**Designing and Optimizing Hand Gesture Detection and Recognition using Advanced Computational Techniques**

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**BACKGROUND/OBJECTIVES**:

Over 2.3% of the world population suffer from speech disorder and use sign language to communicate. Most of the population do not learn sign language. Hence, there is a communication gap. It became our motivation to build a bridge and to develop a hand gesture recognition system for American Sign Language (ASL) which can serve as a translator. In most of the current research work, the size of the dataset was small, various edge cases like hand color, brightness, size of hand, background colours were not considered during testing due to which performance of the designed system was reduced. Hence, we are trying to create an optimized solution for this partially solved problem.

**METHOD**: Detecting a gesture is a challenging problem. Various parameters such as complex background, different camera angles, size and color of hand, and opposite hand edge case make the problem more difficult. Thus, in our research we propose a fast and robust method for hand gesture recognition based on RGB video. In order to achieve desired results, first we detect the skin based on their color. Then the region of interest is segmented. After segmentation the RGB image is converted to binary image.. Finally we recognize the gesture using CNN. The results of our system demonstrate that the proposed method is efficient to recognize gestures with a higher accuracy.

**RESULTS**: Using the above methodology, the system handled major of the edge cases like background light, size difference and other colour ambiguities and detected the gestures with accuracy of 83% and using natural language processing techniques it translates the performed gesture into its meaning in real-time.

**CONCLUSION/IMPLICATION**: In this research, we have Analysed a dynamic hand gesture recognition system for American Sign Language, capable of translating the gesture into text and the sound.

SESBASS 2021

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□ Oral

**Preferred Topical Session**

□ Digital Health Technologies