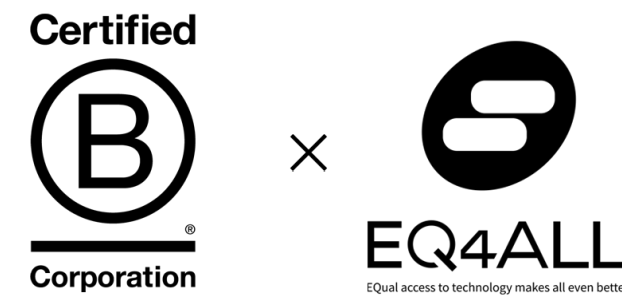


# Sign Language Avatar Animation Search: An Ani2Ani Search Application



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## Motivation

We host a content management system (CMS) with over 12,000 animation segments. Our CMS users build sign language translations from these animation segments. However, we do not have a unified naming system, so nearly identical animations may be saved under wildly different names. Since current animation search is a text-based lexical search (Text2Ani), users spend most of their time searching for animations rather than translating or hand-tuning completed animations.

## Overview

We developed a gesture-based similarity search system for animation-to-animation (Ani2Ani) search. We will extend the system to two additional input modalities: morphological category input (Morph2Ani) and video input (Vid2Ani) in the future to continue improving animation search.

## Search Algorithm

By keeping our system general and modular, we can utilize a wide range of analytical methods, specified from a single config file.

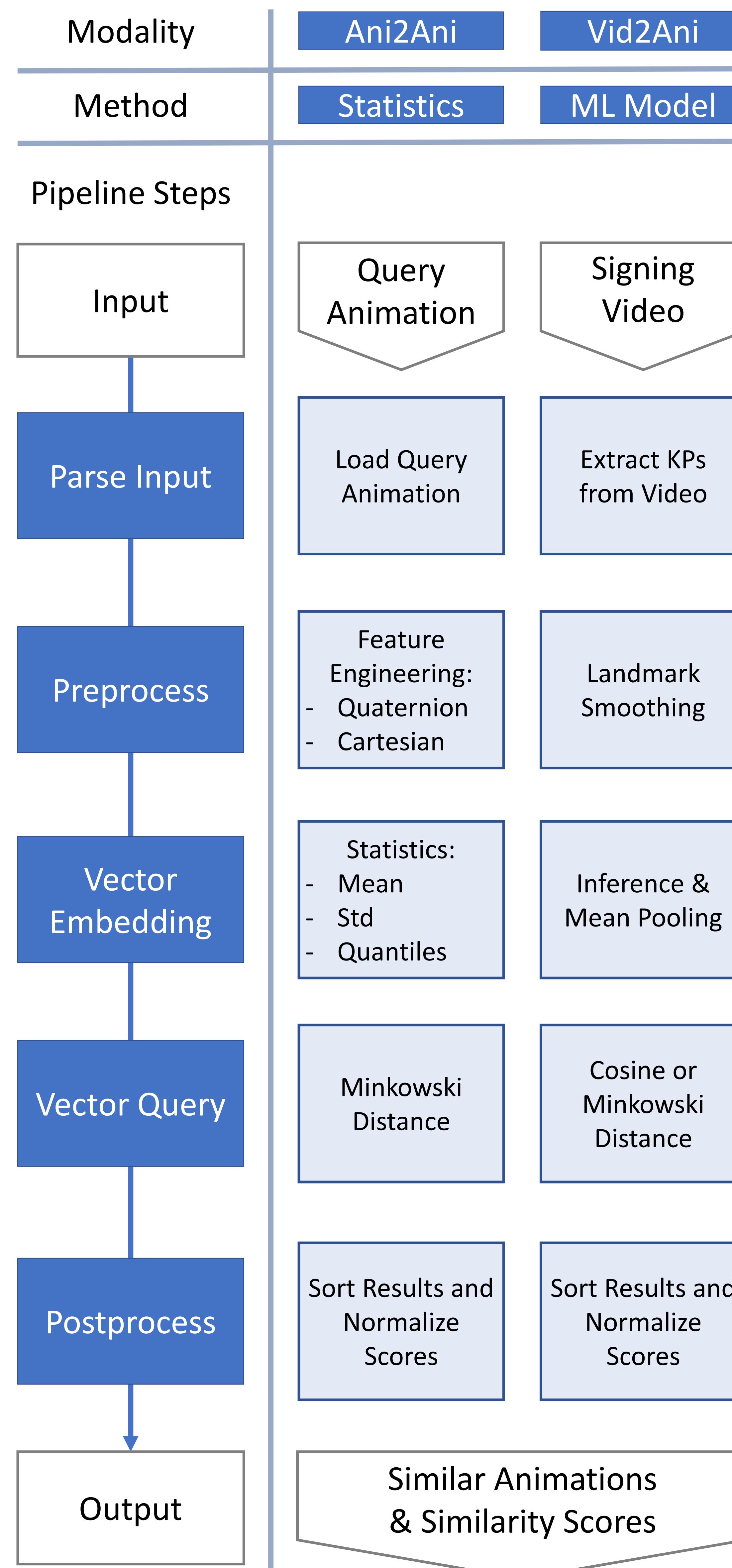
See the middle section for examples of Ani2Ani search and future Vid2Ani search pipelines. Furthermore, since the system is modular, it is trivial to combine several pipelines and utilize multiple modeling techniques in a single system.

As a minimal reference for user evaluation sessions, we used a simple baseline Ani2Ani config with mean pooling and few engineered features.

## Future

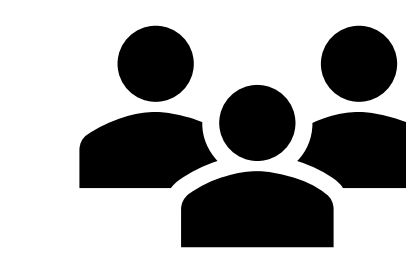
This is an ongoing R&D project. Currently we are working on more advanced feature engineering and data collection for improved learned solutions. We will also start development on Morph2Ani and Vid2Ani soon.

## Search Pipeline



## User Feedback and Evaluation

- User Feedback** (+ positive, - negative, ~ recommendation)
- + Even the mean-pooling baseline would be helpful.
  - + Users found all hard-to-find animations during evaluation sessions.
  - Long or fingerspelling animations were returned too often. (Fixed via weighting results by wrist speed and animation length.)
  - Hand shape should be prioritized over hand position.
  - ~ Interpretation would be easier if similarity scores are shown. (Semi-solved: interpreting distance in high-dimensions is not trivial.)
  - ~ Up to fifty similar results should be returned.
  - ~ Extending existing Text2Ani search with Ani2Ani would be helpful.



## Simulated Search Results

Number of Results	Text2Ani	Text2Ani+Ani2Ani
Min	0	0
Max	12	27
Mean	3.23	4.51
Total	139	194

## Ani2Ani Performance

acc@n (n=no. labels)	28.2%
acc@50	58.2%
marginal value	39.6%

## Planned UI

