Application of Convolution Neural Network (CNN) Method in Web-Based Sign Language Translator

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ABSTRACT

This study examines the application of Convolutional Neural Network (CNN) in sign language detection using a sign dataset in MNIST format. The aim of the study is to evaluate the accuracy and reliability of CNN in recognizing the sign alphabet, with a special focus on certain letters that are difficult to recognize. The CNN method is implemented and evaluated using appropriate test data, with results showing a very high level of accuracy, although there are obstacles in recognizing the letters 'J' and 'Z'. The amount of data used is 20,000 hand gesture images in MNIST format, with an accuracy of 100%. The results of the study highlight the ability of CNN in identifying complex visual patterns of hand movements, which are important in sign language communication. CNN managed to achieve impressive accuracy, with a low loss rate, reaching 8.7863e-04 on the test data. However, the main obstacle lies in the inability of the model to recognize the letters 'J' and 'Z', which is caused by the inappropriate representation of movement in the dataset used. Recommendations for further development include combining the CNN method with motion detection techniques to improve the understanding of sign language holistically. Integration of database login features and use of APIs can extend the functionality of the system, granting limited access to authorized users and allowing data exchange with external applications. This can pave the way for more complex applications in facilitating digital communication using sign language.

Keywords: Convolutional Neural Network (CNN), sign language, MNIST, sign letter detection, accuracy