

Voice of Hearing and Speech Impaired People

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ABSTRACT

Individuals with hearing and speech impairments have always found themselves struggling with communication challenges, often yearning for a tool that would empower them to connect with others easily and freely. Artificial Intelligence (AI) promised to produce such a tool, enabling speech and hearing impaired people express their feelings and ideas properly. Consequently, sign language became a popular medium of communication for individuals who are speech and hearing impaired. This research presents an advanced application that utilizes AI technologies such as deep learning and computer vision—to smoothly translate sign language gestures into written text and spoken language, as well as the reverse. The project incorporates several methodologies, consisting of required data collection, data pre-processing, feature engineering and extraction, and classification. Convolutional Neural Networks (CNNs) and Natural Language Processing (NLP) techniques were utilized for classification purpose. Moreover, the project utilizes two extensive datasets, including American Sign Language (ASL) and Pakistan Sign Language (PSL), resulting in higher accuracy and reliability. The application enables cross-modal communication by providing real-time translation between sign language and text or voice for both ASL and PSL. In comparison with the available datasets that have accuracy of 96%, the project based on the collected dataset performs extremely well and achieves 98% of accuracy. Interestingly, in order to extend accessibility to mobile platforms, an android application is developed by using React Native. Applications areas may include educational accessibility, customer support enhancement, medical communication facilitation, governmental

accessibility, and broader societal inclusivity. Future research could aim to incorporate more sign languages, enhance context understanding, integrate assistive technologies, improve learning experiences, and foster greater social inclusion. As a result, this piece of research work addresses the communication gap between hearing and non-hearing individuals, promoting inclusivity and accessibility in diverse contexts. This study stands out by transforming communication for individuals with hearing and speech impairments, allowing them to connect with the world more fully and effectively.

Keywords: Artificial Intelligence, Deep learning, Computer vision, CNN, React-Native, Speech recognition