A PROTOTYPE CONTENT CREATION FRAMEWORK FOR INDIAN SIGN LANGUAGE (ISL)

Jestin Joy*, Sreeraj M**

* Department of Computer Applications, St. George's College, Aruvithura, India

* *Department of Computer Science, Sree Ayyappa College, Chengannur, India

sreeraj.sac@gmail.com

(Abstract)

COVID-19 pandemic has forced many countries to shutdown educational institutions. Instructions through virtual mode are experimented in many parts of the world as an alternative. This unexpected switch proved to be difficult for both teachers and students. This is more serious for schools catering to the needs of deaf students in the developing world. The lack of availability of Sign Language based lectures and the difficulty in developing contents in sign language has badly affected the teaching learning process of the deaf. This paper proposes a web based easy to use solution for Sign Language based multimedia content creation. Initial feedback suggests that the proposed framework is helpful for the instructors to create accessible multimedia contents.

Indian Sign Language, CALL, Distance Learning

Introduction

COVID-19 pandemic induced lock-down has forced all educational institutions to move teaching online in most parts of the world. This unexpected switch proved to be a challenge for both teachers and students. This is more serious in developing countries(Gupta) since the level of technology adoption is much less as compared to the developed world. According to the census of 2011, India has 5,071,007 people who have hearing disability. The figure amounts to about 8.9% of the total differently abled population of India. Vasishta et al.(Vasishta etal.), in their study, emphasized that there is only one Indian sign language, they however acknowledged that there existed several regional variations. In developing countries, there are only very few schools for deaf students. Unemployment rate

among adults with hearing loss isvery high in developing countries. Learning sign language is not an easy task because of several reasons. Difficulty in understanding the sign language and non-availability of learning materials are some of the reasons for its slow adoption.

Though state backed attempts exist in India for reaching students on a larger scale, instructions in sign language are non existent for deaf students in these platforms. Multimedia based contents are preferred by students since sign based instructions can easily be represented using it. Lack of knowledge in technology based mediums for instructions makes it difficult for teachers to create content. Teachers are forced to release contents as their own for students. Instructors are finding their own solutions to manage the situation. Most of them use mobile phones to record the lessons and share with students using different platforms. This process normally requires additional help from someone to record the video. Textual contents corresponding to sign videos are also provided sometimes. This work presents a web based framework that can be used to create multimedia contents. The primary consideration in the design of the framework are ease of use and high availability. The instructor can create contents without any extra help using this application. Ability to place textual contents along with the video is an added advantage. Initial studies suggests this tool is helpful in educational content creation.

Related Works

Availability of easily accessible sign language based learning tools for textbook contents are very less(Vasishta et al.). Most of the existing tools are multi-modal bilingual applications and are game based ones(Adamo-Villani et al., Chuan and Guardino). We haven't come across any of them for Indian Sign Language (ISL).

RISE ebook(Collins et al.) is a bilingual bimodal joint project by Gallaudet University and Swarthmore College to promote reading. RISE ebook makes available classic children's books and is augmented with Sign Language to provide a shared reading facility for deaf children and their parents. Veliza, Espinoza et al(Véliz et al.) studied the effect of SL augmented digital books for deaf learners. They followed a participatory development model and preliminary results indicate

that augmenting SL based instructions with books improves comprehension. Visual Language and Visual Learning (VL2) project from Gallaudet University aims to develop a story book application for mobile phones and tablets. VL2 project(Malzkuhn and Herzig) augments SL contents with English text, facilitating reading and language acquisition for early and emerging readers. Unlike the above

two projects, SMARTSign AR project1 is a mobile based application that can be used along with physical copy of books. Users can click a picture of the story and SMARTSign AR mobile application automatically converts it to corresponding sign. Assistive Courseware for Hearing-Impaired (AC4HI)(Mutalib et al.) is a system for deaf learners to learn using Sign Language. It describes a system which displays text and sign videos side by side. Evaluation suggests that designing contents tailored for deaf students is favourable and they like text coupled with sign based instructions.

System Working

The proposed application is a web-based software which can easily be used by instructors to create content. Users can choose any of the modern web browser to use the application.

Application is made up of two screens, one for recording videos and adding corresponding text and another screen for previewing the added video. First screen also includes controls for video recording and adding text. Figure A shows the first screen of the application. First, the user starts the camera using the “Start Camera” option. Further, the video recording can be started using the “Start Recording” option. The “Play” option displays the recorded video in the right part of the screen.

“Crop and Play” option helps to crop the video based on the need of the instructor. Simultaneously instructor can also add text corresponding to the video. After the correct videos are cropped and text added, user can use the “Send” option to upload the video to the server. Processed video can be downloaded using the “Download” option. “Submit”option previews the video.

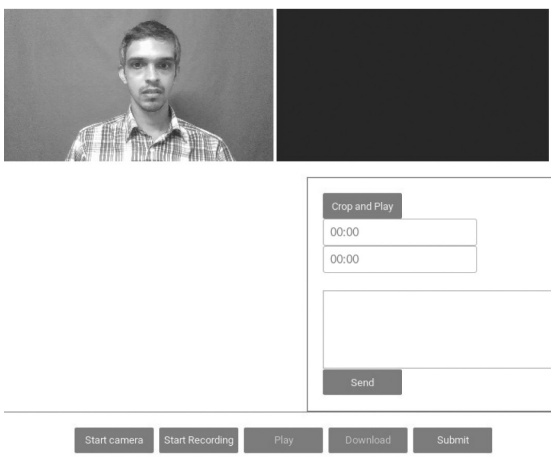

Figure A: Content Creation Screen

The proposed application is implemented using Javascript, which is a client side scripting language and hence it can run in any of the Javascript enabled browser. Content creator is presented with a HTML web page where he can record the video, preview, cut and add spoken language text.

Result and Discussions

Figure A shows the editor interface used by the instructor to create the content. Left portion of the screen is used to record video and the right side is used to store the corresponding text. Figure B shows the result of the recording. Students can use any web browser to view the lectures.

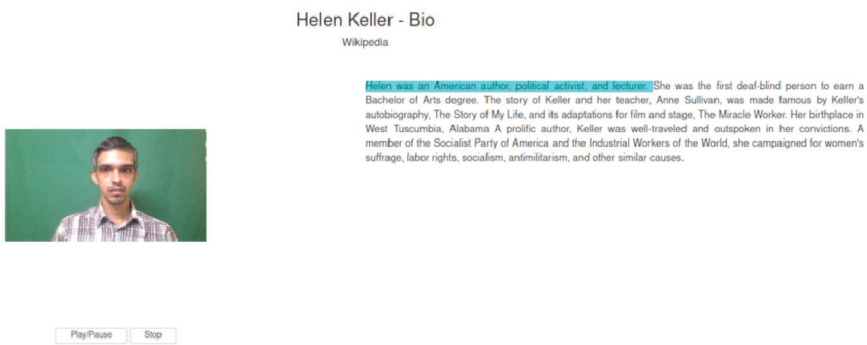

Figure B: Content Creation Screen

A preliminary evaluation was conducted with the help of three instructors. One of the instructors was from a school for Deaf. From the questionnaire response, it is observed that the web based framework is preferred by all the participants. They suggested including an accessible help page in the application as it can help users who are not accustomed to technology based tools for content authoring.

Conclusion

This paper proposes a web based content authoring framework for helping sign language instructors to create accessible contents. Both the content creation process and output are web based making it easy for users to access the contents. Initial feedback suggests that the proposed framework is helpful for the instructors.

References

Adamo-Villani, Nicoletta, et al. “An Immersive Virtual Environment for Learning Sign LanguageMathematics.”ACM SIGGRAPH 2006 Educators Program, SIGGRAPH ’06, ACM,2006.

Chuan, Ching-Hua and Caroline Anne Guardino. “Designing SmartSignPlay: An Interactive

andIntelligent American Sign Language App for Children Who Are Deaf or Hard of Hearingand Their Families."Companion Publication of the 21st International Conference onIntelligent User Interfaces, IUI '16 Companion, ACM, 2016, pp. 45–48.

Collins, Riley, et al. "RISE eBooks: Leveraging Off-the-Shelf Software Components in Supportof Deaf Literacy."Computers Helping People with Special Needs, edited by KlausMiesenberger, et al., Springer International Publishing, 2016, pp. 389–396.

Flórez Aristizábal, Leandro, et al. "Using Storytelling to Support the Education of Deaf Children:A Systematic Literature Review."Design, User Experience, and Usability: UnderstandingUsers and Contexts, edited by Aaron Marcus and Wentao Wang, Springer InternationalPublishing, 2017, pp. 371–382.

Gupta, Sudakshina. "The Impact of the coronavirus SARS-CoV-2 on the Education Sector inIndia."Confluence: Science, Scientists, and Society, edited by Sujin Babu and RamRamaswamy.

Malzkuhn, Melissa and Melissa Herzig. "Bilingual Storybook App Designed for Deaf ChildrenBased on Research Principles."Proceedings of the 12th International Conference onInteraction Design and Children, IDC '13, ACM, 2013, pp. 499–502.

Mutalib, Ariffin Abdul, et al. "Assistive video or assistive courseware: What hearing-impairedlearners say?"AIP Conference Proceedings, vol. 1761, no. 1, 2016, p. 020019.doi: 10.1063/1.4960859,https://aip.scitation.org/doi/pdf/10.1063/1.4960859

Vasishta, Madan, et al.An introduction to Indian sign language:(Focus on Delhi). All IndiaFederation of the Deaf, 1980.

Véliz, Soledad, et al. "Towards a participative approach for adapting multimodal digital books fordeaf and hard of hearing people."International Journal of Child-Computer Interaction,vol. 11, 2017, pp. 90–98.