

Hand Gesture Recognition System Mobile Application for Deaf and Dumb People

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Abstract: American Sign Language (ASL) is a visual language used by the deaf and hard of hearing community for communication. However, many individuals who are not proficient in ASL face challenges in understanding and communicating with deaf or hard of hearing individuals. To bridge this communication gap, hand gesture recognition systems have emerged as a promising solution. In this research paper, we propose a hand gesture recognition system Android Kotlin application for American Sign Language. The system leverages the built-in camera of Android devices to capture hand gestures made by users, processes the gestures using image processing and machine learning techniques, and translates them into ASL signs in real-time. The developed application has the potential to facilitate communication between deaf or hard of hearing individuals and the general public, enhancing inclusivity and accessibility.

This research paper focuses on the development of a hand gesture recognition system using an Android Kotlin application for American Sign Language (ASL). The system utilizes the camera on a mobile device to capture images of hand gestures and applies machine learning algorithms to recognize the corresponding ASL signs. The proposed system can recognize a set of 26 ASL signs and achieve an accuracy of 94.2%. The system was evaluated using a dataset of 5000 images and compared with existing ASL recognition systems. The results demonstrate the effectiveness and potential of the proposed system in improving accessibility for the deaf and hard-of-hearing community.

Keywords: American Sign Language, hand gesture recognition, Android, Kotlin, image processing, machine learning

REFERENCES

- [1]. Singha J, Das K. Indian Sign Language Recognition Using Eigen Value Weighted Euclidean Distance Based Classification Technique. arXiv preprint arXiv:1303.0634. 2013; 4(2): p. 188-195.
- [2]. Kishore PVV, Prasad MVD, Prasad CR, Rahul R. 4-Camera model for sign language recognition using elliptical fourier descriptors and ANN. In International Conference on Signal Processing and Communication Engineering Systems - Proceedings of SPACES 2015, in Association with IEEE; 2015. p. 34-38.
- [3]. Huang J, Zhou W, Li H, Li W. Sign language recognition using 3D convolutional neural networks. In Multimedia and Expo (ICME), 2015 IEEE International Conference on; 2015: IEEE. p. 1-6.
- [4]. Chai X, Li G, Lin Y, Xu Z, Tang Y, Chen X. Sign Language Recognition and Translation with Kinect. The 10th IEEE International Conference on Automatic Face and Gesture Recognition. 2013;: p. 22-26.
- [5]. Gurjal, P., &Kunnur, K. Real Time Hand Gesture Recognition Using SIFT. International Journal of Electrics and Electrical. 2012; 2(3)
- [6]. Koller O, Zargaran O, Ney H, Bowden R. Deep Sign: Hybrid CNN-HMM for Continuous Sign Language Recognition. In Proceedings of the British Machine Vision Conference 2016; 2016.
- [7]. Pigou L, Dieleman S, Kindermans PJ, Schrauwen B. Sign Language Recognition using Convolutional Neural Networks. In Workshop at the European Conference on Computer Vision; 2014; Belgium. p. 572-578.

- [8]. Zhang LG, Chen Y, Fang G, Chen X, Gao W. A Vision-Based Sign Language Recognition System. In Proceedings of the 6th International Conference on Multimodal Interfaces; 2004; Pennsylvania: ACM. p. 198-204.