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Abstract

Sign language plays an essential role in communication for millions of Deaf individuals worldwide. However, the availability of qualified sign language interpreters is limited, and interpreter services can be expensive and inaccessible in many situations.

This paper focuses on the WLASL dataset, which is a collection of word-level American Sign Language (ASL) videos. By utilizing deep learning techniques, particularly CNNs and LSTMs, machine learning systems can process sign language videos and translate gestures into spoken or written language in real time. Despite significant progress, there are challenges related to accuracy, context understanding, and handling variations in sign language across regions.

Methodology

Training the Model: The combined CNN-LSTM model is trained on the WLASL dataset, which is split into training and validation sets. The model learns to recognize gestures from the videos and map them to corresponding word-level labels. Data preprocessing includes extracting frames from video clips, normalizing input sizes, and labeling gestures to ensure consistency across the training data.

Results and Discussion

The machine learning model trained on the WLASL dataset has demonstrated promising results, achieving a high in recognizing word-level signs. It shows us the output of translation of the sign-language into English and the user can be able to translate the phrase into other language and read it out loud. This is a significant improvement over previous approaches that relied solely on traditional image processing techniques. However, there are areas where further improvements are

1.Real-Time Processing: Although the system can operate in real time, occasional delays or inaccuracies in gesture recognition occur due to factors like lighting conditions or the speed of gestures.

2.Expanding Beyond Word-Level Translation: The current model is limited to word-level translation. To achieve sentence-level understanding, future models need to incorporate contextual cues, including body language and expressions that convey emotions or intentions.

Figure 1: Sign Language Translation Flowchart

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