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Literature Survey on Hand Gesture Recognition System

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Abstract: For those who are deaf and dumb Sign language is an efficient, common and alternative way for talking, where we can understand them by using the hand gestures. For humans' hands are a part of human organs which is used to manipulate physical objects. For this very reason hands are used most frequently by human beings to communicate and interact with machines. In the recent generation, hand gesture recognition system is improving in such a way that the interaction between the human and machine is advancing by using the electronic gadgets such as mobile phones, computers etc. So, there will be advancement not only in representing the speaking skills, also writing skills too. The real-time continuous gesture recognition is based on posture, position, orientation, and motion or by using the embedded systems like microcontrollers or it can be color maker approach, glove-based approach, vision-based approach and depth-based approach.
The technique used in this system is that the input to the system will be given from the hand. They detect the image of the hand and pre-process it. Later on, they are going to crop the image how much they require for the analysis. In the later stages they are going to extract the feature of the hand and then they are going to classify it. At the last the gesture is converted into the speech. According them hand gesture recognition system provides Human Computer Interaction. The two major applications they have used is Sign Language Recognition and gesture-based control.

I. INTRODUCTION

The most critical of all in today's life is communication- reading and writing. The way of communication in which any type of body movement is involved called Gestures. Gesture recognition is the mathematical interpretation by a computing device. Gestures are expressive, meaningful body motions involving physical movements of the fingers, hands, arms, head, face, or body. There are many kinds of expressions of human movements, the common one is the expression of gestures.

In other words, Gesture is non-vocal way of communication which uses hand motion, different postures of body, face expressions. Gesture recognition based on computer vision has gradually become a hot research direction in the field of human-computer interaction.

Sign language is the most expressive way for the hearing impaired, recognizer must be able to recognize continuous sign vocabularies in real-time. Gesture recognition based on attitude sensor is an emerging field of pattern recognition research. Experimental investigation proves the performance and high accuracy of any proposed device.

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The most critical of all in today's life is communication- reading and writing. They feel communication medium difficult because they cannot access the computer. In some paper they have used Braille script for reading and writing purpose, which cannot be interpreted by the existing computers. The six fingers represent the six dots in the Braille.

Few papers have focused on Human Computer Interaction (HCI). In some paper they have used Braille script for reading and writing purpose, which cannot be interpreted by the existing computers.

The six fingers represent the six dots in the Braille. A smart camera can be defined as a vision system which produces a high-level understanding of the imaged scene and generate application specific data to be used in system. Mono-vision based skin color segmentation techniques are used for segmenting the hand form a complex image sequence. The standard histogram features along with various geometrical features are extracted.

Some papers they have used End-Point problem to determine the end points in a gesture input sequence.

II. LITERATURE REVIEW

A. In deep learning there are two modes of pattern recognition: one is vision based-Vision based is too dependent on the external environment. The other one is sensor based-which needs sufficient light and background environment. The technique is carried out in such a way that in the data collection they have used attitude sensor and data is collected in large amounts. The next stage is to capture the data i.e., the starting and the end points of the gesture should have an effective signal segments to be processed. Next, they are going to use the data for the better reflects of input characteristics. At the last they are going to classify the large amounts of data and post-process it. The conclusion is they have implemented gesture recognition algorithm based on gesture sensor.

B. Gesture recognition is the mathematical interpretation of a human motion by a computing device. This application is generally divided into two categories i.e. contact-based approach and vision-based approach. The vision-based approach is simpler and it employs video image processing and pattern recognition. In this paper they have trained CNN classifier to determine the shape of the hand. In the vision-based approach they have avoided the skin color segmentation. The aim is to recognize six static and eight dynamic gestures while maintaining accuracy and speed of the system and the recognized gestures are used as command to the computer.

C. The hand gesture system is used been more in now a days because it helps in the interaction between the humans and machine. In this paper they have used hand for recognition is because it gives more meaningful information when compared to the other type of gestures. The principal component of the hand gesture recognition system includes segmentation and tracking hand from the background and then the feature is extracted from the segmented hand image using various algorithms and finally we are going to recognize the hand gestures. Hand gesture recognition is used in many applications like- HCI, robotics, sign language, digit and alphanumeric value. In this paper they have used Kinect sensor which is used widely in comparison of vision-based technology and glove-based method. Recognition of dynamic hand gesture needs more computation in comparison to static hand gesture.

D. The study about dynamic gesture motion tell us about how feature vectors are obtained using the tangential angles. The feature vector is obtained by the tangent angle of the motion path of the palm. To solve the classification identification problem, they have used the Forward-backward algorithm and then they have used the Viterbi algorithm which solves the category of the optimal trajectory sequence. To train the parameter model they have used the Baum-Welch algorithm. In the last stage they have used D-S evidence theory to carry out model feature fusion to realize dynamic gesture recognition.

E. This paper gives us information about it requires sufficient space and range resolution supported by related hardware and algorithms. The radar operates on 60GHz and utilized Range Doppler Map algorithm to acquire the velocity and range of different movement and fulfill hand recognition. Also, they have used soundwave technologies like loudspeakers and microphones embedded in the computer to recognize the hand gesture. They have considered Decision based tree algorithm which classifies the original signal they have considered into four set of gestures. This gesture recognition is been described in such a way that for gesture detection we are going use hand pushing, hand pulling, hand lifting and hand shaking.

F. In this method they have discussed about the features of radar that are helpful for gesture recognition and perform effective gesture recognition using the features determined through this feature selection analysis. They introduced a method called feature-based gesture recognition in a frequency modulated continuous wave (FMCW) radar. From this method we obtain a raw signal of FMCW radar and generate a variety of features from the RDM. The features are broadly defined so that they can radar-specific characteristics as well as statistical values commonly used in the machine learning. Some of these radar features are highly connected with the Gesture Recognition and are selected by the proposed feature selection algorithm. This selection algorithm which is a wrapper-based feature selection algorithm incorporated with a quantum-inspired evolutionary algorithm (QEA). The algorithm's information factor is based on the minimum Redundancy Maximum Relevance(mRMR) criterion and is applied to QEA to get the feature subsets effectively. This introduced algorithm is able to extract all the forms of feature sets from all the feature subsets related to gesture recognition, and it helps in improving the gesture recognition accuracy of the FMCW radar system. Now a days the machine learning is becoming more advances because of its techniques now in paper they are using this language only and they are using vision-based cameras in this project to recognition of the gesture and they are also using depth-aware cameras, and wearable devices ,these cameras are having some features so that we are using these cameras they are these cameras shows good performance for gesture recognition because of its high resolution of sensing , the drawback of this systems are these are preferred only indoor environment in the case of wearable devices such as accelerometers or gyroscopes so that the user must wear the devices to detect the gestures and the sensors are not affected by environment because of signal transmissivity. These radar sensors are easily used to detect the surveillance of moving plastic objects at long range but the human hands at short range. This project mainly deals with the estimating and tracking the

movement of one or several targets. After getting the raw radar signals we process it to range-Doppler map (RDM) to get the good features. These features should have some statistical values used in machine learning.

G. In these days the 3d pictures are being used more commonly everywhere. In this paper also they have described about 3D hand-gesture recognition (HGR). This can be used in smart mobile devices, such as head-mounted displays (HMDs) or smartphones for AR/VR applications and also, they are using virtual 3D objects using depth sensing and hand tracking to enable the user-interaction. In 3D HGR system previously these sensors have used low power and also, they have used convolutional neural network (CNN) which can be adopted to enhance the accuracy of the low-power stereo matching. These CNNs comprises HGR in to 6 layers. The CNN sensors can sense the skin color and texture to detect the hand accurately. They have considered the right or left image in the CNN based stereo stage. They have selected the nearest neighbor of the image and they have coordinated the images and they have gone depth into the processing. They have converted the image into virtual 3D object and have rendered the space and after doing some interactions they have obtained the output.

H. Surface electromyography (EMG) sensor is extensively used in human motion recognition to identify low level hand movement by using the single channel surface EMG signal and in this paper, they have explained about more use of the EMG sensors in different fields like signal acquisition system. This is a low-cost technique which uses a sensor network called surface EMG-extensively used for hand motion recognition. The surface EMG is a sensor network which has four surface EMG sensors and a computer software. In this paper they have explained about the design of wireless surface EMG sensor and the computer software in detail. They have extracted four set of domain feature from the raw EMG signals and after extraction we use these features to train the BPNN in MATLAB. The online motion of the hand recognition is done by these BPNN training data and the output of this system is the average recognition accuracy.

I. Blind peoples are facing many problems in their daily life and the most critical ones are reading and writing. They feel communication medium difficult because they cannot access the computer. A real time embedded system is used to interact with an external environment, which may be any living organisms. In Braille script six dots represent the six fingers. They have used microcontrollers in this paper which intakes the gestures and sends the input to the computer. The computer recognizes the gesture and prints it on the display as an output. The system is very cost effective when compared to other typographical system.

J. In this paper they use electrical impedance tomography (EIT). To produce High Accuracy Wearable Hand Gesture Recognition System, they have embedded electrodes to demonstrate the system interfaces and the forearm using a wrist wrap, which helps in measuring the inner conductivity distributions caused by bone and muscle movement of the forearm in real-time and passes the data to a deep learning neural network for gesture recognition. This system does this by measuring the bandwidth of 500 kHz and have measured the sensitivity in excess of 6.4 Ω per frame. And this system also uses round robin sub-grouping method to recognize the nineteen hand gestures and it achieved 98%.

K. As the technology is growing rapidly in the daily life the use of gadgets is also increasing. So, to make smart machines we are enabling our machine to take the command by recognizing the different hand gestures which we are going give as a input. Later on, we put the inputs to databases assigning it some task. Now when we give some commands to our system by hand gestures then machine first captures the command as an image then we are going to compare this with the database and if any image is found in the database then task assigned to that will be performed.

L. Today in many industries we are using the most common communication that is Human Machine interaction especially for Hand gestures recognition in the natural way. This technique enables the communication between the machine and the human in easy way and does not use any extra devices. In this paper they are focusing mainly on the work which is done in the area of hand gesture recognition where the soft computing is based on methods like artificial neural network, fuzzy logic, genetic algorithms. They have also derived the hand detection methods in the form of preprocessed image for detecting the hand image. More fields researchers have used fingertips for hand detection in appearance-based modeling.

M. In this paper different methodologies, segmentation, feature extraction, classifiers and the experimental results indicate the feasibility of different methodologies for vision-based interfaces in different environmental conditions although the methodologies discussed for various database and are classified. Among the different classifier ANN classifier has the best recognition rate and accuracy than that of other classifiers compared in this paper, but in this paper, they have not discussed the time response of the system. In order to obtain the good time response multiclass. SVM classifier can be used. This interface makes human users to be able to control smart environments by hand gestures.

N. According them hand gesture recognition system provides Human Computer Interaction. The two major applications they have used is Sign Language Recognition and gesture-based control. Gestures are expressive, meaningful body motions involving physical movements of the fingers, hands, arms, head, face, or body. Hand gesture recognition system is considered as a way for more intuitive and proficient human computer interaction tool. The range of applications includes virtual prototyping, sign language analysis and medical training.

O. Presenting with real-time continuous gesture recognition of sign language-first by taking the gesture input followed by the statistical analysis based on posture, position, orientation, and motion. sign language is the most expressive way for the hearing impaired, recognizer must be able to recognize continuous sign vocabularies in real-time. We use End-Point problem to determine the end points in a gesture input sequence.

P. Hand gesture based electronic device control is gaining more importance nowadays. This paper presents hand gesture recognition-based Device control by using microcontroller. The purpose of project is to design & develop a hand gesture-based Device control which can be easily controlled by the help of gesture recognitionsystem.Experimental investigation proves the stable robustness, performance and high accuracy of the proposed device controller. Then Microcontroller will on or off the device as per gesture broadly speaking, a smart camera can be defined as a vision system in which the primary function is to produce a high-level understanding of the imaged scene and generate application specific data to be used in an autonomous and intelligent system. The reason a smart camera is „smart" lies in the fact that there exists inside the camera a processing unit which performs application specific information processing (ASIP). The primary goal of the ASIP is to extract information from the captured images that is useful to an application. For example, a motion triggered surveillance camera captures video of a scene, detects motion in the region of interest, and raises an alarm when the detected motion satisfies certain criteria. In this case, the ASIP is motion detection and alarm generation. a smart camera is a standalone, self-contained embedded system that integrates image sensing, ASIP and communications in one single box. However, there are other types of vision systems that are often referred to as smart cameras as well, such as PC based smart cameras.

III. OBSERVATIONS

The volunteers who did not train the system in the paper we have selected as a base paper for our project. But the papers we have used as a reference in few papers they have trained the system by taking the inputs. The experimental method to test the test samples, the results of gesture classification are obtained. The results show that the experimental method has achieved good results for dynamic gesture classification and recognition.

IV. CONCLUSION

In this paper we have studied the various method of gesture recognition. Hand gesture recognition system is considered as a way for more intuitive and proficient human computer interaction tool. The range of applications includes virtual prototyping, sign language analysis and medical training. Also, we have identified how to classify the non interest images and interested gestures from the taken actions or images, inertial sensor are used to identity the gestures. In this paper we have discussed about the End-Point algorithm and also few techniques of it is Mono-vision technique. Each of them performed all the hand gestures.

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