HAND GESTURE RECOGNITION SYSTEM

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Abstract: Hand Gesture Recognition is one of the systems that can detect the gesture of hand in a real time. The project expects to build up a system that can perceive hand gesture which can be utilized as input to PC which can be connected to various operation of PC. In this we have proposed a technique for the Hand Gesture Recognition and feature extraction utilizing a web camera. In this system, the picture is taken through digital camera which is already associated with the system. With this, the input picture is pre
processed and threshold value is used to remove noise from it and have a clear picture of the provided image.

Keyword: Human Computer

Interaction (HCI), convexity

defects, Python3.

Introduction:

In a day-to-day life, hand gesture recognition is one of the systems that can detect the gesture of hand in a real time video. The gesture of hand is classified
within a certain area of interest. Designing a system for Hand Gesture Recognition is one of the goals of achieving the objectives of this project. The task of recognizing hand gestures is one of the main and important issues in computer vision. With the latest advances in information and media technology, human computer interaction (HCI) systems that involve hand processing tasks such as hand detection and hand gesture recognition.

Gesture detection is the process of finding and extracting features within images or videos and hence Digital Image Processing will be the dominating tool to implement it practically. The area of image analysis is in between image processing and computer vision. As a digital image is composed of a finite number of elements, each of which has a particular location and value, these elements are called picture elements or pixels and the field dealing with the processing of digital images by means of digital computer is Digital Image Processing. Digital image processing stems from two principal application areas

1. Improvement of pictorial information for human interpretation.
2. Processing of image data for storage, transmission, and representation for

autonomous machine perception.

Various traditional input devices are available for interaction with computer, such as keyboard, mouse, and joystick as well as touch screen; yet these are not considered natural interface.

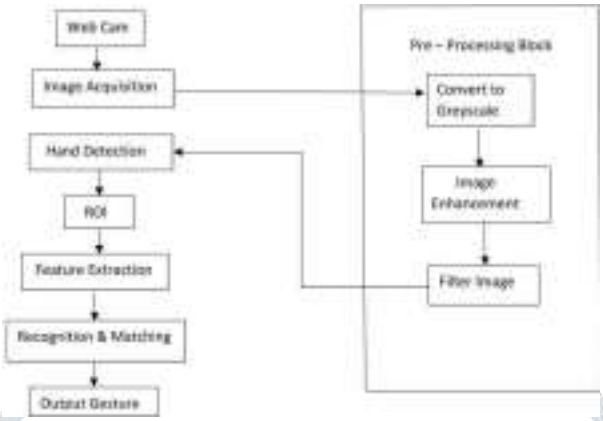
I. Working Methodology:

1) Capture Scene 1 with plain background then Capture Scene 2 with hand. This phase is called image acquisition.
2) After capturing the image, we detect the hand and separate it from the scene because if it is not separated from the scene, it will affect the accuracy of the system later when we will be extracting and matching the features.
3) Crop hand out of scene by subtracting two images.
4) Preprocessing steps, which are: i. Convert RGB to Gray scale
ii.Convert image into black & White using threshold value.
iii. Median filtering: Median filter deletes dark spots called the pepper and fills in white openings in the picture, called salt. It preferred works over mean filter by protecting sharp edges. It just replaces every pixel value by the middle of the intensity level in the neighborhood area of that pixel.
5) Noise removal and smoothing: Noise is really a variation in a picture or unwanted and unwanted changes within the color or brightness of a picture. Noise within the image ought to be removed; as a result of it'll have an effect on the results. If options extracted from a noisy image are used and so it's classified, it'll be deceptive and can end in worst classification and results. To avoid this image is preprocessed by removing noise from this image. It'll increase the accuracy of the system. Within the field of digital image process smoothing is employed as a preprocessing step. This is often a method which is able to use totally different style of filters and apply them on the image.
6) Remove small objects other than hand.
7) Feature extraction.
8) Matching and identifying the corresponding gesture and recognition.

II. Motivation:

The main goal of this study is to explore some of the recent research in Vision base Gesture Recognition in Human Computer Interaction, to perform a feasibility study on recognizing human activity using hand movement analysis, and gathers details of best practices in design and development of these innovative systems and to establish a base for further research. In this paper, we present a survey exploring the power and possibilities Vision base Hand Gesture Recognition in Human Computer Interaction techniques and also to study design issues and challenges in the area. Here a qualitative analysis is made on the different Hand Gesture Recognition systems to identify their strengths and weaknesses. Further a proposal is made on the possible future trends of these systems.

III. System Architecture:



1) Web Cam: The video is captured through the webcam of the local host.

2) Image acquisition: Image Acquisition, the main phase of any vision framework is the picture securing stage.

2.1 Convert to gray scale: Pre processing while changing over a RGB picture to grayscale, we need to take the RGB values for every pixel and make as yield a solitary esteem mirroring the shine of that pixel.

2.2 Image Enhancement: Picture improvement strategies have been broadly utilized as a part of Numerous utilizations of picture.

3) Hand Detection:

Hand Detection gives a calculation to find confronts in still picture and recording stream.

4) Region of Interest (ROI):

It is a chosen subset of tests inside a data set identified for a specific purpose. Inside a ROI may lay individual points of intrigue.

5) Feature Extraction:

The aim of this phase is to find and extract features that can be used to determine the meaning of a given gesture. This is a simple approach which relies on the outline of a given hand region. Given a hand region the outline is extracted using for example some edge tracking algorithm.

6) Recognition and Matching:

This stage is considered to be a final stage for gesture system and the command/meaning of the gesture should be declared and carried out, this stage usually has a classifies gestures and we get output results.

IV. FUTURE ACTIONS: Currently the real-time gesture recognition system is still far away for a complete and perfect system because it didn't able to perform its original intended function which is recognizing both static and dynamic hand gesture in directly control on the vehicle

infotainment system function. Besides that, the system performance and classification performance of the

system is just at the satisfied level and still required much improvement to maximize the average recognition rate and suppress the error rate as much as possible in order to be implement in a real vehicle system with the standard of automotive industry.

In the future work, the system will consider using the better camera which able to collect the RGB and depth data from the captured image so that the system will not be restricted by the lightning condition and the clustered background issues in the gesture recognition process. In addition, the system can consider on implementing machine learning algorithms such as CNN, SVM and HMM in recognizing dynamic gesture as involved the temporal trajectory of some estimated parameter over time. Never the less, the classification models still have to be improved with the consideration of more effective rules in order to recognize gesture with minimal rate of error.

V. RESULT:

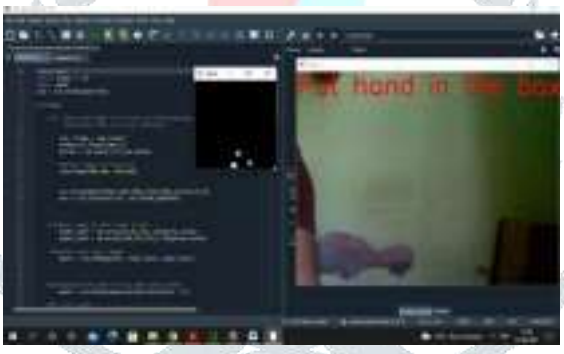


Fig1. Put hand in the box

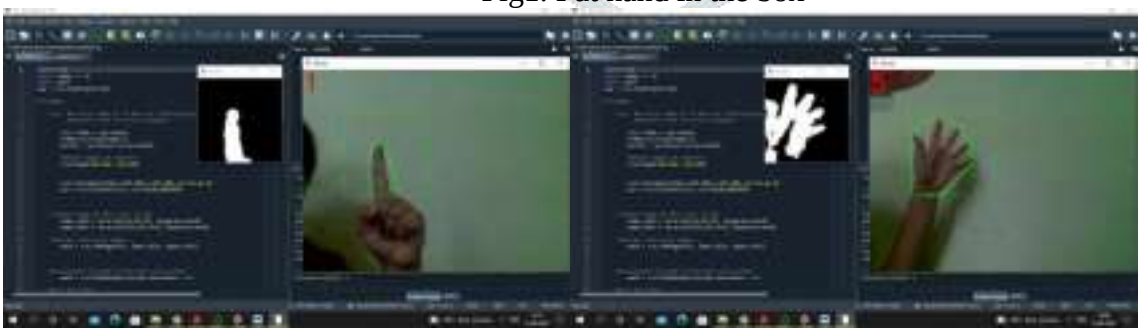


Fig2. Recognizing One

Fig6. Recognizing Five

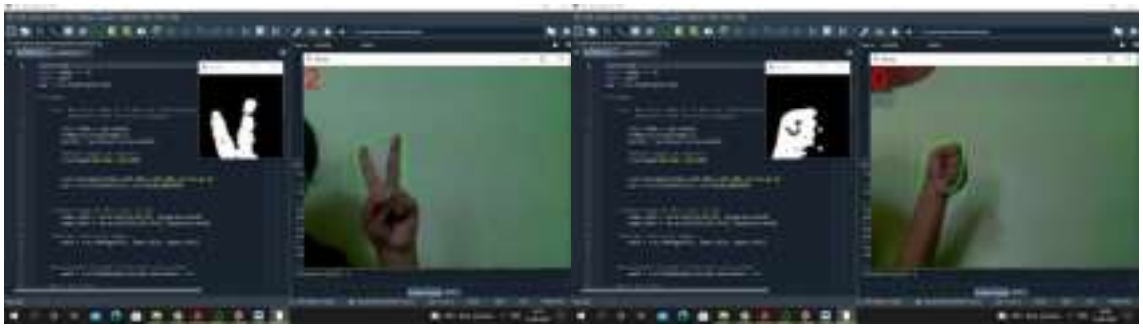


Fig3. Recognizing Two

Fig7. Recognizing Zero

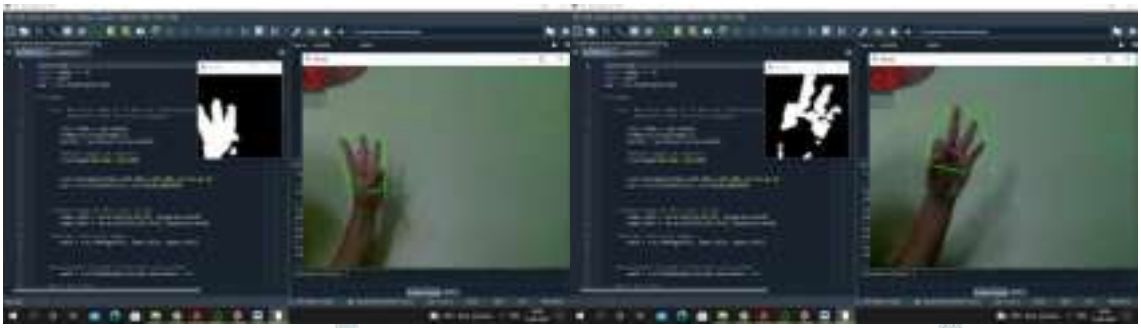


Fig4. Recognizing Three

Fig8. Recognizing Ok

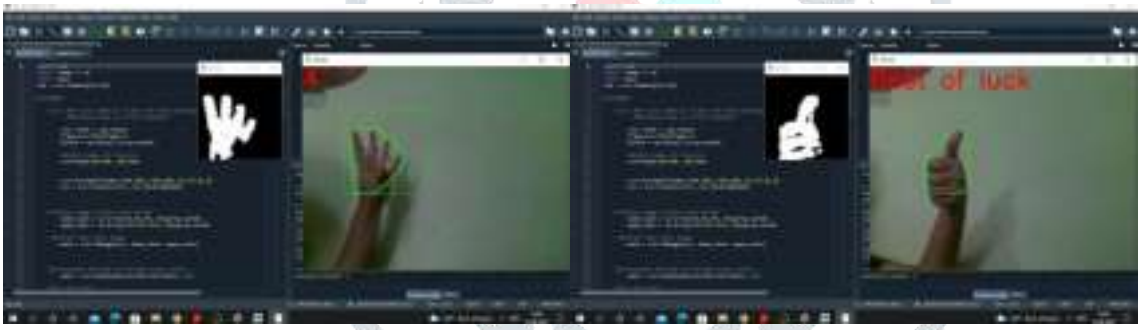


Fig5. Recognizing Four

Fig9. Recognizing Best of Luck

VI. CONCLUSION:

The objectives and goal of this project are achieved successfully. We successfully implemented the image segmentation and recognition part in SPYDER IDE. Where the images are static and provides interface, which is user friendly. And the most important thing is that there is no extra hardware to perform all these tasks. But taking the dynamic environment in mind this project is not enough robust and safe to guarantee result. Here we only considered limited set of gestures but if we take into account a greater number of gestures then we can facilitate more commands and the system will become more interactive.

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