# A Machine Learning-based Segmentation Approach for Measuring Similarity Between Sign Languages

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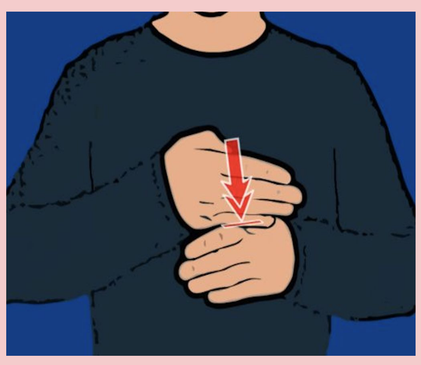
## Classic Method: Lexicostatistics



Movement
Location
Handshape
Orientation

## Segmentation and sign recognition


[Renz et al, 2021]

Machine Learning Model (trained in BSL)

EXACT_MATCH,
MATCH_SYNG,
MATCH_SYNGP

overlap

00:00:00,312 → 00:00:00,815
**let**

00:00:00,312 → 00:00:00,815
**forget**

00:00:00,312 → 00:00:00,815
**emotion**

00:00:00,440 → 00:00:00,920
**empty, discuss, dirty, tidy, let, want**

00:00:01,120 → 00:00:01,440
**Slip, low, not, grow-up, surprise, say**

00:00:00,312 → 00:00:00,815
**Low, say, enough, clothes, panic, angry**

## Results

| Sign Language | Woodward Similarity (in %) | | | Swadesh Similarity (in %) | | | Classic Similarity (in %) |
|---|---|---|---|---|---|---|---|
| | Exact | Synonym Ground Truth | Synonym Prediction | Exact | Synonym Ground Truth | Synonym Prediction | |
| ASL | **28.57** | 33.33 | 47.62 | 13.95 | 23.26 | 39.53 | 25 |
| Auslan | 23.72 | 50 | 57.69 | 34.62 | 46.15 | 48.72 | 77 |
| ISL | 0 | **9.09** | **9.09** | 0 | 0 | 0 | 7 |

**Table 2:** Each represent the similarity score between that sign language and BSL. “Woodward similarity” column represents overlap percentage of Woodward words occurrences according to proposed 3 metrics in 3 datasets. “Swadesh similarity” represents similar overlap percentage for Swadesh words occurrences. “MATCH_SYNG” represents results closely similar to classical similarity score for each dataset.

| Auslan Sign Language | MATCH_SYNG (in %) | | |
|---|---|---|---|
| | Swadesh Similarity | Woodward Similarity | Classic Similarity |
| Northern 1 | 39.29 | 25 | |
| Northern 2 | 45 | 28.57 | |
| Northern 3 | 27.59 | 23.53 | |
| **Total Of this 3 files** | **36.36** | **25** | 77 |
| Melbourne | 55.17 | 75 | |
| Sydney | 68 | 61.11 | |
| **Total Of this 2 files** | **63.29** | **68.42** | 77 |

**Table 3:** Disaggregated analysis of Australian dialects.