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Indian Sign Language to Text/Speech translation

Abstract

The proposed solution for translating Indian Sign Language (ISL) into real-time text and speech bridges communication gaps between the deaf and hard-of-hearing community and the hearing world. This application will recognize ISL gestures, converting them into text and speech across multiple Indian languages such as Hindi, Telugu, and Tamil. It will feature gesture recognition, text translation, speech synthesis, and real-time processing. Using computer vision and machine learning, gestures will be captured through a camera, processed into text, and output as speech using text-to-speech (TTS) technology. The interface will be user-friendly, allowing language selection and real-time feedback on recognized gestures.

While current systems focus on other sign languages like ASL or Libras, they often have limitations, such as narrow language support and struggles with complex gestures involving facial expressions. Our proposal addresses these issues by incorporating a comprehensive ISL gesture library, multi-modal input with optional glove-based sensors, and natural language processing (NLP) for contextual and accurate translations. It also includes customizable speech output in multiple Indian languages.

The application will utilize advanced computer vision frameworks like OpenCV and deep learning models such as Convolutional Neural Networks (CNNs) to ensure high accuracy in gesture recognition. NLP will enhance the translation quality, while the customizable speech feature allows personalized voice output. The simple and accessible user interface will provide features like gesture tutorials, language selection, and real-time feedback to improve the interaction experience.

Our proposal stands out by focusing specifically on ISL with strong multilingual support and addressing gaps in existing systems. By leveraging advanced technologies, it creates an inclusive communication tool for social integration of the deaf and hard-of-hearing community in India. Additionally, it emphasizes real-time performance to ensure smooth, uninterrupted communication. The system's adaptability to various regional dialects and gestures within ISL further enhances its practicality. Ultimately, it aims to break down communication barriers, fostering greater accessibility and inclusion across diverse social and cultural environments.

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