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Digital tools for sign language research: towards recognition and comparison of lexical signs

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Bibliography

- [1] Waleed H Abdulla, David Chow, and Gary Sin. “Cross-words reference template for DTW-based speech recognition systems”. en. In: *TENCON 2003. Conference on Convergent Technologies for Asia-Pacific Region*. Vol. 4. Bangalore, India: Allied Publishers Pvt. Ltd, 2003, pp. 1576–1579. ISBN: 978-0-7803-8162-9. DOI: 10.1109/TENCON.2003.1273186. URL: <http://ieeexplore.ieee.org/document/1273186/> (visited on 02/07/2020).
- [2] Natasha Abner et al. “Getting the Upper Hand on Sign Language Families: Historical Analysis and Annotation Methods”. In: *FEAST. Formal and Experimental Advances in Sign language Theory* 3 (2020), pp. 17–29.
- [3] Faustina Teni Abudu. “Lexical variation in the Ghanaian sign language and its effects on the language development of the hearing impaired”. MA thesis. University of Education, Winneba, 2019.
- [4] Nikolas Adaloglou et al. “A comprehensive study on sign language recognition methods”. In: *ArXiv preprint abs/2007.12530* (2020). URL: <https://arxiv.org/abs/2007.12530>.
- [5] Rawan A. Al Rashid Agha, Muhammed N. Sefer, and Polla Fattah. “A Comprehensive Study on Sign Languages Recognition Systems Using (SVM, KNN, CNN and ANN)”. In: *First International Conference on Data Science, E-Learning and*

- Information Systems (DATA '18)*. Madrid, Spain: ACM, 2018, 28:1–28:6.
- [6] Abdelbaky A Ahmed and Saleh Aly. “Appearance-based Arabic Sign Language recognition using Hidden Markov Models”. In: *2014 International Conference on Engineering and Technology (ICET)*. IEEE, 2014. DOI: 10.1109/icengtechnol.2014.7016804. URL: <https://doi.org/10.1109/icengtechnol.2014.7016804>.
 - [7] Washef Ahmed, Kunal Chanda, and Soma Mitra. “Vision-based hand gesture recognition using dynamic time warping for Indian sign language”. In: *2016 International Conference on Information Science (ICIS)*. Kochi, India: IEEE, 2016, pp. 120–125.
 - [8] Kairat Aitpayev, Shynggys Islam, and Alfarabi Imashev. “Semi-automatic annotation tool for sign languages”. In: *2016 IEEE 10th International Conference on Application of Information and Communication Technologies (AICT)*. Baku, Azerbaijan: IEEE, 2016, pp. 1–4.
 - [9] Oliver Alonzo, Abraham Glasser, and Matt Huenerfauth. “Effect of automatic sign recognition performance on the usability of video-based search interfaces for sign language dictionaries”. en. In: *The 21st International ACM SIGACCESS Conference on Computers and Accessibility*. Pittsburgh PA USA: ACM, 2019, pp. 56–67. ISBN: 978-1-4503-6676-2. DOI: 10.1145/3308561.3353791. URL: <https://dl.acm.org/doi/10.1145/3308561.3353791> (visited on 03/09/2021).
 - [10] Mykhaylo Andriluka et al. “2D Human Pose Estimation: New Benchmark and State of the Art Analysis”. In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. 2014.
 - [11] Scott Axelrod and Benoit Maison. “Combination of hidden markov models with dynamic time warping for speech recognition”. en. In: *2004 IEEE International Conference on Acoustics, Speech, and Signal Processing*. Vol. 1. Montreal, Que., Canada: IEEE, 2004, pp. I–173–6. ISBN: 978-0-7803-8484-2. DOI: 10.1109/ICASSP.2004.1325950. URL: <http://ieeexplore.ieee.org/document/1325950/> (visited on 02/07/2020).
 - [12] Albert J Bickford. “Lexical variation in Mexican sign language”. In: *Sign Language Studies* 72.1 (1991), pp. 241–276.

- [13] Bickford, J Albert. *The signed languages of Eastern Europe*. Citeseer, 2005.
- [14] Yunus Can Bilge, Nazli Ikizler-Cinbis, and Ramazan Gokberk Cinbis. “Zero-Shot Sign Language Recognition: Can Textual Data Uncover Sign Languages?” In: *30th British Machine Vision Conference 2019, BMVC 2019, Cardiff, UK, September 9-12, 2019*. BMVA Press, 2019, p. 169. URL: <https://bmvc2019.org/wp-content/uploads/papers/0122-paper.pdf>.
- [15] Jordan J Bird, Anikó Ekárt, and Diego R Faria. “British sign language recognition via late fusion of computer vision and leap motion with transfer learning to american sign language”. In: *Sensors* 20.18 (2020), p. 5151.
- [16] Ekaba Bisong. “Google Colaboratory”. In: *Building Machine Learning and Deep Learning Models on Google Cloud Platform: A Comprehensive Guide for Beginners*. Berkeley, CA: Apress, 2019, pp. 59–64. DOI: 10.1007/978-1-4842-4470-8_7. URL: https://doi.org/10.1007/978-1-4842-4470-8_7.
- [17] Bokeh Development Team. *Bokeh: Python library for interactive visualization*. <http://bokeh.pydata.org>. 2014.
- [18] Carl Börstell, Onno Crasborn, and Lori Whynot. “Measuring Lexical Similarity across Sign Languages in Global Signbank”. English. In: *Proceedings of the LREC2020 9th Workshop on the Representation and Processing of Sign Languages: Sign Language Resources in the Service of the Language Community, Technological Challenges and Application Perspectives*. Marseille, France: European Language Resources Association (ELRA), 2020, pp. 21–26. ISBN: 979-10-95546-54-2. URL: <https://aclanthology.org/2020.signlang-1.4>.
- [19] Danielle Bragg et al. “Sign language recognition, generation, and translation: An interdisciplinary perspective”. In: *The 21st international ACM SIGACCESS conference on computers and accessibility*. 2019, pp. 16–31.
- [20] Jane Bromley et al. “Signature verification using a Siamese time delay neural network”. English (US). In: *International Journal of Pattern Recognition and Artificial Intelligence* 7.4 (1993). Publisher: World Scientific Publishing Co. Pte Ltd, pp. 669–688. ISSN: 0218-0014.

- [21] Patrick Buehler, Andrew Zisserman, and Mark Everingham. “Learning sign language by watching TV (using weakly aligned subtitles)”. In: *2009 IEEE Conference on Computer Vision and Pattern Recognition*. 2009, pp. 2961–2968.
- [22] Necati Cihan Camgoz et al. “Multi-channel transformers for multi-articulatory sign language translation”. In: *European Conference on Computer Vision*. Springer. 2020, pp. 301–319.
- [23] Necati Cihan Camgoz et al. “Neural Sign Language Translation”. In: *2018 IEEE Conference on Computer Vision and Pattern Recognition, CVPR 2018, Salt Lake City, UT, USA, June 18-22, 2018*. IEEE Computer Society, 2018, pp. 7784–7793. DOI: 10.1109/CVPR.2018.00812. URL: http://openaccess.thecvf.com/content%5C_cvpr%5C_2018/html/Camgoz%5C_Neural%5C_Sign%5C_Language%5C_CVPR%5C_2018%5C_paper.html.
- [24] Necati Cihan Camgoz et al. “Sign Language Transformers: Joint End-to-End Sign Language Recognition and Translation”. In: *2020 IEEE/CVF Conference on Computer Vision and Pattern Recognition, CVPR 2020, Seattle, WA, USA, June 13-19, 2020*. IEEE, 2020, pp. 10020–10030. DOI: 10.1109/CVPR42600.2020.01004. URL: <https://doi.org/10.1109/CVPR42600.2020.01004>.
- [25] Necati Cihan Camgoz et al. “Subunets: End-to-end hand shape and continuous sign language recognition”. In: *Proceedings of the IEEE international conference on computer vision*. 2017, pp. 3056–3065.
- [26] Necati Cihan Camgoz et al. “Using convolutional 3d neural networks for user-independent continuous gesture recognition”. In: *2016 23rd International Conference on Pattern Recognition (ICPR)*. IEEE. 2016, pp. 49–54.
- [27] Zhe Cao et al. “Realtime Multi-person 2D Pose Estimation Using Part Affinity Fields”. In: *2017 IEEE Conference on Computer Vision and Pattern Recognition, CVPR 2017, Honolulu, HI, USA, July 21-26, 2017*. IEEE Computer Society, 2017, pp. 1302–1310. DOI: 10.1109/CVPR.2017.143. URL: <https://doi.org/10.1109/CVPR.2017.143>.

- [28] Steve Cassidy et al. “Signbank: Software to Support Web Based Dictionaries of Sign Language”. In: *Proceedings of the Eleventh International Conference on Language Resources and Evaluation (LREC 2018)*. Miyazaki, Japan: European Language Resources Association (ELRA), 2018. URL: <https://aclanthology.org/L18-1374>.
- [29] Sait Celebi et al. “Gesture recognition using skeleton data with weighted dynamic time warping.” In: *Proceedings of the 8th International Joint Conference on Computer Vision, Imaging, and Computer Graphics Theory and Applications (VISAPP’13)*. 2013, pp. 620–625.
- [30] Center for Tegnsprog. *Ordbog over Dansk Tegnsprog*. <http://www.tegnsprog.dk/>.
- [31] Caroline Chan et al. “Everybody Dance Now”. In: *2019 IEEE/CVF International Conference on Computer Vision, ICCV 2019, Seoul, Korea (South), October 27 - November 2, 2019*. IEEE, 2019, pp. 5932–5941. DOI: 10.1109/ICCV.2019.00603. URL: <https://doi.org/10.1109/ICCV.2019.00603>.
- [32] James Charles et al. “Automatic and Efficient Human Pose Estimation for Sign Language Videos”. In: *International Journal of Computer Vision* 110.1 (2014), pp. 70–90.
- [33] Qifeng Chen and Vladlen Koltun. “Photographic Image Synthesis with Cascaded Refinement Networks”. In: *IEEE International Conference on Computer Vision, ICCV 2017, Venice, Italy, October 22-29, 2017*. IEEE Computer Society, 2017, pp. 1520–1529. DOI: 10.1109/ICCV.2017.168. URL: <https://doi.org/10.1109/ICCV.2017.168>.
- [34] Yutong Chen et al. “A simple multi-modality transfer learning baseline for sign language translation”. In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2022, pp. 5120–5130.
- [35] François et al. Chollet. *Keras*. <https://keras.io>. 2015.
- [36] Sumit Chopra, Raia Hadsell, and Yann LeCun. “Learning a similarity metric discriminatively, with application to face verification”. In: *Proceedings of the IEEE Conference on*

- Computer Vision and Pattern Recognition (CVPR)*. Vol. 1. 2005, pp. 539–546. DOI: 10.1109/CVPR.2005.202.
- [37] Christopher Conly, Zhong Zhang, and Vassilis Athitsos. “An integrated RGB-D system for looking up the meaning of signs”. en. In: *Proceedings of the 8th ACM International Conference on Pervasive Technologies Related to Assistive Environments - PETRA '15*. ACM Press, 2015, pp. 1–8. ISBN: 978-1-4503-3452-5. DOI: 10.1145/2769493.2769534. URL: <http://dl.acm.org/citation.cfm?doid=2769493.2769534> (visited on 10/06/2020).
 - [38] Helen Cooper and Richard Bowden. “Large Lexicon Detection of Sign Language”. In: *Human-Computer Interaction*. Ed. by M. Lew et al. Springer Berlin Heidelberg, 2007, pp. 88–97.
 - [39] Helen Cooper, Eng-Jon Ong, and Richard Bowden. “Give me a sign: A person independent interactive sign dictionary”. In: *Technical Report VSSP-TR-1* (2011).
 - [40] Kearsy Cormier, Sandra Smith, and Zed Sevcikova-Sehyr. “Rethinking constructed action”. In: *Sign Language & Linguistics* 18.2 (2015), pp. 167–204.
 - [41] Runpeng Cui, Hu Liu, and Changshui Zhang. “A deep neural framework for continuous sign language recognition by iterative training”. In: *IEEE Transactions on Multimedia* 21.7 (2019), pp. 1880–1891.
 - [42] Runpeng Cui, Hu Liu, and Changshui Zhang. “Recurrent Convolutional Neural Networks for Continuous Sign Language Recognition by Staged Optimization”. In: *2017 IEEE Conference on Computer Vision and Pattern Recognition, CVPR 2017, Honolulu, HI, USA, July 21-26, 2017*. IEEE Computer Society, 2017, pp. 1610–1618. DOI: 10.1109/CVPR.2017.175. URL: <https://doi.org/10.1109/CVPR.2017.175>.
 - [43] Marco Cuturi and Mathieu Blondel. “Soft-DTW: A Differentiable Loss Function for Time-Series”. In: *Proceedings of the 34th International Conference on Machine Learning - Volume 70*. JMLR.org, 2017, pp. 894–903.

- [44] Mirella De Sisto et al. “Challenges with Sign Language Datasets for Sign Language Recognition and Translation”. In: *Proceedings of the Thirteenth Language Resources and Evaluation Conference*. Marseille, France: European Language Resources Association, June 2022, pp. 2478–2487. URL: <https://aclanthology.org/2022.lrec-1.264>.
- [45] Jeff Donahue et al. “Long-term recurrent convolutional networks for visual recognition and description”. In: *IEEE Conference on Computer Vision and Pattern Recognition, CVPR 2015, Boston, MA, USA, June 7-12, 2015*. IEEE Computer Society, 2015, pp. 2625–2634. DOI: 10.1109/CVPR.2015.7298878. URL: <https://doi.org/10.1109/CVPR.2015.7298878>.
- [46] Philippe Dreuw and Hermann Ney. “Towards automatic sign language annotation for the elan tool”. In: *sign-lang@ LREC 2008*. European Language Resources Association (ELRA). 2008, pp. 50–53.
- [47] Mary Edward. “The phonology and the morphology of the Ghanaian Sign Language”. In: *ATELIER International Conference*. 2014.
- [48] Marcin Eichner and Vittorio Ferrari. “Better appearance models for pictorial structures”. In: *British Machine Vision Conference 2009*. British Machine Vision Association. London, UK, 2009, pp. 3.1–3.11.
- [49] Marcin Eichner et al. “2D Articulated Human Pose Estimation and Retrieval in (Almost) Unconstrained Still Images”. In: *International Journal of Computer Vision* 99.2 (2012), pp. 190–214.
- [50] Ralph Elliott et al. “Search-by-example in multilingual sign language databases”. In: *Proceedings of the Second International Workshop on Sign Language Translation and Avatar Technology (SLTAT)*. 2011.
- [51] Georgios D Evangelidis, Gurkirt Singh, and Radu Horaud. “Continuous gesture recognition from articulated poses”. In: *European Conference on Computer Vision*. Springer. 2014, pp. 595–607.

- [52] Gaolin Fang, Wen Gao, and Debin Zhao. “Large Vocabulary Sign Language Recognition Based on Fuzzy Decision Trees”. In: *Systems, Man and Cybernetics, Part A: Systems and Humans, IEEE Transactions On* 34 (2004), pp. 305–314. DOI: 10.1109/TSMCA.2004.824852.
- [53] Ali Farhadi, David Forsyth, and Ryan White. “Transfer learning in sign language”. In: *2007 IEEE conference on computer vision and pattern recognition*. IEEE, Minneapolis, MN, USA, 2007, pp. 1–8.
- [54] Christoph Feichtenhofer, Axel Pinz, and Andrew Zisserman. “Convolutional Two-Stream Network Fusion for Video Action Recognition”. In: *2016 IEEE Conference on Computer Vision and Pattern Recognition, CVPR 2016, Las Vegas, NV, USA, June 27-30, 2016*. IEEE Computer Society, 2016, pp. 1933–1941. DOI: 10.1109/CVPR.2016.213. URL: <https://doi.org/10.1109/CVPR.2016.213>.
- [55] Pedro F. Felzenszwalb and Daniel P. Huttenlocher. “Pictorial Structures for Object Recognition”. In: *International Journal of Computer Vision* 61.1 (2005), pp. 55–79.
- [56] Jens Forster et al. “RWTH-PHOENIXWeather: A Large Vocabulary Sign Language Recognition and Translation Corpus”. In: *Istanbul, Turkey*. 2012, pp. 3785–3789.
- [57] Manolis Fragkiadakis. “Assessing an Automated Tool to Quantify Variation in Movement and Location: A Case Study of American Sign Language and Ghanaian Sign Language”. In: *Sign Language Studies* 23.1 (2022), pp. 98–126.
- [58] *Find the Sign: Signing as Input for Sign Language Dictionary Search Using Pose Estimation*. Zenodo, May 2020. DOI: 10.5281/zenodo.3870467. URL: <https://doi.org/10.5281/zenodo.3870467>.
- [59] Manolis Fragkiadakis. *Quantifying variation in movement and location: comparing the lexicons of American and Ghanaian Sign Language*. June 2021. DOI: 10.17605/OSF.IO/MV2UF. URL: osf.io/mv2uf.

- [60] Manolis Fragkiadakis, Victoria Nyst, and Marco Nyarko. *Ghanaian Sign Language Lexicon*. <https://zenodo.org/record/4533753>. 2021. DOI: 10.5281/ZENODO.4533753.
- [61] Manolis Fragkiadakis, Victoria Nyst, and Peter van der Putten. “Signing as Input for a Dictionary Query: Matching Signs Based on Joint Positions of the Dominant Hand”. English. In: *Proceedings of the LREC2020 9th Workshop on the Representation and Processing of Sign Languages: Sign Language Resources in the Service of the Language Community, Technological Challenges and Application Perspectives*. Marseille, France: European Language Resources Association (ELRA), 2020, pp. 69–74. ISBN: 979-10-95546-54-2. URL: <https://aclanthology.org/2020.signlang-1.11>.
- [62] Manolis Fragkiadakis, Victoria Nyst, and Peter van der Putten. “Towards a user-friendly tool for automated sign annotation: identification and annotation of time slots, number of hands, and handshape”. In: *Digital Humanities Quarterly (DHQ)* 15.1 (2021).
- [63] Manolis Fragkiadakis and Peter van der Putten. “Sign and Search: Sign Search Functionality for Sign Language Lexica”. In: *Proceedings of the 1st International Workshop on Automatic Translation for Signed and Spoken Languages (AT4SSL)*. Virtual: Association for Machine Translation in the Americas, 2021, pp. 23–32. URL: <https://aclanthology.org/2021.mtsummit-at4ssl.3>.
- [64] Yalan Gao et al. “Chinese fingerspelling recognition via gray-level co-occurrence matrix and fuzzy support vector machine”. en. In: *EAI Endorsed Transactions on e-Learning* 7.20 (2021), pp. 1–13. ISSN: 2032-9253. DOI: 10.4108/eai.12-10-2020.166554. URL: <http://eudl.eu/doi/10.4108/eai.12-10-2020.166554> (visited on 03/02/2021).
- [65] Efsthios D Gennatas et al. “Expert-augmented machine learning”. In: *Proceedings of the National Academy of Sciences* 117.9 (2020), pp. 4571–4577. DOI: 10.1073/pnas.1906831117. eprint: <https://www.pnas.org/doi/pdf/10.1073/pnas.1906831117>. URL: <https://www.pnas.org/doi/abs/10.1073/pnas.1906831117>.

- [66] Toni Giorgino. “Computing and visualizing dynamic time warping alignments in R: the dtw package”. In: *Journal of statistical Software* 31.7 (2009), pp. 1–24.
- [67] Çağrı Gökçe et al. “Score-level Multi Cue Fusion for Sign Language Recognition”. In: *European Conference on Computer Vision*. Springer. 2020, pp. 294–309.
- [68] Alex Graves et al. “Connectionist temporal classification: labelling unsegmented sequence data with recurrent neural networks”. In: *Machine Learning, Proceedings of the Twenty-Third International Conference (ICML 2006), Pittsburgh, Pennsylvania, USA, June 25-29, 2006*. Ed. by William W. Cohen and Andrew W. Moore. Vol. 148. ACM International Conference Proceeding Series. ACM, 2006, pp. 369–376. DOI: 10.1145/1143844.1143891. URL: <https://doi.org/10.1145/1143844.1143891>.
- [69] Simon J. Greenhill. “Levenshtein Distances Fail to Identify Language Relationships Accurately”. In: *Computational Linguistics* 37.4 (2011), pp. 689–698. DOI: 10.1162/COLI_a_00073. URL: <https://aclanthology.org/J11-4003>.
- [70] Karol Gregor et al. “DRAW: A Recurrent Neural Network For Image Generation”. In: *Proceedings of the 32nd International Conference on Machine Learning, ICML 2015, Lille, France, 6-11 July 2015*. Ed. by Francis R. Bach and David M. Blei. Vol. 37. JMLR Workshop and Conference Proceedings. JMLR.org, 2015, pp. 1462–1471. URL: <http://proceedings.mlr.press/v37/gregor15.html>.
- [71] Yannick L. Gweth, Christian Plahl, and Hermann Ney. “Enhanced continuous sign language recognition using PCA and neural network features”. en. In: *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. IEEE, 2012, pp. 55–60. ISBN: 978-1-4673-1612-5 978-1-4673-1611-8 978-1-4673-1610-1. DOI: 10.1109/CVPRW.2012.6239187. URL: <http://ieeexplore.ieee.org/document/6239187/> (visited on 03/02/2021).
- [72] Harald Hammarström et al. *Glottolog 4.4*. Leipzig, 2021. DOI: 10.5281/zenodo.4761960. URL: <https://glottolog.org/%20accessed%202021-10-04>.

- [73] HANDS!Lab. *Ghanaian Sign Language app*. https://play.google.com/store/apps/details?id=com.ljsharp.gsldictionary&hl=es_US. 2020.
- [74] Thomas Hanke. “HamNoSys-representing sign language data in language resources and language processing contexts”. In: *LREC*. Vol. 4. 2004, pp. 1–6.
- [75] Promila Haque, Badhon Das, and Nazmun Nahar Kaspy. “Two-handed bangla sign language recognition using principal component analysis (pca) and knn algorithm”. In: *2019 International Conference on Electrical, Computer and Communication Engineering (ECCE)*. Cox’sBazar, Bangladesh: IEEE, 2019, pp. 1–4. ISBN: 978-1-5386-9111-3. DOI: 10.1109/ECACE.2019.8679185. URL: <https://ieeexplore.ieee.org/document/8679185/> (visited on 03/02/2021).
- [76] Kaiming He et al. “Mask R-CNN”. In: *Proceedings of the IEEE International Conference on Computer Vision*. 2017, pp. 2961–2969.
- [77] Julie Hochgesang, OA Crasborn, and Diane Lillo-Martin. “Building the ASL Signbank. Lemmatization Principles for ASL”. In: (2018).
- [78] Al Amin Hosain et al. “Hand Pose Guided 3D Pooling for Word-Level Sign Language Recognition”. In: *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision*. 2021, pp. 3429–3439.
- [79] Jie Huang et al. “Video-Based Sign Language Recognition Without Temporal Segmentation”. In: *Proceedings of the Thirty-Second AAAI Conference on Artificial Intelligence, (AAAI-18), the 30th innovative Applications of Artificial Intelligence (IAAI-18), and the 8th AAAI Symposium on Educational Advances in Artificial Intelligence (EAAI-18), New Orleans, Louisiana, USA, February 2-7, 2018*. Ed. by Sheila A. McIlraith and Kilian Q. Weinberger. AAAI Press, 2018, pp. 2257–2264. URL: <https://www.aaai.org/ocs/index.php/AAAI/AAAI18/paper/view/17137>.

- [80] Nada B. Ibrahim, Mazen M. Selim, and Hala H. Zayed. “An Automatic Arabic Sign Language Recognition System (ArSLRS)”. In: *Journal of King Saud University - Computer and Information Sciences* 30.4 (2018), pp. 470–477. ISSN: 1319-1578. DOI: <https://doi.org/10.1016/j.jksuci.2017.09.007>. URL: <https://www.sciencedirect.com/science/article/pii/S1319157817301775>.
- [81] Institutionen for Lingvistik. *Svenskt Teckensprakslexikon*. <https://teckensprakslexikon.su.se/>.
- [82] Fumitada Itakura. “Minimum prediction residual principle applied to speech recognition”. In: *IEEE Transactions on Acoustics, Speech, and Signal Processing* 23.1 (1975), pp. 67–72.
- [83] Sandeep S Jambhale and Arti Khaparde. “Gesture recognition using DTW & piecewise DTW”. In: *2014 International Conference on Electronics and Communication Systems (ICECS)*. Coimbatore: IEEE, 2014, pp. 1–5.
- [84] Pat Jangyodsuk, Christopher Conly, and Vassilis Athitsos. “Sign language recognition using dynamic time warping and hand shape distance based on histogram of oriented gradient features”. In: *Proceedings of the 7th International Conference on Pervasive Technologies Related to Assistive Environments - PETRA '14*. Rhodes, Greece: ACM Press, 2014, pp. 1–6.
- [85] Sam Johnson and Mark Everingham. “Combining discriminative appearance and segmentation cues for articulated human pose estimation”. In: *2009 IEEE 12th International Conference on Computer Vision Workshops, ICCV Workshops*. 2009, pp. 405–412.
- [86] Trevor Johnston. “BSL, Auslan and NZSL: three signed languages or one?” In: *Theoretical Issues in Sign Language Research Conference (7th: 2000)*. Signum. 2003, pp. 47–69.
- [87] Trevor Johnston. “From archive to corpus: Transcription and annotation in the creation of signed language corpora”. In: *International journal of corpus linguistics* 15.1 (2010), pp. 106–131. DOI: 10.1075/ijcl.15.1.05joh. URL: <http://www.jbe-platform.com/content/journals/10.1075/ijcl.15.1.05joh>.

- [88] Trevor Johnston. “The lexical database of auslan (australian sign language)”. In: *Sign Language & Linguistics* 4.1-2 (2001), pp. 145–169.
- [89] Aravind K Joshi. “An introduction to tree adjoining grammars”. In: *Mathematics of language* 1 (1987), pp. 87–115.
- [90] Hamid Reza Vaezi Joze and Oscar Koller. “MS-ASL: A Large-Scale Data Set and Benchmark for Understanding American Sign Language”. In: *30th British Machine Vision Conference 2019, BMVC 2019, Cardiff, UK, September 9-12, 2019*. BMVA Press, 2019, p. 100. URL: <https://bmvc2019.org/wp-content/uploads/papers/0254-paper.pdf>.
- [91] Mohammed Waleed Kadous. “Machine recognition of Auslan signs using PowerGloves: Towards large-lexicon recognition of sign language”. In: *Proceedings of the Workshop on the Integration of Gesture in Language and Speech*. Vol. 165. 1996.
- [92] Daniel Kelly et al. “A framework for continuous multimodal sign language recognition”. In: *Proceedings of the 2009 International Conference on Multimodal Interfaces*. 2009, pp. 351–358.
- [93] Cem Keskin et al. “Hand pose estimation and hand shape classification using multi-layered randomized decision forests”. In: *Proceedings of the European Conference on Computer Vision*. Springer. 2012, pp. 852–863.
- [94] Diederik P Kingma and Max Welling. “Auto-Encoding Variational Bayes”. In: *2nd International Conference on Learning Representations, ICLR 2014, Banff, AB, Canada, April 14-16, 2014, Conference Track Proceedings*. Ed. by Yoshua Bengio and Yann LeCun. 2014. URL: <http://arxiv.org/abs/1312.6114>.
- [95] Furkan Kirac, Yunus Emre Kara, and Lale Akarun. “Hierarchically constrained 3D hand pose estimation using regression forests from single frame depth data”. en. In: *Pattern Recognition Letters*. Depth Image Analysis 50 (2014), pp. 91–100. ISSN: 0167-8655. DOI: 10.1016/j.patrec.2013.09.003. (Visited on 03/11/2021).
- [96] Sang-Ki Ko et al. “Neural sign language translation based on human keypoint estimation”. In: *Applied Sciences* 9.13 (2019), p. 2683.

- [97] Oscar Koller, Hermann Ney, and Richard Bowden. “Deep Hand: How to Train a CNN on 1 Million Hand Images When Your Data is Continuous and Weakly Labelled”. In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. Las Vegas, NV, USA: IEEE, 2016, pp. 3793–3802.
- [98] Oscar Koller et al. “Deep sign: Enabling robust statistical continuous sign language recognition via hybrid CNN-HMMs”. In: *International Journal of Computer Vision* 126.12 (2018), pp. 1311–1325.
- [99] Oscar Koller et al. “Weakly supervised learning with multi-stream CNN-LSTM-HMMs to discover sequential parallelism in sign language videos”. In: *IEEE transactions on pattern analysis and machine intelligence* 42.9 (2019), pp. 2306–2320.
- [100] Alex Krizhevsky, Ilya Sutskever, and Geoffrey E Hinton. “ImageNet Classification with Deep Convolutional Neural Networks”. In: *Advances in Neural Information Processing Systems 25: 26th Annual Conference on Neural Information Processing Systems 2012. Proceedings of a meeting held December 3-6, 2012, Lake Tahoe, Nevada, United States*. Ed. by Peter L. Bartlett et al. 2012, pp. 1106–1114. URL: <https://proceedings.neurips.cc/paper/2012/hash/c399862d3b9d6b76c8436e924a68c45b-Abstract.html>.
- [101] Naresh Kumar. “Motion trajectory based human face and hands tracking for sign language recognition”. In: *2017 4th IEEE Uttar Pradesh Section International Conference on Electrical, Computer and Electronics (UPCON)*. Mathura: IEEE, 2017, pp. 211–216.
- [102] Pradeep Kumar et al. “A multimodal framework for sensor based sign language recognition”. en. In: *Neurocomputing. Multimodal Media Data Understanding and Analytics* 259 (2017), pp. 21–38. ISSN: 0925-2312. DOI: 10.1016/j.neucom.2016.08.132. URL: <https://www.sciencedirect.com/science/article/pii/S092523121730262X> (visited on 03/11/2021).
- [103] Simon Lang, Marco Block, and Raúl Rojas. “Sign language recognition using kinect”. In: *Proceedings of the 11th*

international conference on Artificial Intelligence and Soft Computing-Volume Part I. 2012, pp. 394–402.

- [104] Dongxu Li et al. “Word-level deep sign language recognition from video: A new large-scale dataset and methods comparison”. In: *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision*. 2020, pp. 1459–1469.
- [105] Jiefeng Li et al. “CrowdPose: Efficient Crowded Scenes Pose Estimation and a New Benchmark”. In: *arXiv preprint arXiv:1812.00324* (2018).
- [106] Xing Liang et al. “Real time hand movement trajectory tracking for enhancing dementia screening in ageing deaf signers of British sign language”. In: *International Cross-Domain Conference for Machine Learning and Knowledge Extraction*. Springer. 2019, pp. 377–394.
- [107] Tsung-Yi Lin et al. “Microsoft COCO: Common Objects in Context”. In: *European Conference on Computer Vision (ECCV)*. 2014.
- [108] Mart Lubbers and Francisco Torreira. “A Python Module for Processing ELAN and Praat Annotation Files: Dopefishh/Pympi”. In: *Python* (2013). URL: <https://github.com/dopefishh/pympi>.
- [109] Thang Luong, Hieu Pham, and Christopher D. Manning. “Effective Approaches to Attention-based Neural Machine Translation”. In: *Proceedings of the 2015 Conference on Empirical Methods in Natural Language Processing*. Lisbon, Portugal: Association for Computational Linguistics, 2015, pp. 1412–1421. DOI: 10.18653/v1/D15-1166. URL: <https://aclanthology.org/D15-1166>.
- [110] Giulio Marin, Fabio Dominio, and Pietro Zanuttigh. “Hand gesture recognition with jointly calibrated Leap Motion and depth sensor”. en. In: *Multimedia Tools and Applications* 75.22 (2016), pp. 14991–15015. ISSN: 1380-7501, 1573-7721. DOI: 10.1007/s11042-015-2451-6. URL: <http://link.springer.com/10.1007/s11042-015-2451-6> (visited on 03/11/2021).

- [111] Giulio Marin, Fabio Dominio, and Pietro Zanuttigh. “Hand gesture recognition with leap motion and kinect devices”. en. In: *2014 IEEE International Conference on Image Processing (ICIP)*. IEEE, 2014, pp. 1565–1569. ISBN: 978-1-4799-5751-4. DOI: 10.1109/ICIP.2014.7025313. URL: <http://ieeexplore.ieee.org/document/7025313/> (visited on 03/11/2021).
- [112] Leland McInnes, John Healy, and James Melville. “Umap: Uniform manifold approximation and projection for dimension reduction”. In: *ArXiv preprint abs/1802.03426* (2018). URL: <https://arxiv.org/abs/1802.03426>.
- [113] David McKee and Graeme Kennedy. “Lexical comparison of signs from American, Australian, British and New Zealand sign languages”. In: *The signs of language revisited: An anthology to honor Ursula Bellugi and Edward Klima* (2000), pp. 49–76.
- [114] Kapil Mehrotra, Atul Godbole, and Swapnil Belhe. “Indian sign language recognition using kinect sensor”. en. In: *International Conference Image Analysis and Recognition*. Springer. 2015, pp. 528–535. ISBN: 978-3-319-20801-5. DOI: 10.1007/978-3-319-20801-5_59.
- [115] Dimitris Metaxas, Mark Dilsizian, and Carol Neidle. “Linguistically-driven Framework for Computationally Efficient and Scalable Sign Recognition”. In: *Proceedings of the Eleventh International Conference on Language Resources and Evaluation (LREC 2018)*. Miyazaki, Japan: European Language Resources Association (ELRA), 2018. URL: <https://aclanthology.org/L18-1271>.
- [116] Lester James Miranda. “Towards data-centric machine learning: a short review”. In: *ljvmiranda921.github.io* (2021). URL: <https://ljvmiranda921.github.io/notebook/2021/07/30/data-centric-ml/%7D>.
- [117] Pavlo Molchanov et al. “Hand gesture recognition with 3D convolutional neural networks”. In: *Proceedings of the IEEE conference on computer vision and pattern recognition workshops*. 2015, pp. 1–7.

- [118] Sílvia Grasiella Moreira Almeida, Frederico Gadelha Guimarães, and Jaime Arturo Ramírez. “Feature extraction in Brazilian Sign Language recognition based on phonological structure and using RGB-D sensors”. en. In: *Expert Systems with Applications* 41.16 (2014), pp. 7259–7271. ISSN: 0957-4174. DOI: 10.1016/j.eswa.2014.05.024. URL: <https://www.sciencedirect.com/science/article/pii/S0957417414003042> (visited on 03/11/2021).
- [119] Amit Moryossef and Yoav Goldberg. *Sign Language Processing*. <https://sign-language-processing.github.io/>. 2021.
- [120] Thomas B. Moselund, Adrian Hilton, and Volker Krüger. “A survey of advances in vision-based human motion capture and analysis”. In: *Computer Vision and Image Understanding* 104.2 (2006), pp. 90–126.
- [121] Cory Myers, Lawrence Rabiner, and Aaron Rosenberg. “Performance tradeoffs in dynamic time warping algorithms for isolated word recognition”. en. In: *IEEE Transactions on Acoustics, Speech, and Signal Processing* 28.6 (1980), pp. 623–635. ISSN: 0096-3518. DOI: 10.1109/TASSP.1980.1163491. URL: <http://ieeexplore.ieee.org/document/1163491/> (visited on 02/07/2020).
- [122] Anup Nandy et al. “Recognition of isolated indian sign language gesture in real time”. en. In: *Information Processing and Management*. Vol. 70. Springer. Berlin, Heidelberg, 2010, pp. 102–107. ISBN: 978-3-642-12213-2 978-3-642-12214-9. DOI: 10.1007/978-3-642-12214-9_18. URL: http://link.springer.com/10.1007/978-3-642-12214-9_18 (visited on 03/11/2021).
- [123] Donna Jo Napoli and Nathan Sanders. “Iconicity and biomechanics in the historical reconstruction of sign languages: A case study of the movement parameter in the Old LSF family”. In: ().
- [124] Victoria Nyst. *A Reference Corpus of Adamorobe Sign Language*. A digital, annotated video corpus of the sign language used in the village of Adamorobe, Ghana. 2012.

- [125] Victoria Nyst, Moustapha Magassouba, and Kara Sylla. *Un Corpus de reference de la Langue des Signes Malienne II*. A digital, annotated video corpus of local sign language use in the Dogon area of Mali. 2012.
- [126] RE Omardeen. “The contribution of lexical overlap to perceived iconicity in foreign signs”. In: (2018).
- [127] Robert Östling, Carl Börstell, and Servane Courtaux. “Visual iconicity across sign languages: Large-scale automated video analysis of iconic articulators and locations”. In: *Frontiers in psychology* 9 (2018), p. 725.
- [128] Jason Parks. “Sign language word list comparisons: Toward a replicable coding and scoring methodology”. PhD thesis. University of North Dakota, 2011.
- [129] Fabrizio Pedersoli et al. “XKin: an open source framework for hand pose and gesture recognition using kinect”. en. In: *The Visual Computer* 30.10 (2014), pp. 1107–1122. ISSN: 0178-2789, 1432-2315. DOI: 10.1007/s00371-014-0921-x. URL: <http://link.springer.com/10.1007/s00371-014-0921-x> (visited on 03/11/2021).
- [130] Fabian Pedregosa et al. “Scikit-learn: Machine Learning in Python”. In: *Journal of Machine Learning Research* 12 (2011), pp. 2825–2830.
- [131] Lionel Pigou et al. “Sign Language Recognition Using Convolutional Neural Networks”. In: *Computer Vision - ECCV 2014 Workshops*. Ed. by L. Agapito, M. M. Bronstein, and C. Rother. Vol. 8926. Lecture Notes in Computer Science. Springer International Publishing, 2015, pp. 572–578.
- [132] Justin M Power, David Quinto-Pozos, and Danny Law. “Methods and models in historical comparative research on signed languages”. In: (2021).
- [133] Nicolas Pugeault and Richard Bowden. “Spelling it out: real-time ASL fingerspelling recognition”. In: *2011 IEEE International Conference on Computer Vision Workshops (ICCV Workshops)*. IEEE. 2011, pp. 1114–1119. DOI: 10.1109/ICCVW.2011.6130290.

- [134] Deva Ramanan, David A. Forsyth, and Andrew Zisserman. “Tracking People by Learning Their Appearance”. In: *IEEE Transactions on Pattern Analysis and Machine Intelligence* 29.1 (2007), pp. 65–81.
- [135] Razieh Rastgoo et al. “Sign Language Production: A Review”. In: *IEEE Conference on Computer Vision and Pattern Recognition Workshops, CVPR Workshops 2021, virtual, June 19-25, 2021*. Computer Vision Foundation / IEEE, 2021, pp. 3451–3461. DOI: 10.1109/CVPRW53098.2021.00384. URL: https://openaccess.thecvf.com/content/CVPR2021W/ChaLearn/html/Rastgoo%5C_Sign%5C_Language%5C_Production%5C_A%5C_Review%5C_CVPRW%5C_2021%5C_paper.html.
- [136] Chotirat Ann Ratanamahatana and Eamonn Keogh. “Making time-series classification more accurate using learned constraints”. In: *Proceedings of the 2004 SIAM International Conference on Data Mining*. Society for Industrial and Applied Mathematics, 2004, pp. 11–22.
- [137] Jordy Ripperda, Linda Drijvers, and Judith Holler. “Speeding up the detection of non-iconic and iconic gestures (SPUDNIG): A toolkit for the automatic detection of hand movements and gestures in video data”. In: *Behavior Research Methods* 52.4 (2020), pp. 1783–1794.
- [138] Anastasios Roussos et al. “Hand Tracking and Affine Shape-Appearance Handshape Sub-units in Continuous Sign Language Recognition”. In: *Trends and Topics in Computer Vision*. Ed. by K. N. Kutulakos. Vol. 6553. Lecture Notes in Computer Science. Springer Berlin Heidelberg, 2012, pp. 258–272.
- [139] Hiroaki Sakoe and Seibi Chiba. “Dynamic programming algorithm optimization for spoken word recognition”. In: *IEEE transactions on acoustics, speech, and signal processing* 26.1 (1978), pp. 43–49.
- [140] Benjamin Sapp, Chris Jordan, and Ben Taskar. “Adaptive pose priors for pictorial structures”. In: *2010 IEEE Computer Society Conference on Computer Vision and Pattern Recognition*. 2010, pp. 422–429.

- [141] Ben Saunders, Necati Cihan Camgoz, and Richard Bowden. “Everybody sign now: Translating spoken language to photo realistic sign language video”. In: *ArXiv preprint abs/2011.09846* (2020). URL: <https://arxiv.org/abs/2011.09846>.
- [142] Shreyashi Narayan Sawant and M. S. Kumbhar. “Real time sign language recognition using pca”. In: *2014 IEEE International Conference on Advanced Communications, Control and Computing Technologies*. IEEE, 2014, pp. 1412–1415. ISBN: 978-1-4799-3914-5 978-1-4799-3913-8. DOI: 10.1109/ICACCCT.2014.7019333. URL: <http://ieeexplore.ieee.org/document/7019333/> (visited on 03/02/2021).
- [143] Adam Schembri et al. “Building the British Sign Language Corpus”. In: *Language Documentation and Conservation* 7 (2013), pp. 136–154.
- [144] Pascal Schneider et al. “Gesture recognition in RGB videos using human body keypoints and dynamic time warping”. In: *Robot World Cup*. Springer. 2019, pp. 281–293.
- [145] Stuart M. Shieber and Yves Schabes. “Synchronous Tree-Adjoining Grammars”. In: *COLING 1990 Volume 3: Papers presented to the 13th International Conference on Computational Linguistics*. 1990. URL: <https://aclanthology.org/C90-3045>.
- [146] *SignWriting Linguistics Forum* — signwriting.org. <https://www.signwriting.org/forums/linguistics/ling001.html>. [Accessed 06-Jul-2023].
- [147] Ozge Mercanoglu Sincan and Hacer Yalim Keles. “AUTSL: A Large Scale Multi-Modal Turkish Sign Language Dataset and Baseline Methods”. In: *IEEE Access* 8 (2020), pp. 181340–181355.
- [148] Josef Sivic, C. Lawrence Zitnick, and Richard Szeliski. “Finding people in repeated shots of the same scene”. In: *British Machine Vision Conference 2006*. Vol. 3. British Machine Vision Association. Edinburgh, 2006, pp. 909–918.
- [149] Han Sloetjes and Peter Wittenburg. “Annotation by category-ELAN and ISO DCR”. In: *6th international Conference on Language Resources and Evaluation (LREC*

- 2008). Marrakech, Morocco, 2008, p. 5. URL: <https://tla.mpi.nl/tools/tla-tools/elan/>.
- [150] Deepak Soekhoe, Peter Van Der Putten, and Aske Plaat. “On the impact of data set size in transfer learning using deep neural networks”. In: *International Symposium on Intelligent Data Analysis*. Springer. 2016, pp. 50–60.
 - [151] Thad Starner, J. Weaver, and Alex Pentland. “Real-time American sign language recognition using desk and wearable computer based video”. In: *IEEE Transactions on Pattern Analysis and Machine Intelligence* 20.12 (1998), pp. 1371–1375.
 - [152] William C Stokoe. “Sign language structure: An outline of the visual communication systems of the American deaf”. In: *Journal of deaf studies and deaf education* 10.1 (2005), pp. 3–37.
 - [153] William C Stokoe, Dorothy C Casterline, and Carl G Croneberg. *A dictionary of American Sign Language on linguistic principles*. Linstok Press, Incorporated, 1976.
 - [154] Stephanie Stoll et al. “Text2Sign: Towards sign language production using neural machine translation and generative adversarial networks”. In: *International Journal of Computer Vision* 128.4 (2020), pp. 891–908.
 - [155] Valerie Sutton. “SignWriting”. In: *Sl: sn* (2009), p. 9.
 - [156] Morris Swadesh. *The origin and diversification of language*. Chicago: Aldine, 1971.
 - [157] Romain Tavenard et al. *tslearn: A machine learning toolkit dedicated to time-series data*. <https://github.com/rtavenar/tslearn>.
 - [158] Gineke A Ten Holt, Marcel JT Reinders, and Emile A Hendriks. “Multi-dimensional dynamic time warping for gesture recognition”. In: *Thirteenth annual conference of the Advanced School for Computing and Imaging*. Vol. 300. 2007, p. 1.
 - [159] Paolo Tormene et al. “Matching incomplete time series with dynamic time warping: an algorithm and an application to post-stroke rehabilitation”. In: *Artificial Intelligence in Medicine* 45.1 (2009), pp. 11–34. ISSN: 0933-3657. DOI: <https://doi.org/10.1016/j.artmed.2008.11.007>. URL: <https://doi.org/10.1016/j.artmed.2008.11.007>.

// www.sciencedirect.com/science/article/pii/S0933365708001772.

- [160] Aäron Van Den Oord, Nal Kalchbrenner, and Koray Kavukcuoglu. “Pixel Recurrent Neural Networks”. In: *Proceedings of the 33rd International Conference on Machine Learning, ICML 2016, New York City, NY, USA, June 19-24, 2016*. Ed. by Maria-Florina Balcan and Kilian Q. Weinberger. Vol. 48. JMLR Workshop and Conference Proceedings. JMLR.org, 2016, pp. 1747–1756. URL: <http://proceedings.mlr.press/v48/oord16.html>.
- [161] Aäron Van den Oord et al. “Conditional Image Generation with PixelCNN Decoders”. In: *Advances in Neural Information Processing Systems 29: Annual Conference on Neural Information Processing Systems 2016, December 5-10, 2016, Barcelona, Spain*. Ed. by Daniel D. Lee et al. 2016, pp. 4790–4798. URL: <https://proceedings.neurips.cc/paper/2016/hash/b1301141feffabac455e1f90a7de2054-Abstract.html>.
- [162] Laurens Van der Maaten and Geoffrey Hinton. “Visualizing data using t-SNE.” In: *Journal of machine learning research* 9.11 (2008).
- [163] Mieke Van Herreweghe, S. Slembrouck, and Myriam Vermeerbergen. *Digitaal Vlaamse Gebarentaal-Nederlands - Nederlands-Vlaamse Gebarentaal woordenboek*. <https://woordenboek.vlaamsegebarentaal.be>.
- [164] Ashish Vaswani et al. “Attention is all you need”. In: *Advances in neural information processing systems* 30 (2017).
- [165] Lucas Ventura, Amanda Duarte, and Xavier Giró-i-Nieto. “Can everybody sign now? Exploring sign language video generation from 2D poses”. In: *ArXiv preprint abs/2012.10941* (2020). URL: <https://arxiv.org/abs/2012.10941>.
- [166] Ulrich Von Agris and Karl-Friedrich Kraiss. “Towards a video corpus for signer-independent continuous sign language recognition”. In: *Gesture in Human-Computer Interaction and Simulation, Lisbon, Portugal, May 11 (2007)*, p. 2.

- [167] Chong Wang, Zhong Liu, and Shing-Chow Chan. “Superpixel-based hand gesture recognition with kinect depth camera”. In: *IEEE transactions on multimedia* 17.1 (2014), pp. 29–39.
- [168] Haijing Wang et al. “A system for large vocabulary sign search”. In: *European Conference on Computer Vision*. Springer. 2010, pp. 342–353.
- [169] Sy Bor Wang et al. “Hidden conditional random fields for gesture recognition”. In: *2006 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR’06)*. Vol. 2. IEEE. 2006, pp. 1521–1527.
- [170] Ting-Chun Wang et al. “High-Resolution Image Synthesis and Semantic Manipulation With Conditional GANs”. In: *2018 IEEE Conference on Computer Vision and Pattern Recognition, CVPR 2018, Salt Lake City, UT, USA, June 18-22, 2018*. IEEE Computer Society, 2018, pp. 8798–8807. DOI: 10.1109/CVPR.2018.00917. URL: http://openaccess.thecvf.com/content%5C_cvpr%5C_2018/html/Wang%5C_High-Resolution%5C_Image%5C_Synthesis%5C_CVPR%5C_2018%5C_paper.html.
- [171] Søren Wichmann, Erik W. Holman, and C. H. Brown. *The ASJP database*. URL: <https://asjp.cild.org/>.
- [172] James Woodward. “Sign language varieties in Costa Rica”. In: *Sign Language Studies* 73.1 (1991), pp. 329–345.
- [173] James Woodward. “The relationship of sign language varieties in India, Pakistan, & Nepal”. In: *Sign Language Studies* 78.1 (1993), pp. 15–22.
- [174] Xinchun Yan et al. “Attribute2image: Conditional image generation from visual attributes”. In: *European conference on computer vision*. Springer. 2016, pp. 776–791.
- [175] Yi Yang and Deva Ramanan. “Articulated pose estimation with flexible mixtures-of-parts”. In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. 2011, pp. 1385–1392.

- [176] José Elías Yauri Vidalón and José Mario De Martino. “Brazilian Sign Language Recognition Using Kinect”. In: *Computer Vision – ECCV 2016 Workshops*. Ed. by Gang Hua and Hervé Jégou. Cham: Springer International Publishing, 2016, pp. 391–402. ISBN: 978-3-319-48881-3.
- [177] Kayo Yin and Jesse Read. “Better Sign Language Translation with STMC-Transformer”. In: *Proceedings of the 28th International Conference on Computational Linguistics*. Barcelona, Spain (Online): International Committee on Computational Linguistics, 2020, pp. 5975–5989. DOI: 10.18653/v1/2020.coling-main.525. URL: <https://aclanthology.org/2020.coling-main.525>.
- [178] Kayo Yin et al. “Including Signed Languages in Natural Language Processing”. In: *Proceedings of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing (Volume 1: Long Papers)*. Online: Association for Computational Linguistics, 2021, pp. 7347–7360. DOI: 10.18653/v1/2021.acl-long.570. URL: <https://aclanthology.org/2021.acl-long.570>.
- [179] Shi Yu, Carlo Geraci, and Natasha Abner. “Sign Languages and the Online World Online Dictionaries & Lexicostatistics”. In: *Proceedings of the Eleventh International Conference on Language Resources and Evaluation (LREC 2018)*. Miyazaki, Japan: European Language Resources Association (ELRA), 2018. URL: <https://aclanthology.org/L18-1668>.
- [180] Chenyang Zhang, Xiaodong Yang, and YingLi Tian. “Histogram of 3D Facets: A characteristic descriptor for hand gesture recognition”. In: *2013 10th IEEE International Conference and Workshops on Automatic Face and Gesture Recognition (FG)*. 2013, pp. 1–8.
- [181] Jihai Zhang et al. “Chinese sign language recognition with adaptive HMM”. In: *2016 IEEE international conference on multimedia and expo (ICME)*. IEEE. 2016, pp. 1–6.
- [182] Liwei Zhao et al. “A machine translation system from English to American Sign Language”. In: *Proceedings of the Fourth Conference of the Association for Machine Translation in the*

Americas: Technical Papers. Cuernavaca, Mexico: Springer, 2000, pp. 54–67. URL: https://link.springer.com/chapter/10.1007/3-540-39965-8_6.

- [183] Ronglai Zuo and Brian Mak. “C2slr: Consistency-enhanced continuous sign language recognition”. In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2022, pp. 5131–5140.
- [184] Inge Zwitterlood. “Sign language lexicography in the early 21st century and a recently published dictionary of sign language of the netherlands”. en. In: *International Journal of Lexicography* 23.4 (2010), pp. 443–476. ISSN: 0950-3846, 1477-4577. DOI: 10.1093/ijl/ecq031. URL: <https://academic.oup.com/ijl/article-lookup/doi/10.1093/ijl/ecq031> (visited on 01/21/2020).