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Enabling Seamless Communication Between Deaf And Dumb And Normal People

Dr.G.Maria Priscilla, Gowtharani S

Associate Professor& Head , PG& Research Department of Computer Science, Sri Ramakrishna College of Arts & Science, Coimbatore, Tamil Nadu India

UG Student, PG& Research Department of Computer Science, Sri Ramakrishna College of Arts & Science, Coimbatore Tamil Nadu, India

ABSTRACT: he work presented in proposed work an exertion(extension) towards examining the difficulties in classification of characters in Indian Sign Language (ISL). Sign language is for enough for communication of people with hearing disability or people with speech disability. The hand gestures made by the people with disability gets mixed or disordered for someone who has never learnt this language.This proposed work, introduce a Sign Language recognition using Indian Sign Language. The user must be able to capture images of hand gestures using a web camera in this analysis, and the system must predict and show the name of the captured image. The captured image undergoes series of processing steps which include various Computer vision techniques such as the conversion to grayscale, dilation and mask operation. Convolutional Neural Network (CNN) is used to train model and identify the pictures.

KEYWORDS: Indian sign language, Hand Gestures, Disability, Convolutional Neural Network, web camera.

I. INTRODUCTION

Sign languages are mainly developed for the deaf and dumb people to convey their messages with each other. A normal person can communicate with those people in a best way if they are also familiar with the sign languages. The main aim of this work is to make the normal person and the deaf and dumb people to communicate with each other in a comfortable manner. It can be achieved by creating an approach that will convert the given static hand gesture into the corresponding text. For thispurpose, various areas like image processing, and speech recognition may be concentrated more to get better results than the existing systems.One of the most important requirements for social survival is communication. Deaf and dumb peoples communicate with one another using sign language, but it is difficult for normal and dumb people to understand them. While much study has been done on the recognition of American Sign Language, Indian sign language varies greatly from American Sign Language. Furthermore, a lack of datasets, combined with the fact that sign language varies depending on location, has limited ISL gesture detection efforts. This project aims to take the first step in using Indian sign language to bridge the communication gap between normal people and deaf people. The extension of this project to words and common phrases will not only make it easier for deaf and dumb people to communicate with the outside world, but it may also help in the development of autonomous systems for understanding and assisting them. The aim of this paper is to use the corresponding gesture to recognise in Indian Sign Language. The identification of gestures and sign languages is a well-studied subject in American Sign Language, but it has received little attention in Indian Sign Language. We want to solve this issue, but instead of using high-end technologies like gloves or the Kinect, we want to recognise gestures from photographs (which can be accessed from a webcam), and then use computer vision and machine learning techniques to extract specific features and classify them.

II. RELATED WORKS

In the recent years, many different methods of application in the recognition of sign language have been suggested but those works are differing from each other in their modules and the techniques they had been used. Techniques such as Neural Networks, Fuzzy Systems and Hidden Markov Model had been used in their works. Thad Starner, Joshua Weaver, and Alex Pentland developed an American Sign Language recognition system by using Hidden Markov Model and they found 25% of errors in the unrestricted grammar text. Lee and Yangsheng Xu developed a glove-based gesture recognition system. On the other part vision-based analysis is more natural and essential for real time applications.

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Sushmita Mitra and Tinku Acharya had developed a survey on gesture recognition, with detailed description on hand gestures and facial expression. Many different methods have been used to recognize the gestures.

III. PROPOSED WORK

A vision based analysis is used in this work. This type of analysis is mainly based on the way human beings receive information about their surroundings. Here the image is captured using a camera and then extract some features from those images. The extracted features may be used as an input in a classification algorithm. The system consists of the following stages such as input image, Pre-processing, Feature extraction and Classification. Fig (1) describes the architecture of this work.

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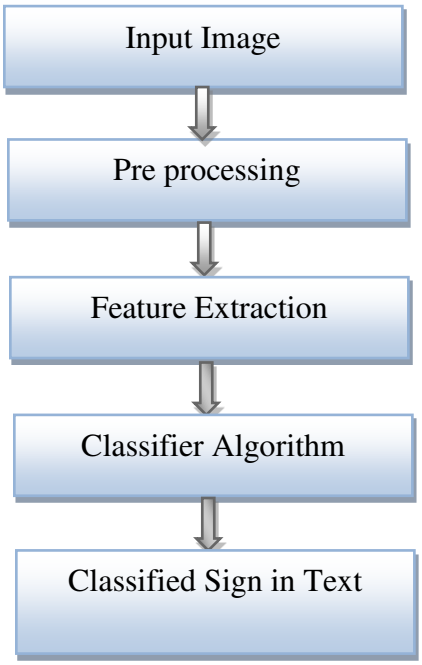

Fig-1 System Architecture

Input image

The first stage of this system is the stage of image acquisition. Here the images of different Ta sign word should be captured. The resolution of each image may vary so we need to resize them to the same resolution and this image is given as input to the next stage i.e. the pre-processing stage. The sample images of are shown below in Fig (2).

Pre-processing

Pre-processing methods are applied to the input image to get a new brightness value in the output image. Methods like RGB to gray conversion, filtering and thresholding may be used to get an efficient output image.

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Fig-2 Sample Input Image Represents Auto

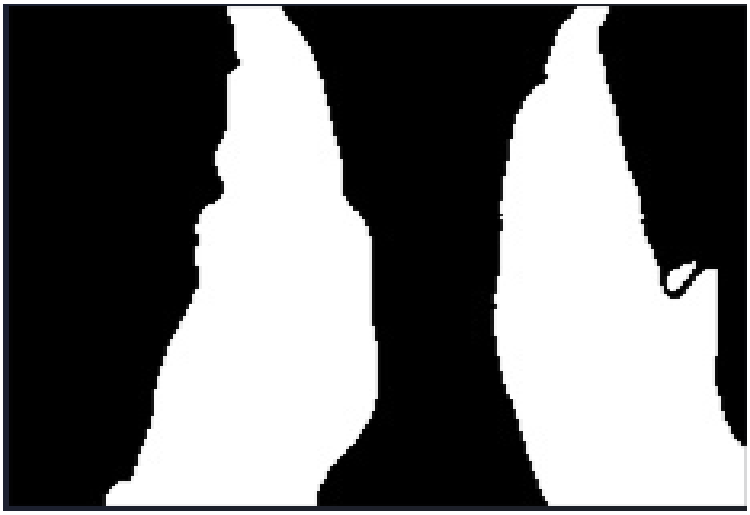

Fig-3 Sample Input Image Represents Railway

Fig-4Sample Input Image Represents School

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Feature Extraction:

The following shape descriptors may be used as features (i) Solidity (ii) Perimeter (iii) Convex area (iv) Major axis length (v) Minor axis length (vi) Orientation. Let us discuss about the features.

(i)Solidity

Solidity, S, is the measurement of the overall concavity of a particle. It is defined as the image area, A, divided by the convex hull area, Ac

Solidity = Area / Convex area

(ii)Perimeter

The perimeter of the particle, P, is defined as the total length of the object boundary.

(iii)Convex Area

A convex area is a scalar that specifies the number of pixels of the specified 'convex image'.

(iv)Major and minor axes

All particulate matter has major and minor axes. The major axis passes through the centre of mass of the object corresponding to the minimum rotational energy of the shape. The minor axis passes through the centre of mass of the object and is always perpendicular to the major axis.

(v)Orientation

Orientation is a scalar representing the angle (degrees ranging from -90 to 90) between the x-axis and the major axis of the ellipse

IV. RESULTS AND DISCUSSION

In this proposed work the image collected is in the size of 350*350 is being collected from creating gesture. The gesture stored in data collection will be stored in the values of number. The image collected will be train and test by giving an input of 0 and 1. For training of an image this requires a frame that had created in the size of 350*350. The training of image is stored in 300 frames. The first 60 frames store the background which is being used while running the proposed work. The background should be stable to recognize the image. The rest of 240 frames while stored the image of sign languages are collected in the proposed work. While testing the first 2 frames in 240 frames is being checked while the sign is related to the train data collection. If it is not similar it will continue the process in all collected frames in the data collection. To get more accuracy of the gesture the image is converted from RGB colour into grey scale image. Then image will be converted into text by giving the word dictionary by giving the text for the respective gesture. Then while running the proposed work if turn on the camera and recognizes the background and it display to show the gesture and gives the text for image.

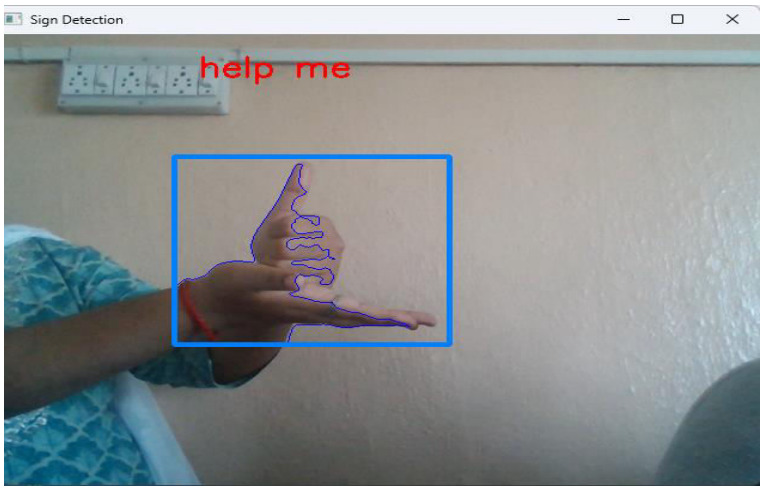

Fig-5 Sample Input Image Represents Help me

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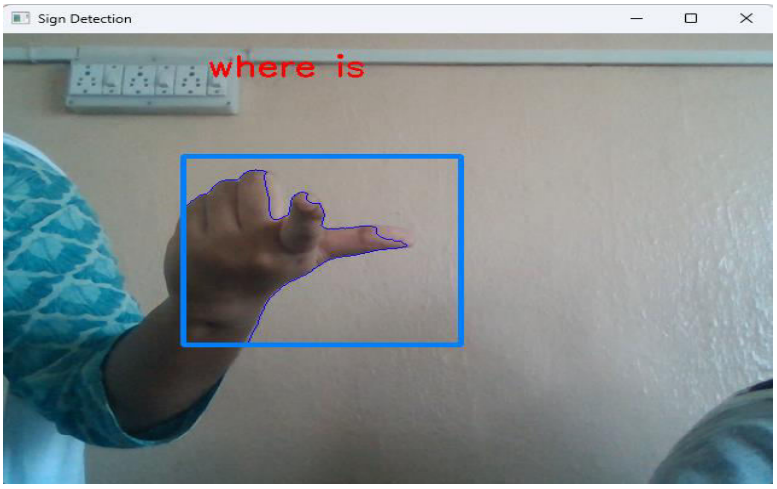

Fig-6 Sample Input Image Represents Where is

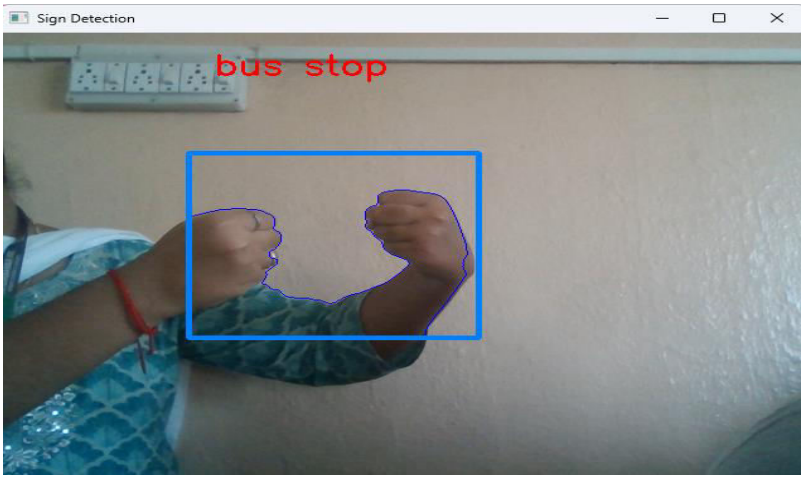

Fig-7 Sample Input Image Represents Bus stop

Fig-8 Sample Input Image Represents School

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V. CONCLUSION

In conclusion, the Sign Language Recognition System developed using Convolutional Neural Network (CNN) demonstrates promising results in accurately identifying hand gestures in Indian Sign Language (ISL). The system's high accuracy, efficiency, and real-time capabilities hold significant implications for facilitating seamless communication between individuals proficient in ISL and those without prior knowledge of the language. By bridging the communication gap, this system contributes to fostering inclusivity and accessibility for individuals with hearing disabilities. It helps bridge the communication gap between people who use sign language and those who don't. With continued development and refinement, this system has the potential to positively impact the lives of countless individuals, fostering greater inclusivity and understanding in society.

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