Scalable Video-Based Search in the VGT Dictionary

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Abstract

Video-based sign language dictionary search – in which a user records a sign to retrieve its translation – has been increasingly studied, yet never deployed in a large-vocabulary setting. We present the first such deployment: a fully scalable video-based search system integrated into the Flemish Sign Language (VGT) Dictionary, comprising over 11,000 signs. The system, released on November 28th, 2025, requires no retraining as new signs are added, and was validated on data collected *in the wild*. It was developed through an equal partnership between the deaf-led Flemish Sign Language Centre (VGTC) and AI researchers from Ghent University, and shows that closing the gap between sign language research and community impact is both achievable and essential.

1 The Flemish Sign language dictionary

The Flemish Sign Language (VGT) dictionary (Brosens, 2022) is the primary lexicographic resource for Flemish Sign Language (Link: woordenboek.vlaamsegebarentaal.be). Through its continual development in close collaboration with the Flemish signing community, it plays a central role in preserving, documenting, and teaching the language, while reflecting its contemporary lexical and regional diversity. Currently, the VGT dictionary comprises 11,248 unique signs, but this number is rapidly expanding through several curation mechanisms that rely on community involvement.

The VGT dictionary was among the first to support a form of sign-to-text search (Vermeerbergen and Van Herreweghe, 2018). Initially, users could search for sign translations using SignWriting (Sutton, 2022). Later, this was replaced with a system based on sign parameters, in which users search by selecting handshape(s) from a list or indicating the articulatory location on a pictogram of the human body. Similar (or even more extensive) search functionality is also available in several other sign language dictionaries.

However, parameter-based approaches fall short of enabling true sign-to-text search, where a user performs a sign in front of a camera and retrieves its relevant Dutch translations. Building a system capable of searching through large dictionaries poses several non-trivial challenges. It must handle any arbitrary sign mapped to a unique gloss, scale efficiently and robustly to very large vocabularies, and remain flexible enough to accommodate new entries without requiring retraining. Through our collaboration, video-based search has been added alongside existing parameter-based methods, making the VGT dictionary the first to support this at such a vocabulary scale. While Vandendriessche et al. (2026) detail the co-creation process that brought initial research results into a validated application, this paper describes the final system, which has been publicly available as part of the VGT dictionary since November 28th, 2025.

Before our addition, the dictionary was used primarily by hearing VGT learners looking up signs for Dutch words. Video-based search makes the VGT dictionary truly bidirectional: enabling reliable sign-to-text search opens the dictionary to DHH users as well – particularly those with lower Dutch proficiency – as it allows them to consult it in their native language. Beyond expanding the

user base, this functionality also unlocks new applications, such as lexical research and the development of VGT learner support tools driven by the DHH community itself. While the full community impact remains to be seen, realising this functionality required concrete technical advances, which we describe below.

2 Product properties and usage statistics

To ensure frictionless access, we deliberately embedded this functionality into the trusted VGT dictionary rather than branding it as a standalone product. Technically, our solution is based on similarity search, using vector representations that were not specifically tailored to VGT. As a result, it is not affected by dictionary expansion. Most technical aspects described in (Vandendriessche, 2026) are retained in the current implementation. One key design choice was the privacy-oriented decision to extract keypoints locally on the user's device, ensuring that no personal data is ever transmitted over the internet. In the original implementation, however, real-time keypoint extraction using MediaPipe[1] introduced frame drops on less performant hardware, reducing retrieval accuracy. We therefore reimplemented the recording workflow to enforce the processing of all frames, at the cost of some processing time. Additionally, in-frame detection of the user's elbows and shoulders reduces keypoint jitter caused by out-of-frame body parts. Together, these changes significantly improved retrieval performance.

Fig. 1 shows steady platform usage since release. To support long-term monitoring we invite user-driven labelling: after each query, users can indicate whether the correct sign appeared among the retrieved results. Since this feedback is optional, annotated samples remain a minority (at the time of writing, only 172 labelled queries have been logged), which limits statistically significant conclusions. However, we expect that meaningful evaluation data will accumulate over time.

3 Conclusions and call to action

Bringing research technology to a real-world, large-vocabulary dictionary required steps that are rarely reported in academic research – and even more rarely rewarded by it. Validating performance *in the wild*, adapting to real hardware constraints, and iterating based on genuine user behaviour are not linear processes, yet they are essential to ensure that research outcomes actually reach the communities they are intended to serve. We argue that the field of sign language technology would benefit from more explicitly valuing these steps, both in how research is conducted and how it is evaluated. We therefore encourage sign language technology researchers to engage more openly with the practical challenges of real-world deployment, and to treat the gap between laboratory results and genuine community use not as an implementation detail, but as a research problem in its own right. In the end, this engagement is what transforms research outcomes into community-driven products with real short-term impact (Bragg, 2019) – and what gives co-creation its meaning beyond a buzzword.

[1]Link: github.com/google-ai-edge/mediapipe

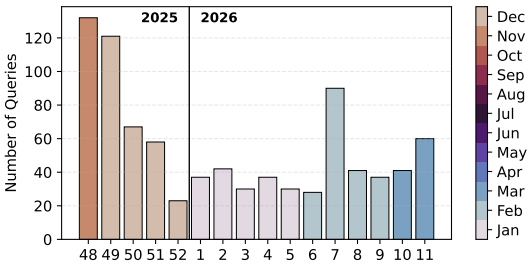

Figure 1: Weekly usage of video based lookup in the VGT online dictionary since release on Nov. 28th, 2025.

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