

TReLSU-HS: a new handshape dataset for Uruguayan Sign Language Recognition

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Abstract — In this work we present TReLSU-HS, a new database composed of more than 3000 still images for handshape recognition in the context of Uruguayan Sign Language. TReLSU-HS has 30 classes sampled from 5 native signers. The images were obtained from a previous dataset of Uruguayan Sign Language called Léxico TReLSU. Each component image was labeled according to consistent criteria. This database is useful for the computer science community, especially for designing new sign language recognition methods or to better understand the generalization capability of a given recognition system when it is applied to Uruguayan Sign Language data.

Introduction

Sign language is the most natural communication modality between deaf people all over the world. In order to complement the communication process, several works in the field of automatic sign language recognition (ASLR) have allowed computers to approach the semantic content of data obtained from a signer (Cheok, Omar, & Jaward, 2019). This translation is carried out by several artificial intelligence methods, showing encouraging results at different language levels: handshapes, isolated signs, and sentences. The effectiveness of these methods strongly depends on the datasets used to perform their fitting. In general terms, more representative datasets will produce better results. A characteristic of the ASLR field is that every region or country has its own sign language. This fact generates the requirement of acquiring or create local datasets that represent a particular sign language.

In this work, we introduce TReLSU-HS, a new database for handshape recognition obtained from a previous public dataset of Uruguayan Sign Language called Léxico TReLSU. We present here how TReLSU-HS was conformed and then describe the features of the resulting dataset.

Materials and Methods

Léxico TReLSU

Léxico TReLSU is an online dictionary set (see Figure 1) of Uruguayan Sign Language composed by 315 isolated signs, including both unimanual and bimanual ones. Inside this dictionary, each sign was indexed by an *ad hoc* codification based on the initial and final handshapes of both hands (Peluso Crespi, 2014). In this manner, each video name is composed by 2 and 4 handshapes for the unimanual and bimanual case, respectively.

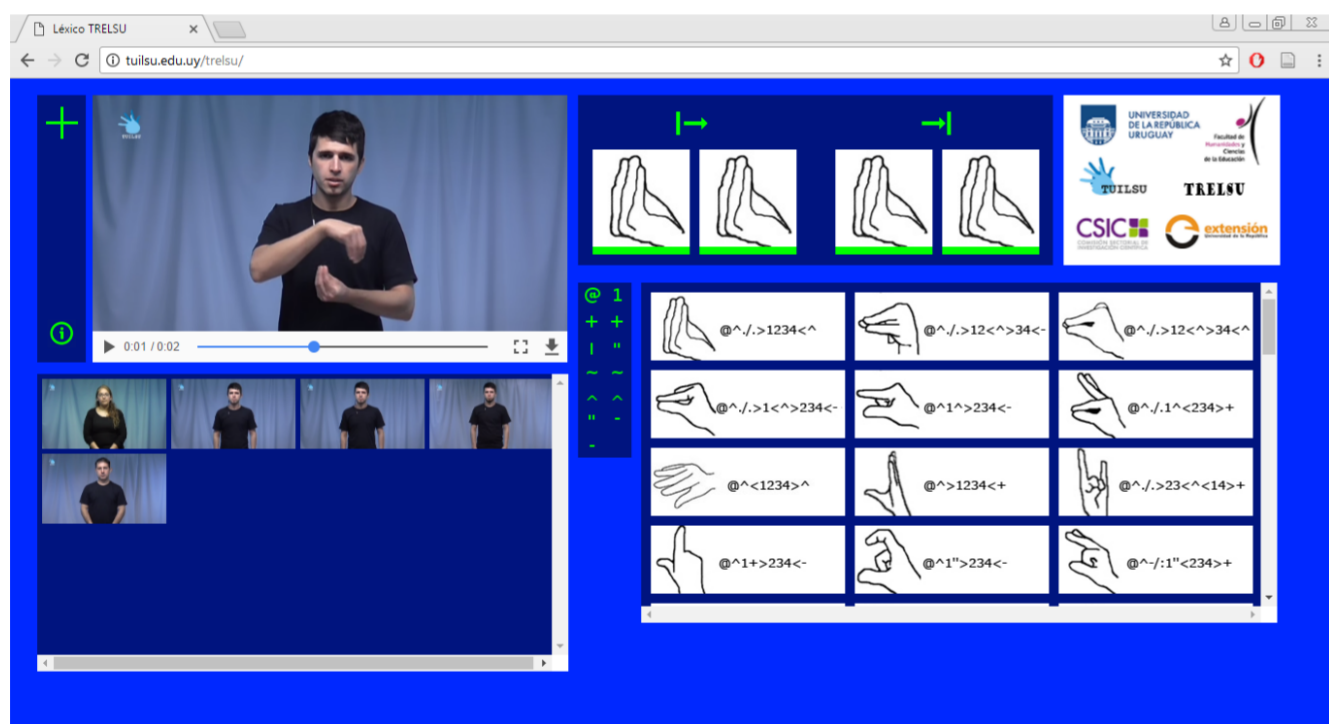


Figure 1. Screenshot of Léxico TReLSU from the website <http://tuilsu.edu.uy/treلسu/>.

TReLSU-HS conformation

The images of TReLSU-HS were obtained from Léxico TReLSU videos. As we said, each video linguistic content was described by 2 or 4 handshapes, depending on uni or bimanual case. In this work we proceed in the following way: (1) manual selection of only unimanual signs; (2) manual annotation (one by one) of temporal limits for the handshapes involved in each video. For step (2) we use the segmentation mode of ELAN 5.2, a free access software widely used in the linguistic community to make annotations on audiovisual data (Drew & Ney, 2008). In this manner, the 133 unimanual signs were segmented. Later, making use of 'ffmpeg' and 'ffprobe' from 'Python 3' it was extracted and labeled each frame included in the identified periods in step (2). Finally, each image was labeled according to Deep Hand classes (Koller, 2016). Table 1 shows class equivalences used in this work. During this process, 6 videos were discarded due to errors in the acquisition process.

Results

Following the described steps, TReLSU-HS is composed by 3067 frames of 640×360 pixels, labeled according to Deep Hand classes. TReLSU-HS has 30 classes sampled from 5 native signers –2 females and 3 males– in a controlled environment –artificial lighting, unicolored cyan background, and black clothes–.

References

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Because of its conformation method, TReLSU-HS is a non-balanced dataset, not only in each class samples but also in samples per signer. Figure 2 shows the sample distribution over the 30 classes for each signer. Note that the used labels correspond to the labels presented in Table 1.

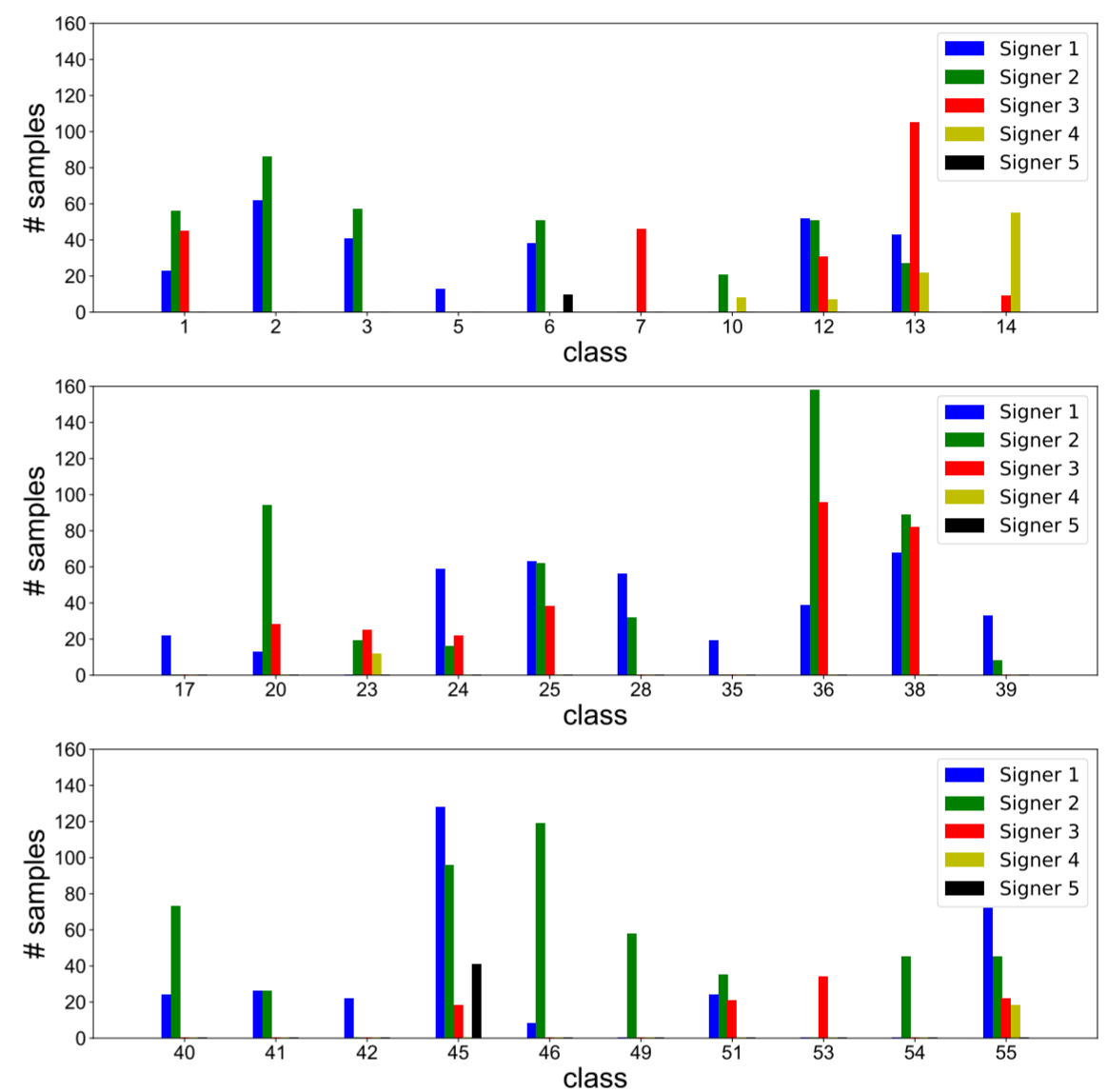


Figure 2. TReLSU-HS: sample distribution over classes and signers.

The TReLSU-HS dataset is publicly available for direct download in the following link: <https://github.com/ariel-stassi/TReLSU-HS>. Please cite this work if you use this dataset in your research.

Conclusions

In this work we present a new database for handshape recognition in the context of Uruguayan Sign Language Recognition. Even though this problem has been tackled in many other countries, this work is an effort to develop the field of ASLR in Uruguay. Currently, we are working on a new dataset for automatic recognition of Uruguayan Sign Language at isolated sign, alphabet and sentence levels and we hope to be in conditions to publish it soon.

Table 1. TReLSU-HS labeling according to Deep Hand classes.

Léxico TReLSU class	Deep Hand handshape	class	Léxico TReLSU class	Deep Hand handshape	class	Léxico TReLSU class	Deep Hand handshape	class
@+1-B		1	@-1'A		14	@-1'A		40
@-1+C		2	@-1'B		17	@+1'A		41
@+1+E		3	@-1'F		20	@-1'C		42
@-1+A		5	@-1'H		23	@-1-C		45
@+1+A		6	@-1'E		24	@R1'A		46
@-1'C		7	@-1+D		25	@-1+F		49
@R1-A		10	@-1-A		28	@-1'A		51
@R1+A		11	@-1'H		35	@-1+G		53
@-1+B		12	@-1+C		36	@+1-A		54
@+1+B		13	@-1'D		38	@-1'C		55

