LSEAvatar: An Avatar for Spanish Sign Language

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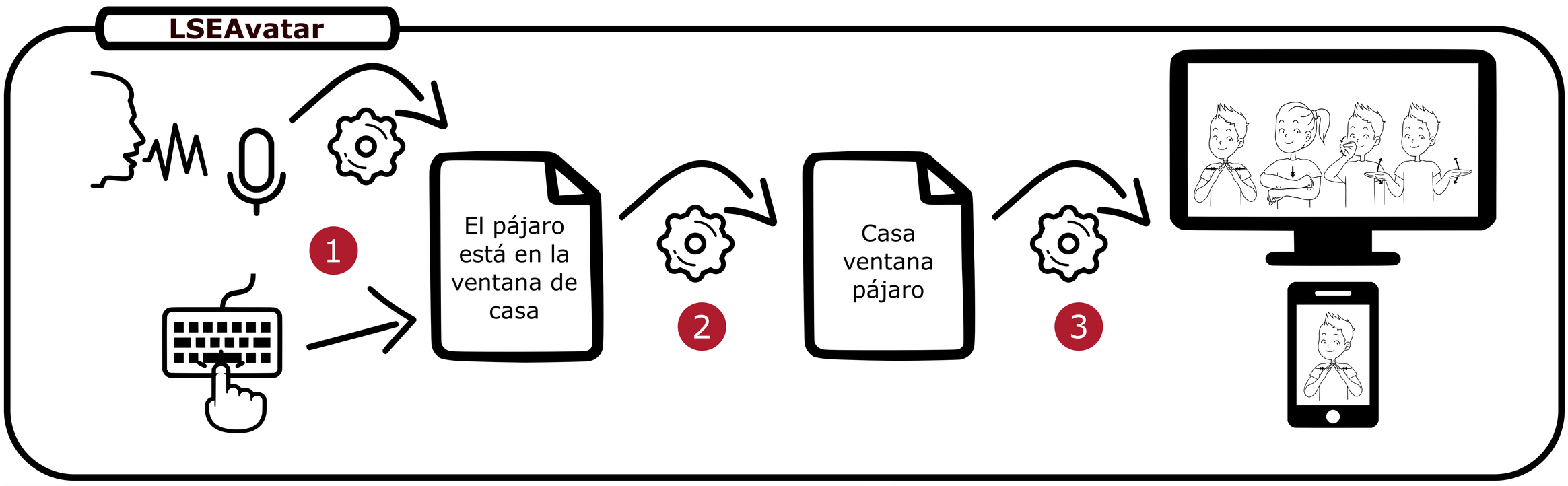
Abstract

Approximately 70,000 individuals use Spanish Sign Language (LSE) as their primary means of communication. However, due to the limited prevalence of sign language proficiency among the general population, deaf individuals often face significant challenges in various environments. Therefore, the development of technological systems that facilitate communication between deaf and hearing individuals is essential.

In the LSEAvatar project, we address how to translate messages from Spoken Spanish into LSE to facilitate communication for deaf individuals. To achieve this goal, we will employ natural language processing techniques along with deep learning models that convert audio or text into LSE glosses. Ultimately, the project aims for these glosses to be interpreted by an avatar, enhancing access to information and communication for deaf individuals. This project has the collaboration, advice, and validation of the Association of Deaf of La Rioja.



1 - LOE audio to LOE text

We have analysed 7 pretrained ASR models in the COSER corpus: 6 Whisper-based and 1 Seamless model. We can conclude that:

1. Although the Seamless model is the fastest, its performance is only better than the tiny version of Whisper.
2. The large-v3 version of Whisper produces the most accurate transcriptions; however, it is slower than its smaller counterparts.
3. For real-time processing the medium version of Whisper provides a good trade-off between accuracy and inference speed.

2 - LOE text to LSE glosses

We have approached this task as a translation problem and fine-tuned three sequence-to-sequence multilingual models (MBart Large 50, Marian MT and T5-Small) using the synLSE dataset.

We have evaluated the models using both BLEU, BLEU-3, BLEU-4 and Rouge-L, concluding that the best model was obtained with the MBart architecture.

3 - LSE glosses to avatar

First, we have built a dataset of LSE glosses captured from three different sources. The next step is the extraction of the movements from each video using 3D Human Pose Estimation models. Then, we build a 3D Blender armature that replicates the poses and transitions of the target signs.

The construction of this module is still ongoing; however, preliminary results can be seen in these links.

Social Impact

LSEAvatar aims to benefit all individuals who use LSE as their primary means of communication. The tool developed as a product of the LSEAvatar project will benefit deaf individuals, who will gain direct access to relevant information, as well as public administrations and businesses, which will be able to disseminate information to a larger audience.

This tool must be validated by LSE experts for it to be helpful to the deaf community. To this end, we are collaborating with the Association of the Deaf of La Rioja. Specifically, between three and eight individuals from the association will participate in the validation process.

This project has the potential to be adapted to other sign languages, thereby increasing its reach and impact.

Research Groups

The development of LSEAvatar is conducted by members of two groups of University of La Rioja: the *Grupo de Informática de la Universidad de La Rioja* and the *Grupo de Lingüística Aplicada de la Universidad de La Rioja*.

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