WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Literature Review on Hand Speak Gesture Controlled Text Formation System

Eshaan Srivastava, Durlabh Krishn Pandey

Shri Ramswaroop Memorial College of Engineering and Management, Lucknow

Introduction

Communication is a part and parcel of human interaction, and for individuals who have hearing or speech disabilities, communication is a huge problem. Sign language, a visual language that employs the use of hands, facial expression, and body language, is a primary channel for such individuals. However, there is a communication gap between individuals who know sign language and those who don't. As such, designing an efficient and user-friendly Sign Language Recognition (SLR) system has become imperative to make an environment accessible and inclusive to deaf and mute individuals.

Sign Language Recognition systems use computer vision, image processing, and machine learning to recognize hand movements and express them as text or speech. The technology facilitates communication between the deaf and the general public with ease without the use of special interpreters. Researchers have attempted diverse approaches to SLR systems, from vision-based methods, sensor gloves, and machine learning algorithms. Each of these methods has different strengths and presents different challenges.

This review of literature presents major research developments in SLR systems. It presents the dominant methodologies, principal technologies, and implications and suggests the need to include contemporary tools such as Artificial Neural Networks (ANN), Convolutional Neural Networks (CNN), and OpenCV in order to achieve accuracy and efficiency.

Overview of Sign Language Recognition Techniques

Different methods have come forward in Sign Language Recognition system designing .Most significant among these are as follows:

1. Vision-Based Approach: Vision-based systems utilize cameras to pick up and interpret hand gestures through image recognition. The method is cost-effective because it utilizes a standard camera and no extra hardware is needed. Background noise, lighting, and complicated motion of the hand are drawbacks to the method.

2. Glove-Based Approach: Using this method, sensors like potentiometers, accelerometers, or flex sensors in glove form are used to capture finger movement and hand postures. More accurate, but less natural, glove systems require the need to wear a special device and hence are less convenient to use in a real-world setting.

Vision-based systems gained importance in the past few years due to the advances in computer vision and machine learning technologies. Vision-based systems are more scalable, user-friendly, and flexible.

Major Research Contributions

1. Deaf-Mute Communication Interpreter System: This study describes two major deaf-mute communication methods: Wearable Communication Devices and Online Learning Systems. Wearable systems are based on glove-based systems with the integration of sensors such as accelerometers and text-to-speech modules. Their disadvantages relate to dependency on external hardware. Online Learning Systems utilize computer vision-based sign language gesture recognition. SLIM Module, TESSA, and Web-Sign Technology are key advancements here.

2. An Effective Indian Sign Language Recognition Framework Based on Wavelet Transform: This paper suggested a pattern recognition framework with Discrete Wavelet Transform (DWT) for feature extraction and a Nearest Neighbor Classifier for gesture identification. The system achieved a high accuracy of 99.23% using cosine distance classifiers.

3. Hand Gesture Recognition Based on PCA: Researchers proposed a gesture recognition system based on Principal Component Analysis (PCA) with YCbCr color space skin color modeling. PCA improved computational efficiency, making it suitable for real-time applications.

4. Indian Sign Language Recognition Automated System: This method used Otsu's Thresholding Algorithm for efficient hand region extraction and Hu's Invariant Moments for feature extraction. An ANN classifier was utilized for robust sign recognition with improved accuracy in varying lighting conditions.

5. Real Time Indian and American Sign Language Recognition using SIFT: This vision-based system used the Scale-Invariant Feature Transform (SIFT) algorithm for gesture recognition. It successfully recognized 35 distinct hand gestures in real-time applications with improved accuracy.

Recommended Steps and Enhancements

Drawing from previous researches, our project aims to create a better Sign Language Recognition system with the following integrating factors:
• Image Processing Techniques: Using OpenCV to segment the hand, detect contours, and eliminate background noise to improve recognition rate in different environment.

• Deep Learning Architectures: Using CNNs for improved pattern detection in visual data.

• User-Friendly Interface: Designing an accessible graphical interface to simplify use for non-technical users.

• Real-Time Recognition: Ensuring the system works optimally under dynamic conditions.

• Flexible Setup: Unlike traditional glove-based systems, the project aims to eliminate hardware dependency by relying solely on camera-based vision systems.

Through the integration of these elements ,the system we have proposed will be efficient ,scalable, and cost-effective solution for real-time sign language recognition. It will bridge the communication gap between the deaf-mute community and non-sign language speakers.

Conclusion

Sign Language Recognition systems have come a long way in recent times. While glove-based systems provide high accuracy, vision-based systems have emerged as a more practical solution for real-world use. Artificial intelligence , machine learning , and computer vision have helped us achieve trusted and accurate systems that can interpret complex hand movement in real time. Our system integrates tools such as OpenCV, ANN, and CNN to improve recognition accuracy, increase flexibility, and ensure user-friendliness.With decreased hardware dependencies and the utilization of advanced image processing techniques the system can improve communication for the deaf and mute community on a greater level. With continuous research and development, SLR systems will play a vital role in promoting inclusiveness and enhancing communication for the deaf and mute community.