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A Review for Hand Gesture Recognition Techniques

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ABSTRACT: Hand gesture is a tool used for communication between mute/deaf people and the normal people. Hand gesture is realistic and inborn and it is similar to the natural way of communication like oral communication and written language. It will act as a method of natural communication between human and machine, and plays a very important role within the field of human and computer interaction. By using gestures people can be able to express their affection or care towards others and also it enables them to show their ideas towards others. So gestures are something that is essential in some fields like communication. By using gestures, the interaction between humans and computer will be in an ordinary way and becomes easier. There are different varieties of gestures which will vary according to the size and shape for different individuals.

KEYWORDS: Hand gestures, human computer interaction

I. INTRODUCTION

There are many people with speech and hearing problems. Such people can't be able to communicate with normal people in a normal way. One existing and easiest way for them to communicate with normal people is by using gestures. Gestures embrace movement of the hand, face or different elements of the body. Hand gesture recognition is incredibly important for human computer interaction. Gestures can be of two types, static gesture and dynamic gesture. In static gesture, gesture of the hand denotes an indication and in dynamic gesture, movement of the body or hand conveys some messages. Gesture is a tool which is greatly totally different from the normal hardware based mostly strategies and it might achieve an interaction between human and computer through the process of gesture recognition. Those people with speech and hearing problems also want to communicate with others for their requirements. This is one of the reasons that the gesture recognition is important in the field of communication. Gesture recognition is not only applicable to the field of communication but also has various applications such as in the field of virtual reality. There are many criteria such as accuracy, efficiency etc. in order to recognize hand gestures correctly. So hand gesture recognition is a difficult process. Here are some techniques for hand gesture recognition process.

II. LITERATURE SURVEY

Hina Shaheen and Tariq Mehmood proposed a system "talking gloves gesture recognition system for sign language translation" based on sensor gloves which convert the sign language to speech. The gloves which read the movement and exposure of both hands through accelerometer, gyroscope and flex sensors stitched within. All the data from the devices is processed and multiplexed wirelessly through Bluetooth. A sound file is produced by the audio module, when there is no sign formed, the system has the potential to change to its sleeping mode which enables it to save lots of the facility

Mohammed Ennajar proposed a system "sign language translator and gesture recognition" for converting sign language into text by developing a data acquisition and control system. Hand gestures are captured by using a smart glove and it converts gestures in the form of text. In order to complete this process the glove is developed with flex sensors, contact sensors and half dozen DOF accelerometer or gyroscope on one chip. By using this system sign language can be converted in the form of text. That can help mute/deaf people to easily communicate with other people.



Dr R Suguna and Neethu P S proposed a system “hand gesture recognition using shape features”. This presents a system for hand gesture recognition using shape features. The detection is purely based on the shape features such as hand gestures. The shape features captured by the web camera are given to the computer and an alphanumeric value for each gesture has been sent to the microcontroller then it will select the assigned voice in the voice processor.

K.Manikandan proposed a method “hand gesture detection and conversion to speech and text” for helping the hearing impaired persons. The various hand gestures are converted into speech as well as text. Images of hands are taken by using a camera. Hand gestures are identified by using a contour feature process. Audio recordings are played based on the identified hand gestures.

Jean Meunier proposed a brand methodology “static hand gesture recognition using artificial neural network” supporting hand gesture recognition within the static type, exploitation artificial neural network. Input data is collected and the data is trained. Then the next stage is pre-processing and makes a group of attribute’s descriptions for the image. The network is then trained and the process of recognition takes place.

Sruthy skaria and Al-Hourani proposed a method “Hand gesture recognition using two-antenna Doppler radar with deep convolutional neural networks” in which an integrated circuit of low-cost consumer radar combined with recent advances in machine learning have opened a range of latest possibilities in smart sensing. To capture Doppler signatures of 14 different hand gestures and train a deep convolutional neural network (DCNN) a miniature radar is used. Two-receiving antennas of a continuous wave doppler radar is used as the miniature radar which also produces in phase and quadrature components of a beat signal. Raw time-domain signals are the output of radar module which is converted to spectrograms using STDFT. The spectrograms of the 2 beat signal together with the matrix of AoA for every Christian Johann Doppler part are given as three input parts for the DCNN. Starting with the gesture signal collection and ending with the gesture classification output, each fundamental block is described in detail in the subsections that follow. This proposed system provides gesture classification accuracy prodigious 95% and a really low confusion between completely different gestures.

Peijun Bao and Narciso Garcia proposed this research, a deep convolutional neural network is proposed to directly classify hand gestures in arbitrary positions that occupy a reduced image area in comparison with the surrounded background. A novel hand gesture recognition system is proposed to detect the gestures. This method can be implemented using open source framework. This approach is very useful for real time gesture recognition.

M. I. N. P. Munasinghe, this paper has researched for about the “dynamic hand gesture recognition using computer vision & neural networks”. Using hand gesture, it is one of the most natural ways of interacting with computer. Real time hand tracking and extraction algorithm has used to trace the moving hand and in order to extract the hand region from the dynamic hand gestures. A fourier descriptor was used in order to characterize the facial features from the dynamic hand gesture. It is used to develop a real-time dynamic gesture recognition system. This system is mainly used to develop and identify four gestures which are swipe left, swipe right, swipe down and shrink. Implementation is done using python programming language, open CV have been used.

Zi Xian Justin Yeo, This analysis has explored the methods for hand gesture recognition using a more-common device laptop-web camera. Most people own’s a laptop nowadays. Several steps has been developed to recognize hand gestures such as canny edge detection, background subtraction, calibration and thresholding has been used. Among these steps the background subtraction is the simplest method to implement. And also a convex hull method is used to identify the number of fingers the user is showing to us by the number of convex and defect points. If the user has shown the hand gesture it is detected and tracked by the system and execute command corresponding to it. This paper researches about the human computer interaction. As human computer interaction has very important aspects nowadays.

Gerhard Rigoll proposed a method for the real time recognition of hand gestures. It is done by using a convolutional neural network which uses sliding window approach for this process. This technique introduces an architecture which consist of a detector, classifier, a post-processing stage and single time-Activation stage. After testing the performance using Ego gesture and NVIDIA Dynamic hand gesture dataset, the real time evaluation is possible.

E. Stergiopoulou introduces a new technique for the recognition of hand gestures. This method is suggested because of two innovative networks which are the Self Growing and Self Organized Neural Gas (SGONG) networks. In this



technique, the first stage is to detect hand gesture by setting the background uniform and plain. The next stage is to approximate the morphology of hand and then the finger identification process occurs. The last stage is the recognition process which is done according to the gesture.

Md. Zahirul Islam & Raihan U Islam It aims to recognize static hand gestures by a CNN model that can analyze large amount of image data. In this the trained and tested images were divided into 10 classes. Here to recognize hand gestures is composed of 2 convolutional layer, 2 max pooling layer, 2 fully connected layer and output layer. The first layer produces the feature maps and passes to next layer. Max-pooling layer helps the network to understand the image better. The next convolution layer discards the 25% of total neurons to prevent overfitting. Then it is passed on to flatten layer and the output layer uses softmax function to give a specific value for each classes.

III. CONCLUSION

This analysis explores the challenges in recognition of hand gestures and also the different ways to recognize the hand gestures are discussed in this paper. Gesturing will facilitate an individual to express their clear thoughts. Hand gestures in communications can show off one's feeling, emotions etc. There are so many techniques in which hand gestures can be recognized using different algorithms which may be helpful for the vocally impaired people who uses their hand gestures for communication. The projected methodology and CNN designs open door to a future implementation of gesture recognition in embedded devices with hardware limitations. This analysis explores a way to the vocally impaired people to communicate in an efficient manner.

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