Gesture Recognition Via Neural Network

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Abstract:
Physical disabilities, such as paraplegia tetraplegia, and Parkinson's disease, can greatly limit the autonomy of patients with respect to home living. In the United States, more than 270,000 patients suffer with paralysis with some form of spinal cord injury (SCI) which manifests it in varied motor impairments. Computational gesture recognition is a field which has made significant technological advancement in the past few years. This work presents a display design for accessible interaction in home appliances. Based on research, accessible interfaces state of the art, an interface design is proposed. The gesture recognition system has the ability to read hand gestures using high resolution camera which is then processed by the computer after supervised neural networks applied.

Keywords: Hand gesture, assistant, neural network

I. INTRODUCTION

Throughout the history of mankind, humans have used language as a medium. sign language is a language which uses manual communication and body language to convey meaning. This can include combining hand gestures, predilection and movement of the hands, arms or body, and facial expressions to fluidly express a speaker's thoughts. This medium of language is very useful for disabled patients. The proposed model uses image processing and computer vision to produce understand-ing sign. It creates track of various hands parameters and provides data to analysis it and monitor system. It is depend on gestures language Interpreter of the patients. This utility system have general facility due to its depend on monitoring the patients in different regions. If a patient ask to eat or something else, the system helps him to achieve what he wants, even if this request out of reach It is used to express of patient wishes. This method is the easiest way to help the patients and what they need, when the patient unable to walk due to stroke, and what feeling in complete paralysis, except his hands. Then the system completely depend on hands movements. The details of system consist of digital camera connects with active system to monitor. The idea of the system is to monitor the patient's hands. Basically, the movement of the patient will be interpreted and compared with the database, depend on special movement build in the system. The system reject any gestures not exist (contrary to the predefined image data sets). The error messages are displayed when the patient's gesture is out of system rules.

II. EXISTING SYSTEM

Since computer fields have merged with computational ability to solve problems. Many researchers and computer scientist have worked on hand gestures and machine learning to achieve a good end. B. Peng and G.Qian developed Online gesture spotting from visual hull data, IEEE Trans. on Pat-tern Analysis and Machine Intelligence which was very well received. Then S. Mitraand T.Acharya developed the paper Gesture Recognition: a survey, IEEE transactions on systems, man, and cybernetics-part 2007.

Further J. Davis and M. Shah, Recognizing Hand Gestures, in Proceedings of European Conference on Computer Vision along with Y. T. Chen and K. T. Tsengn, Developing a multiple-angle hand gesture recognition system for human machine interactions, in Proceedings of 33rd Annual Conference of the IEEE industrial Electronics Society, Taipei, Taiwan.

III. PROPOSED SYSTEM

A gesture recognition system for disabled people is built on MATLAB. The proposed system depends on GUI or called vision interface. The Vision interfaces are based on feasibility and popularity because the computer machine is able to communicate with user using camera or webcam. In this way, the user can be able to give commands (hands commands or gestures) to the computer by just showing some actions (hand movements) in front of the webcam without typing keyboard and clicking mouse button. Hand movements are the key points in hand gesture recognition modelling in the human hand model. This approach is based detection and recognition on applying a learning model to reconstruct the hand mode.

1. Dataset
There are fifty different gestures which are taken with the help of webcam and stored in database for training. And the test data will be taken at runtime.

2. Image Acquisition

The image acquisition is the first step in image processing because without get the images we cannot perform any operation. The tools make easy to acquire images and video from cameras and frame grabbers directly into MATLAB. In this work, the webcam is used to capture a video as input.

3. Feature extraction

It is the method of changing the input data into the set of features. It extracts relevant information from the input data. To perform the desired task, it reduces the input image size representation and simplifying the amount of resources required to describe a large set. In this work, feature extraction involves two major steps. The first step is image segmentation and the second one is edge detection. Image Segmentation is the method of separating a digital image into segments(subparts). Image segmentation is generally used to locate objects and boundaries (lines, curves, etc.) in images. In order to get those important parts, background subtraction to be done. We have to detect objects. Edge Detection is used to identify points in a gesture image. The points are easily detected by the sharp changes in the image. And these points are termed as edge. After this step the edge pixels are highlighted. For that we use the sobel edge detection technique. Then we have to convert an image to a binary image, based on threshold. It removes pixel value below the standard value. Finally to equalize the entire extracted pixel and to improve the local contrast of an image and bringing out more detail we perform the adaptive histogram equalization.

4. Gesture Classification

After completion of previous step process, the application will then convert the gesture into its recognized character which might be helpful to be understood sign language. In gesture recognition, take the image at runtime and perform feature extraction. And maintain the trained data sets. The trained data sets contain output of feature extraction and also the real hand gestures of the person. In this module, compare the run time feature extracted images with trained feature extracted images.

5. Translation

Either text-to-voice system or display of message on screen interface. This will help normal people to communicate more effectively with mute or hearing impaired people. Using required function, we convert the word into speech. First, it converts raw text containing symbols like numbers and abbreviations into the equivalent of written-out words. Then converts the symbolic linguistic representation into sound and gives a message on screen.
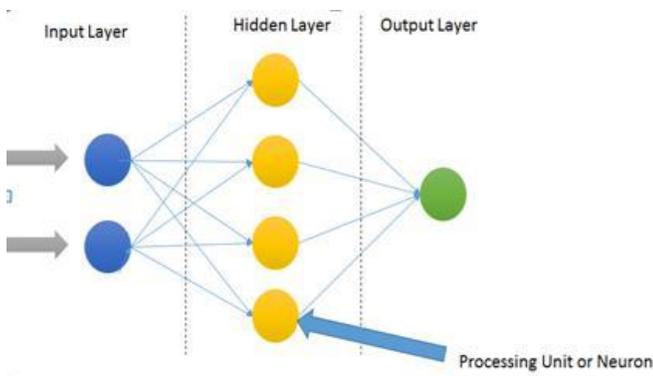
IV. OBJECTIVE

In this system, the interface developed will be providing basic information like: Date, Time, Weather, etc. It will be performing actions according to the given commands using the hand gestures by the patients. This will allow them to make request for any kind for help from nearby helper without any worries. This also helps the workers to do their respective task without watching the patient all the time. The system uses basic camera, a computer interface, a hand-gesture dataset and neural network.

V. REQUIREMENT ANALYSIS

1) Hardware Requirements

- OS-Windows
- Processor- Intel Pentium or Higher Hard disk- 160GB Minimum
- RAM -512MB

2) User Requirement

- High resolution camera or webcam Speaker
- Display
- Software Requirement

3) MATLAB

a)MATLAB
b) Date Set Storage

VI. PROCEDURE OF WORK

A main objective of the system is the ability to use hand gestures for the general applications, aiming for the natural interaction between the human and computer. The steps of procedure have been discussed below:

1) Image capture from high resolution camera or web cam.
2) Images re sizing 150 140 pixels fit (the desired size). Edges detection (detect boundaries of hand gesture).In this step we are using 2- filters.
3) Divide two image matrices resulting dn and dm element by element and then taking the a tan (tan1) to get gradient orientation.
4) Re-arrange the blocks of inputting image into columns by calling MATLAB function im2 col. This is optional step.
5) Converting the column matrix with the values to degrees. This way we can scan the vector for values ranging from 0 to 90. This can also be seen from the orientation histograms where values come up only on the first and last quarter.

VII. BENEFITS OF PROPOSED SYSTEM

1)The system if developed will greatly overcome the problem of communication for disabled people
2)It can speed up the automation of applications in certain place of work.
3)Will act as automation tool
4)It overcomes the labour of nurses and caretakers of disabled people.

5) As the current system is manual it does not require any sophisticated training for the users of the system.

VIII. SYSTEM EVALUATION

1) Advantages
- The system can be further customized to greater extent to cater to the needs of automation.
- The applications will greatly the automation process.
- Multiple algorithms working together to produce best results.
- The system is easy to deploy, safe with convenient operations.
- Access to authorized personnel only.

2) Disadvantages
- Designing the framework architecture for the sys- tem can be challenging part to make framework dynamic.
- Cannot help people with hand impairment. The void sin education system can be found.

IX. CONCLUSION

In this paper, we present a new proposed system for Signal processing, where these patients cannot move their bodies except hands. We build this system to read hands movements and translate this movements to requests carried out by doctors. The future GRNN is very bright especially for disabled patients and signal processing .This technique is natural and easy way to make a contact with a machine (simulation) , where the user not needing the training phase .This technique can be made a wireless technique, especially faraway patients . At this time this technique can be controlled remotely. So in any case of disaster like fires or earthquake, if the person is in danger and can't get a help, he can show hand gesture syntax to the system that will interpret it and send it as a signal to transceiver nearby and it will forward the signal further to the rescue team in the control room. This system can be development by adding Global Positioning System. This way help the persons to detect there locations by rescue team.

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