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Realtime Sinhala Sign Language Translation System using CNN

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ABSTRACT

Communication between the deaf and hearing communities in Sri Lanka is hindered by the limited understanding of Sinhala Sign Language (SSL). Existing tools provide only word-level or alphabet-based translations with offline processing, creating barriers in education, healthcare, and daily interactions. This lack of real-time solutions leads to misunderstandings, frustration, and social isolation for deaf individuals.

To address this, a real-time Sinhala Sign Language translation system was developed using a Convolutional Neural Network (CNN). The model, trained on a dataset of static SSL hand gestures, incorporates preprocessing techniques to enhance accuracy and robustness. The CNN effectively captures and classifies complex visual patterns, ensuring real-time performance through optimized processing and efficient deployment.

The system achieved 92% accuracy in SSL sign classification, with a 3% false-positive rate and a 5% false-negative rate. An initial AUC-ROC of 0.91 highlights its strong discriminative capability. These results demonstrate the system's potential for accurate real-time translation, fostering better communication and inclusivity.

Keywords: Sign language translation, Sinhala Sign Language, Real-time Communication, Gesture Recognition, Convolutional Neural Network

Subject Descriptors:

- Computing methodologies -> Artificial intelligence -> Computer vision -> Object identification
- Computing methodologies -> Machine learning -> Machine learning approaches -> Neural networks
- Human-centered computing -> Accessibility -> Accessibility technologies