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Review paper of Hand Recognition and Gesture Control Using Image processing

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ABSTRACT—This paper is concentrated available gestures and finger detection in still images and video sequences. The paper also contains a quick testing of various approaches handy gesture detections also because the realization of the platform independent application written in Python using OpenCV and PyTorch libraries, which will show a specific image or play a video sequence with highlighted recognized gestures.

Keywords: Hand detection, Gesture recognition, Deep Learning, Python, OpenCV, PyTorch .

I. INTRODUCTION

Computer technology has come an extended way within the past 20 years. the items which will be done, and therefore the time spent on electronic devices has increased tremendously also. they need infiltrated every aspect of our lives; from how we learn, to how we share experiences with others. Although the devices are advancing quickly, the methods of interacting with these devices are largely neglected – so far. With numerous aspects of our lives being suffering from computers, people began to wonder if there was a far better, more natural thanks to interact with devices, aside from using the normal devices. This led to the emergence of a replacement field: Human Computer Interaction (HCI). The impact of HCI is often seen within the first iPhone, which revolutionized the mobile device industry with its intuitive touch screen. A newer example of such a revolution is voice commands, through products like Google Now and Apple's Siri, which allowed for hands-free controls. It is often said that both of those methods of interaction succeeded because they were so natural, so familiar to us – it had been much more natural to point and tap on an icon using our finger, than to shift a mouse to maneuver acursor to click on an icon. because the industry places its specialize in Virtual and Augmented Reality, the importance of HCI will grow even more. People will desire A level of interaction thatbefits the term "virtual reality" – it's to mimic reality, where we use our limbs, five senses and voice to interact with the planet around us. Hence, starting with the foremost basicinteraction, we might want to use our hands to maneuver and 'touch' things. In other words, we'd like hand gesture recognition as the basis of HCI in virtual reality. This report aims to explore the prevailing options for hand gesture recognition during a common context. most of the people nowadays own a laptop with a front-facing camera. If we could tap into this, we could possibly bring a more natural method of interaction to the masses. Moreover, as computer game devices become more common, the laptop camera can also become a viable complementary interaction device, capturing a field of view break away the computer game device.

II. MOTIVATION

Recently Gesture controlled Laptops or computers are becoming very famous. this system is named Leap motion which enables us to regulate certain functions of Toyies, Medical Devices, by simply waving our hand ahead of it. So during this research allow us to try building our own Gesture control Smart Toyies using latest technologies.

Analysis of hand gestures is beneficial for providing another way of understanding what humans do in videos for visually impaired or blind people or translation of signlanguage to text. Another example might be gesture basedcontrols of some systems in automotive industry, to researchnon-verbal communication of criminals caught on cameras etc. There are a couple of already existing approaches handy andgesture recognition, but either need a background removalto extract just the hand for Contour Analysis [1], need aninput captured by a depth sensor [2], preprocessing thatcreates output almost like a depth map for mapping a handto a virtual model [3] or track the contours movement

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usingCurve Fitting [4] then on. due to these downsides toeach of the approaches, we chose the approach using DeepLearning to be ready to detect hands in any RGB input withoutthe need for any extra preprocessing or need for controlledconditions. Hand gesture is one among the foremost intuitive and natural ways for human to speak with computers, and it's been widely adopted in many human–computer interaction applications with the event of computer vision and machine learning, human–computer interaction has been playing a crucial role in people's lifestyle. Compared to the normal two-dimensional graphical interface, the last word goal of human–computer interaction is to understand the natural communication between the human and therefore the computer and supply the operator with a more intuitive and cozy interactive experience. sorts of research on interactive techniques about face, gait, gestures, and posture are administered. Among these interaction methods, hand gesture is that the most intuitive and natural one which has aroused great attention of researchers.

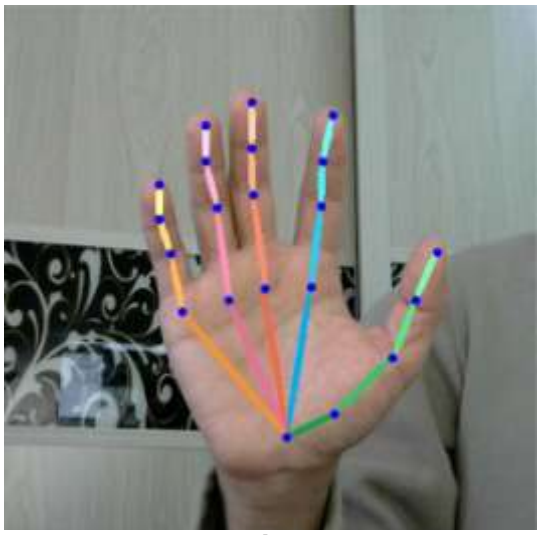

Fig .1. Hand Key-Points

The main purpose of hand pose estimation is to localize hand key-points, which may facilitate the next procedure of gesture recognition. so as to get a hand pose estimator which is strong to the complex background, we tailor the tactic proposed by Wei et al. [11] called convolutional pose machine (CPM), which is originally used for human pose estimation. during this paper, the CPM takes an RGB image of a person's hand as input and therefore the output are heatmaps for every hand key-point. We consider 21 hand key-points during this paper which are denoted because the blue points in Fig. 1, and consequently the CPM generates 22 heatmaps in total including one for the background.

The combination heatmap of every stage is shown in Fig. 2. we will see that the heatmap produced at the primary stage may be a little noisy and therefore the activation values are weak. it's because the effective receptive field at this stage is little and therefore the long-range relationships between key-points can't be learned well with small receptive fields. When it involves the second stage, the receptive field becomes larger and thus the mixture heatmap is far more clear as shown in Fig. 2c. At the third stage, the receptive field is that the largest and it's ready to handle the long-range relationships between parts. The heatmap of Stage 3 is more clear, the response value is stronger, and therefore the location of key-points is more accurate compared to the heatmap of Stage 2.

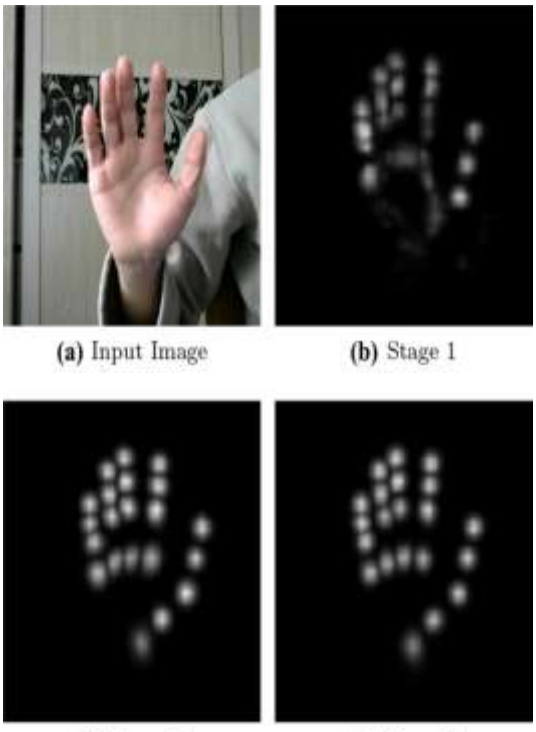

Fig .2. Outputs of each Stage

III. LITERATURE REVIEW

There are a lot of work done on gesture detection. Significant amount of research andliterature is available. Maria Abastillas in "Hand Gesture Recognition and Classification Technique in Real-Time" (17 June 2011). This work, a way of recognition and classification of hand movement performed by healthy subjects in Real time has been discussed. Additionally, analysis of selecting the simplest features and best classifier for the specified hand

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movements are discussed. the 2 modes of hand movement: Relax hand and shutting hand are classified within the Lab View platform. For this purpose, surface electromyography (sEMG) signal has been acquired employing a single channel electrode. Statistical time domain features of the signals are extracted from the signals i.e., mean, variance, kurtosis, and skewness because the classifying features of the signal. First, offline classification has been done using intelligent classifiers i.e., SVM and KNN classifier. Classifier model has been prepared by taking 75% data as training set and therefore the remaining 25% data as testing/validation data of the model. The results show that the proposed model is an efficient and accurate method of classification of hand movement with an accuracy of roughly 96.58% for the offline classification has been obtained. The classified model has been also implemented in LabView software by interfacing it with Python [8]. Tomas Bravenec, Tomas Fryza in "Multiplatform System for Hand Gesture Recognition" (2019). This paper is concentrated available gestures and finger detection in still images and video sequences. The paper also contains a quick testing of various approaches handy gesture detections also because the realization of the platform independent application written in Python using OpenCV and PyTorchlibraries, which will show a specific image or play a video sequence with highlighted recognized gestures [1].

Zi Xian Justin Yeo Exchange Student in "Hand Recognition and Gesture Control employing a Laptop Web-camera" (2017). Hand gesture recognition may be a technology that's becoming

increasingly relevant, given the recent growth and recognition of Virtual and Augmented Reality technologies. it's one key aspect to HCI, allowing two-way interaction in virtual spaces. However, many instances of such interaction are currently limited to specialized uses or costlier devices like the Kinect and therefore the Oculus Rift. during this paper we explore the methods for hand gesture recognition employing a more common device – the laptop web3 camera. Specifically, we explore and test 3 different methods of segmenting the hand, and document the pros and cons of every method. we'll also cover one method for hand gesture recognition [4].

Nithin Kumar B et al. (2019) in "Facial and Hand Gesture based Media Player" Volume 10, Issue 3, (March-2019). during this work, we are developing an enhanced media player which

plays and pauses the video by detecting the users face watching screen or not and also the sector of computer vision-based hand gesture interfaces for Human-Computer Interaction

(HCI). System will continuously monitor whether the user is watching the screen or not employing a web camera. If it detects then the video will play with none interruption. along side

these, the online camera also will detect the users hand gestures which may be used for performing various events like increasing or decreasing the quantity , changing to next video

or previous video, etc. If the system couldn't detect user's face then the video are going to be stopped immediately. Currently we propose to create prototype for exploring the utilization of marking menus in gesture-based interaction for controlling the Media player [2].

S.Ghotkar and G. K. Kharate in "Hand Gesture Recognition using Python" vol. 3, no. 1(2012). The goal for the proposed work was to develop a replacement sort of Human Computer Interaction system that subdues the issues that user are facing with the present system. The project is implemented on a Linux system but might be implemented on a windows system by downloading some modules for python. The algorithm applied is immune to change in background image because it isn't supported background image subtraction and isn't programmed for a selected hand type; the algorithm used can process different hand types, recognizes no of fingers, and may perform tasks as per requirement. As it is stated within this paper, the most goals were reached. the appliance is capable of the gesture recognition in real-time. There are some limitations, which we still need to be overcome in future [7].

J. Francis and A. B K in "Controlling pc using ultrasonic sensors" vol. 99, no.7 (2014). The aim of this proposed work is to create a machine which may control pc using ultrasonic sensors. during this we are using Arduino to interact between ultrasonic senor and PC. The Arduino are often connected to the PC/Laptop for powering the module and also for Serial

communication. Once the connections are done place them on your monitor as shown below. The concept behind the project is extremely simple. we'll place two Ultrasonic (US)sensors on
top of our monitor and can read the space between the monitor and our hand using Arduino, supported this value of distance we'll perform certain actions [5].

IV. CONCLUSION

The proposed system is based on programming languages-based image recognition

whichwill identify the gestures of user and after identification this gesture can be used in multipleapplications like controlling the multimedia player in which we can control the volume zoomare we can see the playback of this multimedia. Also, where connecting oneexternal devicewhich microcontroller based which canreceive the commands from the computer and can beused to control any other devices or can be coupled with the television to control the channelsas well as the volume on the television. So, this is team will be useful for all the peoples notonly controlling the computer as well as controlling the externaldevices using the simpleplug and play device. Lots ofresearch and literature are present, Literature survey regardingto this topic is completed.

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