SignaMed: a Cooperative Bilingual LSE-Spanish Dictionary in the Healthcare Domain

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Abstract

In this paper we present SignaMed, a bilingual dictionary accessible in Spanish and LSE (Spanish Sign Language) specific to the medical domain. Building a sign language dataset to develop machine learning algorithms and linguistic studies is a complex task that requires the cooperation of Deaf people. The dictionary platform, built with their contributions, offers diverse access modes for users, including basic search functionalities, games, and activities for sign donation. It allows sign searching using webcam or mobile phone capturing, facilitating intuitive interaction and feedback. The article presents the technical, linguistic and cooperation details behind the construction of the dictionary and will hopefully serve as inspiration for similar initiatives in other sign languages. The dictionary is accessible through https://signamed.web.app.

Keywords: LSE, Dictionary, Sign recognition, Deaf collaboration

1. Introduction

The landscape of sign language dictionaries is broad and diverse, driven by the intrinsic need of educators and relatives of Deaf individuals to learn sign language for communication. It is essential to remember that dictionaries play a crucial role in the consolidation of a national language, which includes sign languages. Many languages have dictionaries and sign banks collected by one or more entities, usually accessible online, where users can search for signs by keyword and view video recordings of the signs. Examples include ASL (www.signasl.org), BSL (www.signbsl.com, bslsignbank.ucl.ac.uk), DGS (web.dgs-korpus.de), AUSLAN (auslan.org.au), LSE (fundacioncnse-dilse.org), NZSL (www.nzsl.nz), LSFB (dicto.lsfb.be), among others. The European initiative Spreadthesign (www.spreadthesign.com) is notable for compiling signs in multiple languages for comparison.

Traditionally, sign language dictionaries have not been used to train automatic recognition algorithms for several reasons: there is usually no more than one sample per sign, there are usually few signers, and because they contain isolated signs, there is a lack of information about the non-manual components and co-articulation effects. But recently they have started to be used to obtain visual references to train sign spotting algorithms that help to look up examples of the dictionaries in videos with continuous signing (Jiang et al., 2021; Varol et al., 2022; Vázquez Enríquez et al., 2023), which opens the door to dense annotation of continuous SL footage, to advance in the translation problem, and to develop actual applications for search and retrieval.

Despite the advancements on the performance of sign spotting and isolated sign language recognition (ISLR), there has been very few examples of sign recognition models applied to practical use cases. One of the oldest examples can be found in Muhammed et al. (2016), where the authors introduced an interactive platform for communicating with Deaf individuals in a hospital setting through directed dialogue and a recognizer capable of identifying 33 signs using Dynamic Time Warping-based classifiers on RGB+D inputs from KinectV2. More recently, deep learning approaches have been utilized in small-scale applications, such as in Zhou et al. (2020), where a dataset of 45 Hong Kong Signs was collected to train a ResNet model and develop a mobile application paired with a Jetson Nano. During inference, the smartphone preprocesses the sign video, which is then wirelessly transmitted to the Jetson Nano for recognition and translation of the sign to spoken language. In the Greek project SL-ReDu, an education platform for learning GSL and providing automatic assessment (Papadimitriou et al., 2023), the authors train and test several deep learning approaches to recognize a set of 54 signs and the 24 Greek letters in fingerspelled words. They reported 91% sign recognition rate and 65% in fingerspelled letters both in signer

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independent mode and using 2DCNN RGB features with a Mobilenet backbone and a BiLSTM recursive model. From a business model point of view, it seems that some start-ups are starting to leverage ISLR models, like SLAIT (now focused on an ASL educational interactive platform) or CSLR, like SignAll and Sign-Speak (still landing pages that promise ASL translation).

In this paper we detail the construction of a dictionary that allows sign lookup using isolated sign recognition algorithms as an extension of a preliminary version presented at the GoodIT2021 conference (Vázquez Enríquez et al., 2021a). To our knowledge, only a similar idea was developed simultaneously for the French-speaking sign language of Belgium (LSBF) (Jérôme et al., 2023). Their model is able to classify 700 signs with a top-10 accuracy of 83%, and responds to a query in less than 10 secs without using GPU. It is clear that bigger efforts should be made to increase the accuracy and responsiveness of these applications.

The rest of this paper is organized as follows. Section 2 presents the project and summarizes the origin, the iterative growing process and the engagement of the Deaf community. Section 3 describes the main functionalities of the dictionary platform and how volunteers can contribute. Section 4 gives some more detail on the main technology modules of SignaMed: the platform itself, the sign recognition algorithm and the quality checking for incorporating new sign donations. Section 5 is dedicated to the linguistic issues that appear when trying to build a sign language dictionary, namely the variants of signs for the same meaning and the selection and definition of LSE terms for the health domain. The paper concludes with a discussion of potential benefits and next steps for the SignaMed platform.

2. SignaMed: a Bilingual LSE-Spanish Dictionary

2.1. Origin

SignaMed was conceived from the convergence of needs during a research project on automatic recognition of Spanish Sign Language (LSE). Before the COVID-19 pandemic, we began recording a dataset of isolated signs and short phrases in a laboratory setting and at Deaf associations (Docío-Fernández et al., 2020). In that project, we surveyed the Deaf community to identify the most urgent application scenarios for deploying a potential LSE to Spanish translation service. Healthcare emerged as the top priority by a significant margin. With the pandemic making it impossible to continue sample collection in the lab and associations, we aimed to develop an online capture platform, asking the Deaf community to record health-related signs. Aware of their fatigue from long-promised technological solutions, we sought to develop a practical application using the recordings so they could immediately see their efforts were not in vain. The initial reactions to being able to search for a sign by performing it in front of a webcam or smartphone encouraged us to further invest in the platform we named SignaMed. Moreover, the medical vocabulary sparked interesting discussions about the genesis of signs in this field and the lack of signs for relatively common concepts.

The medical environment is particularly sensitive for communication. For the Deaf, it proved especially exclusionary during the Covid-19 pandemic due to mask mandates. Beyond this context, the need persists for tools that facilitate understanding between healthcare personnel and the Deaf, encouraging sign language learning at beginner levels.

SignaMed aims to break down the barriers Deaf people face with medical nomenclature and help them gain spaces of trust and privacy, which is essential for managing terminology in their own language. Healthcare personnel will become more effective with a linguistic and technological tool that enables them to explore diagnoses and name symptoms, diseases, tests, and treatments. A micro-learning course with a Telegram bot [@signasalud] was created for medical staff to learn the most relevant signs within a few weeks, enhancing communication within their environment.

2.2. Internal structure

SignaMed is organized according to a double search function: from LSE and from Spanish. What connects both interfaces is a system that relates signs and variants of signs with meanings or concepts (meaning labels), which correspond to a singled out definition. Internally, each variant is identified by an id-gloss, which refers to a standardized articulation, that is, it unambiguously identifies a single sign or variant. These glosses are not shared with users but used internally.

The concept of "lexical entry", traditional in lexicography, is not adequate to describe the structure of SignaMed, since the dictionary is not organized by LSE lemmas, but by signs or sets of signs associated with a concept (a meaning label). This concept is materialized in a Spanish word in the text search.

2.3. Growing the dictionary

The initial model for sign recognition was trained with 40 signs. It was gradually expanded through an iterative process involving the collaboration of the Federation of Associations of Deaf People of

Galicia (FAXPG), which records reference signs from the vocabulary and some common variants, and the research team, which integrates the vocabulary and videos into the dictionary. They also seek community collaboration to record new samples of the vocabulary and propose new variants that might be less common. New samples of sufficient quality are added to the training dataset for the sign recognition algorithms, and the updated model is deployed, marking new signs in the dictionary as accessible in LSE. As of this article's submission, SignaMed consists of 373 reference signs corresponding to 312 health terms from which 273 are already learnt by the model (accessible in LSE)[1]. SignaMed includes 273 definitions in LSE and 120 usage examples. The creation of ad-hoc definitions for the dictionary is a complex linguistic exercise, noteworthy because medical term definitions in LSE are scarce. Claudia Domínguez, a Deaf person with a master's in Applied Linguistics, first developed the definitions in Spanish, so that they were easily translatable in LSE, consulting multiple sources of Spanish definitions. Then, she translated them to LSE thus ensuring full accessibility for Deaf users seeking to understand terms in their native language. After the definitions are prepared in LSE, with the necessary adaptations, the Spanish versions are not revised.

The iterative process of constructing SignaMed is summarized in Figure 1.

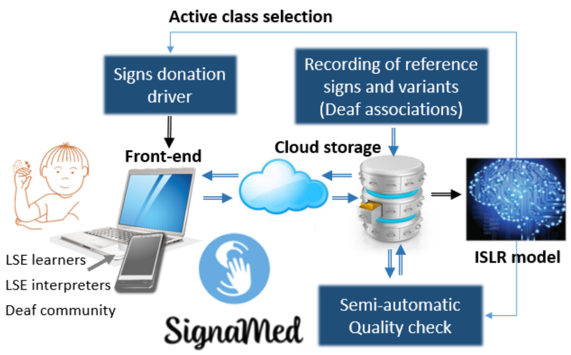

Figure 1: Iterative process for growing the SignaMed dictionary in signs and model capabilities.

The front-end allows target users to interact with the dictionary by searching words/signs and contributing with video donations. Reference signs and variants are provided by FAXPG, iteratively, including more and more specialized meanings. The ISLR model is trained from the dataset formed by reference signs and donations through a semi-supervised loop that curates samples and asks the users to donate specific class samples. The platform is engineered to request samples of signs most needed to enhance the model's capabilities. It's well understood that as the number of classes increases, the performance of multiclass classifiers decreases. This platform employs Active Class Selection techniques (Bicego et al., 2023) to prioritize the signs (Classes) the model needs to recognize better, whether due to insufficient samples in prior training, the shifting of decision boundaries after adding more classes, or the multiclass model partitioning the space differently in the latest growth iteration. A module named "Donate Signs" has been implemented, prompting donors to perform a series of signs requested by the system to fulfill its learning needs. Users can donate signs in this manner or contribute a new term, an unconsidered variant, or simply an additional repetition during any dictionary query.

Unfortunately, the long-term growth of the dictionary is not guaranteed, as it is being built with intermittent public funding, but the research groups involved are firmly committed to making the application increasingly useful, both for research and for everyday use, by searching alternative funding options.

2.4. Engaging the Deaf Community

Engaging the Deaf community in today's vast landscape of mobile applications is a challenge, which has led to the creation of a collaborative project that involves potential users of the application in its creation, incorporating playful and educational activities related to the underlying technology. SignaMed emerges as a citizen science project in which the Deaf community acts as both contributor and beneficiary. This approach requires maintaining optimal usability and drawing attention to the functionality of the application, ensuring that users not only understand its fundamentals, but also to comprehend how the machine makes use of generalizations about movement that exclude the reuse of the personal image and thus ensure anonymity.

A dedicated website[2] features videos in LSE explaining critical aspects of the algorithms for extracting spatial-temporal features defining signs and their classification, emphasizing personal data privacy and management within the SignaMed platform. Additionally, the platform offers interactive activities to highlight the importance of recording quality using webcams or mobile phones for the dictionary search. Users can compete for the highest scores by correctly identifying signs based on

[1] As of February 2024 the model was trained with 6K curated donations of 273 signs, but there are already more than 2K donations and 38 new signs ready to be processed for a new model. The donated video samples will not be shared due to GDPR restrictions but their Mediapipe keypoints will be made publicly available soon.

[2] www.signamed.uvigo.es

movement and articulations, with varying recording quality, and vie for the best quality recordings as a personal challenge, thereby enriching the platform with high-quality signs for continued growth, as illustrated in Figure 1.

3. Main Functionalities

With the development and evolution of the application, new features were added to the basic dictionary functions to encourage participation and interest from both the Deaf community and those interested in the field, thus promoting knowledge and collaboration within the platform.

Upon accessing SignaMed, the initial window (Figure 2) presents various tools and activities available to users. From left to right, these include video search, text search, "Donate Sign," and some games to explain the technology while playing.

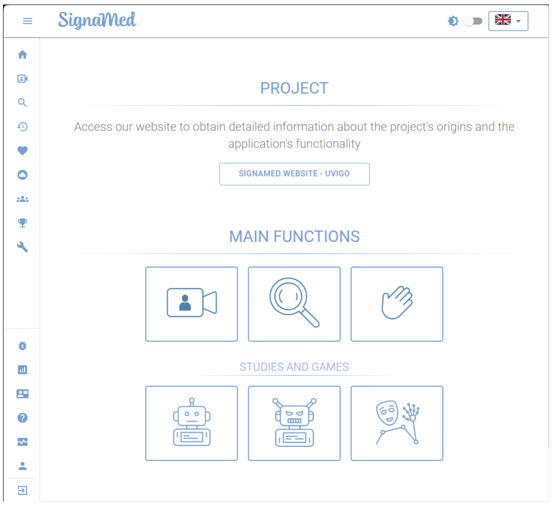

Figure 2: Home screen for the SignaMed platform

The web application offers several access modes adapted to user roles, allowing for different functionalities. Guests have restricted access to the core dictionary search functions, including both text-based and video-based searches. Registered users can participate in games and other activities such as the donation of elicited signs. Annotators, expert LSE collaborators, have access to an exclusive tool for the review and validation of videos.

The Guest option is needed to allow searching the dictionary without the platform saving the video of the query sign. When someone registers is giving permission, following the EU GDPR, to save their query for the only purpose of improving the recognition model.

The most unique feature of this dictionary is the search for a sign using the webcam or the cell phone. Figure 3 shows the recording dialog. After recording, the users are prompted to verify if they want to send it. Then the keypoints are extracted with Mediapipe Holistic (Lugaresi et al., 2019) and the keypoint matrix is injected into the trained recognition system, based on a MSG3D architecture as explained in Vázquez Enríquez et al. (2021b). Then, the user is shown the top-3 signs with their corresponding recognition confidence. In the example in Figure 3, the DIABETES term sign is recognized. The dialog allows the user to give feedback on the recognition result and even to indicate, in case the correct result is not among the top 3, which sign was asked for. In addition, the definition in sign language and an example of use in a medical environment can be consulted.

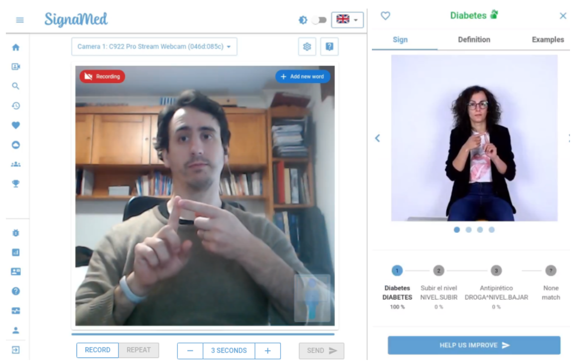

Figure 3: Dialog for sending a video query for a sign (left) and the top-3 results with their associated confidences (right)

The main functionality is common to Guests and Registered users, but the later can also donate signs. They have several options to do it:

- Looking for "red tagged" signs in the dictionary: red means that the model doesn't have enough samples for that sign to produce an accurate estimation (Figure 4 left part).
- Adding a sign variant for the same meaning: useful if the user knows another way to sign the same meaning, so they are invited to add it to the "puzzle" of variants (Figure 4 right part).
- Donate signs in a series: the users sit, relax and wait for the system to elicit the signs it needs more, so they just repeat and send until they decide to stop.

Videos from registered contributors are curated in a semiautomatic process that is explained in subsection 4.2.1.

As of December 1, 2023 SignaMed had 7050 donated signs from 339 registered users, 156 of whom have participated in the proposed interactive games. Figure 5 shows the evolution of donated signs since the first version of SignaMed. The peaks in this graph coincide with the dates

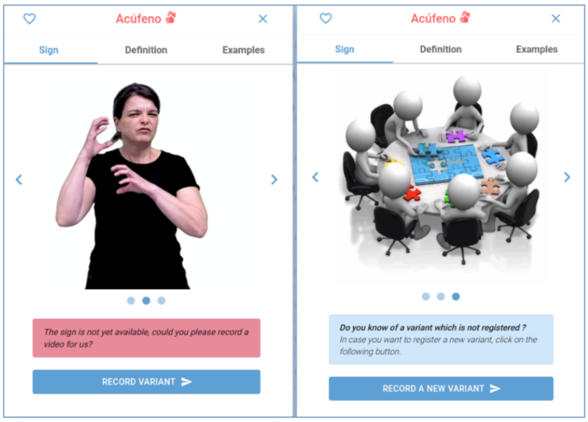

Figure 4: Option for donating a red-tagged sign (left) or a variant with the same meaning (right)

when campaigns were carried out through social networks or by going to deaf associations.

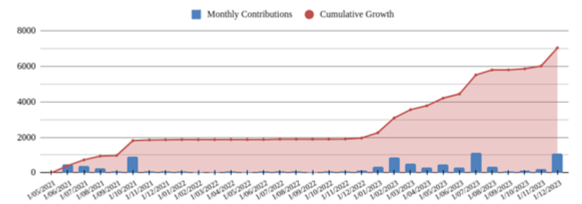

Figure 5: Evolution of sign donations in SignaMed

4. Technology Behind the Curtain

We summarize here the three main technical developments under the platform: the technology associated with the deployment of the platform itself, the technology that allows the recognition of signs and the semi-automatic module to check the quality of the donated signs.

4.1. Technology for the Deployment of the Web Application

The technologies implemented for the deployment of SignaMed were designed to provide an optimal experience on desktop browsers and mobile devices, and to safeguard the videos and data generated from user participation.

For deployment, we integrated Firebase for hosting, authentication and as a database and storage for reference videos. Cloudflare supports communication with the server, improving loading speed and offering protection against DDoS attacks. In the server, the requests pass again through several layers of security (firewall and a Nginx reverse proxy) reaching a Restful API that allows us to answer queries to our database, record videos and user activity, and process videos.

4.2. Sign Recognition

Figure 6 shows a summary process for automatic recognition of a query signal. We have adopted a recognition model based on keypoints (Mediapipe holystic (Lugaresi et al., 2019) in this case) because i) the sparsity of RGB samples do not guarantee a robust video-based deep neural network, and ii) when running Mediapipe in the client, the keypoint matrices weigh much less to transfer across the client-server platform which makes the whole system lighter and allows for more agile dictionary lookups.

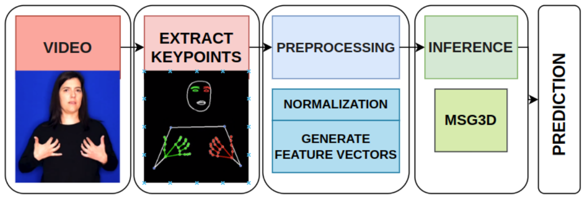

Figure 6: Sign recognition pipeline

Following the successful performance of the MSG3D-based solution merging logits of joints (keypoints) and bones (natural connections between joints) in Vázquez Enríquez et al. (2021b) we decided to train this model for the SignaMed dictionary using the samples donated by the users. The model is retrained periodically when a new set of curated signs is available.

4.2.1. Quality check of the donated signs

One of the challenges of training a model when few samples are available consist of dealing with the problem of noisy data. In the SignaMed iterative process for growing the dictionary there's a necessity of cleaning the donated samples due to two main issues: videos are captured in the wild and signs might not correspond to the elicited ground-truth. These two problems were tackled with a three-stage quality check:

1. A computer vision routine automatically checks several sources of quality degradation that could hamper the correct extraction of keypoints: hands blurriness, person too close or too far from the camera, arms-hands partially missed during the sign recording, too dark or bright illumination. A score is given to each video and those with low scores are discarded in the new training set.

2. The donated samples that correspond to repetitions of signs already accessible through the model, are passed through it to check if the predicted sign corresponds to the elicited one (ground-truth). If the difference over the

second passes a safety threshold the video is included in the new training set but not tagged for manual review.

3. The set of videos not discarded because of quality and not being safely classified by the current model, go through a manual review of the labels. This process is done by research group members, Deaf and hearing persons using an ad-hoc module (Figure 7) that allows reviewing around 300 samples per hour from any internet-connected device. This module allows to add comments from a predefined list regarding the video quality and the realization of the elicited sign. These annotations are very useful to improve the computer vision routine for automatic quality labeling.

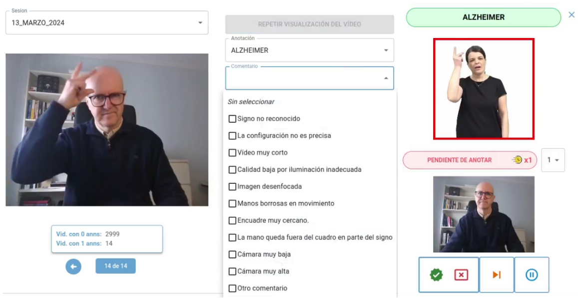

Figure 7: Module to review labels online with the quick review option (right) and the tool for adding comments if needed (left).

SignaMed does not give any instructions for donating signs, leaving freedom for each person to sign as they usually do. It is worth noting that differences have been detected in the way native speakers or interpreters donate signs, compared to people who are learning LSE. The latter group tends to imitate the sign as they see it in the video, which detracts from the naturalness of the samples. However, we have decided to keep all the videos with correct signing in order to have more samples when training the algorithms.

4.2.2. Recognition Accuracy

Currently, the model is trained for recognizing 273 signs, a number continuously growing based on the availability of new curated videos from donations. The current overall performance of the model is summarized in Table 1 for the test set of reference signs (not used in training). The server responds within 3 to 4 seconds after the user submits a video, depending on its duration. This time is shortened to 350ms by extracting the keypoints directly in the browser if the user's device is able to run the Mediapipe keypoints estimator at least at 10 fps.

Stream	Top1	Top5
Joints + Bones	92	97

Table 1: Top-1 and Top-5 accuracy (%)

5. Linguistic Challenges in SignaMed

The consolidation of a dictionary of technical terms for a minority language is already a challenge in itself, due to the proliferation of variants that arise for the same concepts and the need to adapt word formation procedures that are natural and usable. The deaf community must be involved in this task but when facing the creation of SignaMed it is necessary to be aware of the doubts and difficulties it poses, both for Deaf individuals and for organizational entities[3]. Proposals for the creation of a particular term may arise simultaneously in different geographical contexts, with great insecurity on the part of its creators due to the absence of a standard. As far as the formation of new terms, the usefulness of the composition procedure has been detected (at least in the case of the LSE and for the field of health). Compound signs such as DOCTOR+OPERATE (*surgeon*) are common. However, although faithful to the meaning, they are difficult to remember and constitute a challenge for automatic recognition. In the case of LSE, there are some lexicographic repertoires that constitute good sources for medical signs: Ferre (2006); CNSE (2019); Aroca et al. (2003).

The selection of terms and the elaboration of definitions constitute another difficulty. Definitions have to be clear, adapted to the meaning and simple. The existing lexicographic sources, both general and specialized, of spoken languages do not always constitute appropriate models. This is partly due to intrinsic features of LSE (and other sign languages), such as categorical indeterminacy, which often makes complex the exclusion of the defined term in the definition. Thus, for example, "vivir" (*to live*), "vivo" (*alive*) and "vida" (*life*) in Spanish are a single sign in LSE. Something similar happens with the polysemy of the signs: "hígado" (*liver*) and "hepatitis" (*hepatitis*) have the same sign (examples from Domínguez, 2023). In practice, this has led to ad hoc solutions, such as using a circumlocution to define hepatitis: "Inflammation of the organ that regulates the chemical levels of the blood" Domínguez (2023).

[3] In the case of LSE, there is an entity whose mission is to standardize and protect the language: the Centro de Normalización Lingüística de la LSE (CNLSE).

5.1. Variants of Signs in the Health Domain

As already mentioned, relatively frequently (34%) more than one sign appears associated with the same meaning label. For example, for "allergy" we recorded two different articulations, glossed as ALERGIA and ALERGIA2 (Spanish form for ALLERGY and ALLERGY2, see Figure 8).

Figure 8: Two sign variants for the meaning "Allergy"

Three types of variants have been recorded:

- Phonological: only one parameter varies. Thus, for example, we have recorded three different articulations for "alta" (*discharge*): ALTA, ALTA(MP) and ALTA(2M). In all three the dominant hand is raised with the palm upwards, the difference lies in the passive hand: it does not intervene, it intervenes statically or it intervenes with the same movement and orientation of the dominant hand (Figure 9). In total there are 61 articulations, which are grouped into 29 meaning labels. Other examples of labels that gather phonological variants are: "análisis de sangre", "azucar", "meningitis" or "tensión" (*blood test, sugar, meningitis or tension*, respectively).

- Morphological: in some cases, articulations referring to the same lemma have been recorded. These are directional verbs, whose realization is noted in different orientations "ayudar", "revisar" (*help, look-over*) or signs with relevant location like "herida" (*wound*). They represent a total of 12 signs in the database, which are grouped into 5 meaning labels.

- Lexical: these are the most frequent and the ones that constitute true variants. 159 signs are involved in this type of variation, grouped in 71 meaning labels. In addition to "alergia" (*allergy*), other meanings that group lexical variants are, for example: "colesterol", "diabetes", "diarrea" or "ictus" (*cholesterol, diabetes, diarrhea or ictus*, respectively).

Figure 9: Three articulations for "discharge"

Two pie-charts are presented in Figure 10. The top one (signs) shows the percentage of variants, according to the types presented above. The "forms 0" include those with no registered variants and those considered reference forms[4]. It shows that variants constitute slightly more than a third of the total SignaMed database. The bottom one (meanings) presents a summary of the meaning labels. It focuses in how variants are grouped in relation to meanings.

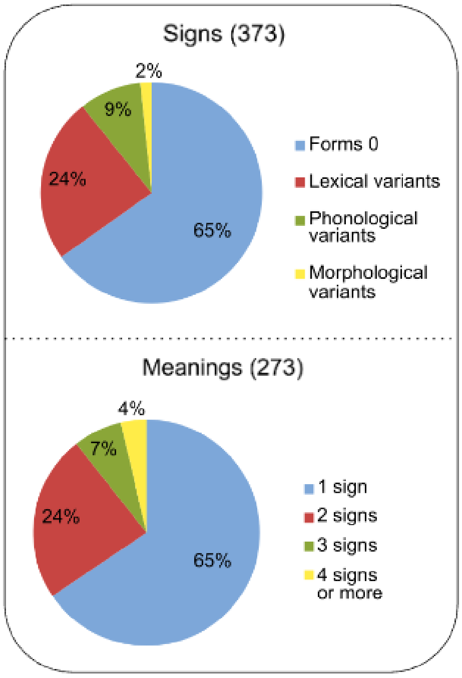

Figure 10: Distribution of variants in SignaMed

As mentioned above, about one third of the meanings into which SignaMed signs are grouped have more than one associated sign. Since the terminology tends to be univocal, one could hypothesize that, as the dictionary grows in number of signs and meanings, these groupings into variants will become less and less frequent. However, there is no indication that this will be the case. On the contrary, it is possible that variants of some of the

[4]Only in order to make visible in how many cases there is more than one form for the same meaning label. It is not intended to select one variant as the main one.

meaning labels that are not currently registered may appear in the future. Thus, for example, there is a single sign for "depresión" (*depression*), but "antidepresivo" (*antidepressant*) is linked with two compound signs, the second element of which is the sign for "contra" (*against*) and the first is in one case the same sign for "depresión" and the second is another form for the same meaning (the signer accompanies it with a mouthing that corresponds to the Spanish word "depresión"). The reasons that can be given for this variation are two: on the one hand, the fact that LSE is, like other sign languages, a minority and poorly standardized language. On the other hand, lexical creation procedures in sign languages have a conceptual basis strongly rooted in bodily perceptions, which is especially profitable in the case of diseases, symptoms, treatments and other semantic categories that are part of medical terminology and health.

5.2. Challenges in selecting terms and developing definitions

As has already been noted, one of the problems that have arisen when developing definitions is that of avoiding the defined term. For example, "hígado" (*liver*) in “hepatitis” or “pulmón" (*lung*) in “neumonía" *pneumonia*. They have been resolved with paraphrases and circumlocutions, but also by exploiting the iconic resources of the LSE. The solution of finding synonyms leads to another problem: that of deciding whether said synonymous signs are not actually lexical variants with the same meaning. Another difficulty that had to be overcome is the coincidence of the name, in Spanish, of the disease and the agent that causes it. This is what happens with “hongo" (*fungus*). In this case it was decided to provide two different entries in the dictionary. For the disease, four variants were identified, two of which begin with the fingerspelled H (in one of them followed by the sign "célula" (*cell*) and another two locating the sign for *spot* in different body places (on the arm and on the torso). For the agent that causes the disease, a compound was formed with the sign used for *mushroom* (a common and well-known type of fungus) and another glossed as *etc* [5]. The LSE definition proposed for the disease begins by specifying that it affects the skin tissues and then points out different locations. For the living being, a description of its characteristics and ways of life is provided. The collaborating team of the FAXPG, who was hired by the project to record signs and definitions that were being selected (see section 2.3), intervened in these decisions. The fact that LSE allows different body locations to be selected to indicate where an illness is located has also posed some difficulty. In the case of “infarto" (*infarction*) there is a generic sign that does not specify a location. Due to this, a generic entry has been included in the dictionary, another for “infarto de miocardio" (*myocardial infarction*) (whose sign consists of a compound whose first part indicates the location of the heart and the second is "INFARTO") and a third for “ictus”. The latter has five variants, one of which is a compound in which the first term points to the head and the second is "INFARTO".

[5]The Spanish signs corresponding to the meanings *spot*,*mushroom* and *etc* are not searchable in SignaMed.

6. Concluding remarks and next steps

In this article we have presented SignaMed, an accessible collaborative bilingual LSE-Spanish dictionary in the health domain. The dictionary is conceived as a citizen science project to involve its recipients in the process of building and learning the AI techniques that support it. The article is intended to serve as an example of the necessary collaboration that must exist in any project that seeks to develop sign recognition or sign language translation technology. Brief details of each of the main parts of the project have been given, but due to space limitations some functionalities have been left out. The reader is invited to try it out at https://signamed.web.app.

The next steps for the SignaMed platform are already underway: preparing it for extension to translation of phrases in the healthcare domain. The challenge is to get the Deaf community to contribute phrases for a specific purpose. The platform is already preparing to learn a communication ontology in a hospital emergency department where there is an established protocol of questions. The SignaMed platform will have all questions and samples of potential answers in LSE. Donors will be able to choose between signing exactly the same answer, some glossing variant with the same meaning, or a totally different answer. These interactions will help to tune an end2end sign language translator between LSE and Spanish in the healthcare domain.

In short, this project serves the dual purpose of demonstrating a practical use of isolated sign recognition technology while presenting a user-friendly signs collection platform that can be used for new projects.

7. Acknowledgements

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