CHAPTER 2

LITERATURE SURVEY

Sign language recognition and its conversion to text represent a multifaceted research area that integrates computer vision, machine learning, natural language processing, and human-computer interaction. This literature survey provides an overview of significant advancements and existing challenges in the field.

Initially, many systems concentrated on recognizing static gestures, such as hand shapes and positions. However, recent studies have shifted towards dynamic gestures that involve continuous signing. For instance, Fang et al. (2007) introduced a method utilizing data gloves to capture finger movements and hand shapes. Although this approach achieved high accuracy, its practicality was hindered by the need for specialized hardware, limiting its everyday usability.

Recent developments in computer vision and machine learning, particularly through deep learning techniques, have greatly enhanced sign language recognition capabilities. Li et al. (2020) improved gesture recognition by integrating Convolutional Neural Networks (CNNs) with Recurrent Neural Networks (RNNs), specifically Long Short-Term Memory (LSTM) networks. This combination effectively captured both spatial and temporal features of dynamic sign language gestures, leading to improved performance in continuous recognition tasks.

Real-time gesture recognition is crucial for the practical implementation of sign language recognition systems. Several approaches have been developed to optimize these systems for speed and accuracy, addressing the need for immediate translation in communication contexts.

Despite these advancements, several challenges persist in the development of effective sign language to text conversion systems. One major challenge is the complexity inherent in continuous signing; unlike spoken languages, sign languages are highly dynamic and involve not only hand gestures but also facial expressions and body postures. The ability to recognize transitions between signs (co-articulation) remains difficult, as systems adept at static gestures often struggle with continuous signing. Additionally, the scarcity of large, annotated datasets for training machine learning models poses a significant hurdle. Collecting and annotating sign language data

demands specialized expertise and resources, complicating efforts to train models on diverse sign languages.

In conclusion, the literature on sign language recognition and conversion reveals substantial progress in both hardware and software solutions. Early systems relied heavily on specialized equipment for static gesture recognition, while modern methodologies leverage deep learning and computer vision technologies to facilitate real-time recognition of continuous gestures. Nonetheless, challenges related to continuous signing recognition, multilingual support, and dataset availability remain critical areas for future research. The "Sign Language to Text Conversion" project aims to build a comprehensive real-time translation system that accommodates various sign languages. This survey serves as a foundation for understanding the current state of research in sign language recognition and its application to text conversion while highlighting ongoing challenges that must be addressed for broader adoption.