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Hand Gesture Recognition Using CNN Algorithm Deep Learning

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Abstract:

Human gestures are a non-verbal method of communication that are essential in interactions between humans and robots. In order to recognise hand movements and facilitate such interactions, vision-based gesture recognition techniques are crucial. A simple and usable interface between gadgets and users is made possible by hand gesture recognition. Hand gestures have a wide range of applications, making them useful for communication and other purposes. People who have had strokes can also benefit from hand gesture recognition since they need to communicate with others using several common essential motions like the sign for eating, drinking, family, and more. Hand gesture recognition is not only helpful for the deaf or disabled. An strategy for identifying hand gestures using a convolutional neural network is presented in this paper (CNN).

Keywords— **Deep Learning, classification, Convolutional neural network, feature extraction.**

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I. INTRODUCTION

Direct touch between the user and the machine is now the most common method of communication. Devices like a mouse, keyboard, remote control, touch screen, and other direct contact techniques are the foundation of the communication channel. Human-to-human communication is performed using more intuitive and natural non-contact techniques, like sound and body gestures. Many researchers are Considering using these non-contact communication techniques to support humancomputer interaction because of their adaptability and effectiveness. An essential non-contact way of human communication that contributes significantly to the human language is the gesture In the past, wearable data gloves were frequently employed to record the angles and locations of each user's joint during a motion. The limitations of wearable sensors include their difficulty and high cost. The main goal of Gesture recognitionis to develop a system that can identify and understand specific gestures and communicates information from them[1].Gesture recognition methods based on the non-contact visual inspection are currently popular.

II. LITERATURE SURVEY

People with speech and hearing impairments rely heavily on sign language in their daily lives. Due to its growing complexity and substantial intraclass variation, computer vision recognition of American Sign Language is highly difficult. Convolutional neural networks (CNNs) are employed in this study [1] to recognise the ASL alphabet. This approach is helpful in identifying it as a deep network, which is what is anticipated for the purpose of classifying the ASL alphabet. The first stage involves pre-processing the MNIST dataset. After the first stage,

many significant aspects of the hand gesture image that has been pre-processed are computed. The accuracy and AUC score of the network model's ability to recognise objects in the final phase will depend on the properties estimated or determined in the preliminary phases.

People who are deaf or dumb suffer from a variety of activities around the world because there aren't enough qualified sign language interpreters. In order to overcome the large communication gap between sign language users and deaf people, our research article [2] suggests a novel hand gesture detection framework for Bangla. The hand was seen experimenting with the YCbCr and HSV colour spaces. Deep convolution neural networks are able to recognise a total of thirty-seven (37) characters (8 vowels and 29 consonants). For the 37 alphabets in Bangla sign language, we attend 37 lessons. A fresh dataset for the Bangla sign language was used to support our framework's contribution to the gesture recognition system. 3219 photos from six distinct persons make up our dataset. With the help of this new dataset, we can achieve an accuracy of 99.22%.

The recognition of any sign languages is one of the challenging problems with computer vision. These sign languages [3] are used by the deaf and the dumb to communicate. With recent advancements in deep learning, neural networks can be used in a variety of ways to understand sign languages. This research suggests using a powerful artificial intelligence technique, the convolutional neural network, to recognise static images of American Sign Language.

Our model has been trained and validated using the ASL dataset, which consists of 1815 images representing 26 English alphabets. The validation accuracy was determined to be 94.34%, which is higher than several other approaches currently in use.

The community of people who have speech and hearing impairments uses sign language to communicate. It is the [4] language that makes use of hand and body gestures in addition to facial expressions. The most widely used sign language in India is called Indian Sign Language (ISL). These days, sign language to common language and vice versa translation services are offered online. But it requires an expert who can interpret in both methods and also they charge. As a result, communication between the community of people who have hearing or speech impairments and the general public has become challenging and expensive. This makes the community of people who have difficulty hearing or speaking socially isolated. Therefore, the goal of this endeavour is to close the communication gap between the two. The use of finger spelling in sign language is significant.

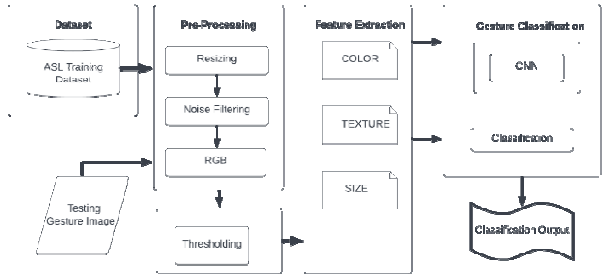
People who are deaf or dumb suffer from a variety of activities around the world because there aren't enough qualified sign language interpreters. In order to overcome the large communication gap between sign language users and deaf people, our research article suggests a novel hand gesture detection framework for Bangla. The hand was seen experimenting with the HSV and YCbCr colour spaces. Deep convolution neural networks are able to recognise a total of thirty-seven (37) characters (8 vowels and 29 consonants). For the 37 alphabets in Bangla sign language, we attend 37 lessons. A fresh dataset for the Bangla sign language was used to support our framework's contribution to the gesture recognition system. 3219 photos from six distinct persons make up our dataset.

III. OBJECTIVE

In this report a To design a real time software system that will be able to recognize ASL handgestures using deep learning techniques. This project aims to predict the ’alphabet’ gesture of the ASL system.

1.Apply deep learning to obtain the ROI.
2.Help deaf and dumb people.
3.Provide 24X7 access to system .
4.Remove physical barriers by providing online interface.
5.Used python Django to ensure high security.

IV. ARCHITECTURE



STEP 1- PRE-PROCESSING

Take an image of the Hand Gesture training dataset first, then perform the Pre- Processing operation. It is not always possible to obtain clean or formatted Gesture Recognition during Pre-Processing. Using Deep Learning data, and while performing this operation with this data, it must be cleaned and formatted. Various operations, such as RGB and noise filtering, are carried out in Pre-Processing.

STEP 2 – FEATURE EXTRACTION

Take an image of the ASL training dataset first, then perform the Pre- Processing operation. It is not always possible to obtain clean or formatted Gesture Classification during Pre-Processing. Using Deep Learning data, and while performing this operation with this data, it must be cleaned and formatted. Various operations, such as RGB and noise filtering, are carried out in Pre-Processing.

STEP 3 –IMAGE CLASSIFICATION

Convolution is the first layer in CNN. A feature map is created in this layer by detecting different patterns in the input image. Using that pattern, the image is classified, and the result is displayed as the Gesture's name.

V.EXPECTED RESULT

As an experimental output, our system will generate a text output that contains the name of a gesture from an input of a gesture image.

VI.CONCLUSIONS

The proposed work will help to eliminate the traditional model training method completely. It only require one interface to upload image. This would lead to a new generation of human computer interaction in which no physical contact with device is needed. Anyone can use the system to operate the computer easily, by using this deep learning based system.

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