish (neither identify) tiny variations due to vertical and/or horizontal translations of symbols within signs, because such values aren't discretized in the system (as opposed to, e.g., rotation, which can only assume a few set of discrete possible values).

The solution we've found to allow the user to control the criteria to be used for judging on the similarity of two signs is to define a kind of degree of similarity between the component symbols of a sign, assuring that two similar symbols should have the same symbol type, rotation and flop, but allowing them to have some variation on their relative positions within the respective signs.. This kind of similarity is formalized here as a parameterized, reflexive and symmetric relation, that we call *sign similarity relation*, the basis for the sign-matching procedure we are defining.

6. A sample SWML-based application: SW-WebMail

To illustrate the use of SWML in the storage and processing of sign language texts, we are building SW-WebMail, an SWML-based webmail service.

7. Conclusion

This paper (draft full version reachable at http://sign-net.ucpel.tche.br/papers/www10) presented work that is going on toward promoting the use of deaf sign languages, in written form, on the Web. The SWML initiative - and the SignNet Project that supports it - encompass more than the work presented here. It concerns also several other problems, such as development of new SignWriting software, development of means to help the interoperability of such SignWriting software, development of techniques for the automatic spell cheking of sign language texts,

development of techniques for the automatic translation between sign languages and oral languages (and between sign languages and sign languages), the creation of methods for the animation of written signs, etc.

Acknowledgments

References

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