

Review on Computer Vision Technology using Gesture Recognition

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Abstract— Any patient who suffers from speech disorder is the most serious problem in which he has to face lot of things which causes lack of communication with others. In today's technological era, many technologies are evolving day by day. One such promising concept is Human-Machine Interface. For example, in a wired mouse there is no provision to extend limit. In wireless mouse, one should have Bluetooth hardware installed in the computer and Bluetooth dongle attached. The proposed technology will have no such limitations and will instead depend on gesture recognition. The mouse control by the use of gesture recognition is done. Different gesture based technique are explained. The use of this technique which makes controlling of mouse and other function.

Key words: Camera, Face Gesture, Mouse Tracking

I. INTRODUCTION

Face recognition system is one of the applications of a computer for verifying and identification of a person. This field is related to biometrics application which includes others like fingerprint, eye iris recognition systems. Face Recognition systems are based on a very old era of 2D algorithms, taking us back to the early 1960s. The first face recognition methods used the geometry of key points. Hand Tracking is technique used to move and control mouse cursor without using an external mouse device. Our paper proposes a basic model of integrating Face Recognition method with Hand Tracking where the authenticated user alone can access their system without using mouse thereby providing access privilege to the user. Hand Tracking has been carried out with either Edge/Shape Motions acknowledgment framework progressively getting to be noticeably huge piece of human-PC cooperation. Motions can begin from any substantial movement or state yet usually start from the face as well as hand. A motion is a development of the body parts that contain data as well as emotions. Waving farewell is a signal. Squeezing a key on a console isn't a motion in light of the fact that the movement of a finger on its approach to hitting a key is neither watched nor huge. The only thing that is in any way important is which key was squeezed. Numerous specialists have attempted to characterize motions yet their real importance is as yet subjective. A framework that naturally distinguishes and perceives human head signals, for example, gesturing and shaking in complex foundation conditions utilizing Web camera under uncontrolled conditions is head motion acknowledgment. Execution change is measuring the yield of a specific methodology, and after that adjusting the system to expand the yield, increment proficiency, or increment the adequacy of the technique. Face identification is a PC innovation that decides the areas and sizes of human faces in advanced pictures. It identifies confront and disregards whatever else, for example, structures, trees and bodies. Face recognition can be viewed as a broader instance of face limitation. In

confront confinement; the assignment is to discover the areas and sizes of a known number of appearances (normally one). In confront location, confront is handled and coordinated bitwise with the fundamental face picture in the database. Any slight change in outward appearance, e.g. grins, lip development, and won't coordinate the face. Face recognition can be viewed as a particular instance of protest class identification. In question class recognition, the undertaking is to discover the areas and sizes of all items in a picture that have a place with a given class. Cases incorporate upper middles, walkers, and autos.

II. LITERATURE SURVEY

Parth B. Pancha , Vimal H. Nayak, [1] research close by motion acknowledgment expects to plan and improvement of such frameworks than can distinguish unequivocal human motions as info and process these motion portrayals for gadget control through mapping of orders as yield. The different diverse messages can be shown on touch screen LCD and it can be change as per change in accelerometer position or distinctive edges of accelerometer. Danchi Huang, and Lijuan Li, [2] this technique can track protest accurately, in spite of the fact that it is impeded by the comparable skin-shading objects. In this strategy, utilizing the twice-coordinating to coordinate the question, and refresh the format, with the goal that the protest can discover effectively when the presence of the protest is changed. When the protest is lost, the calculation can discount it rapidly and keep following. Improvement of this calculation is expected to better match the protest with different highlights. The following is the different authors review what they have done. In [3] the system controls the computer cursor by the user's eye gaze. By looking at the control keys displayed on screen, a person can synthesize speech, control his environment, type, operate a telephone, run computer software, operate a computer mouse, and access the internet and e-mail. The eye-gaze system is a direct-select vision-controlled communication and control system. This software controls a computer cursor by the user's eye gaze. The only requirement is to operate the Eye gaze are control of at least one eye with good vision & ability to keep head fairly still. The system provides fair results as output and uses external device for voice command. It also reduces external noise from surrounding. In [4] paper concentrates on Electrooculography (EOG) technique for moving the mouse cursor through eye retina. It sense eye signals which in turns used to control the movement of mouse cursor. The signals captured using electrode sensors, are first amplified, then noise is removed and then digitized, before being transferred to PC for software interfacing. The EOG is the technique used for retina tracking. The EOG electrodes are placed on user's forehead around the eyes to record eye movements. EOG is a very small electrical potential that can be detected using electrodes. The electrodes are placed in up, down, left and

right so whenever the retina moves from center to towards the electrodes, this electrodes results in positive side that in turns move the mouse cursor in respective direction. This method uses external electrical circuit for tracking the retina movement. The output results i.e. the movement of the cursor is limited to left, right, up and down. The system cannot be implemented for cursor movement top corners and bottom corners. In [5] the software is developed for face and retina detection. This software is simulated in Matlab and OpenCV to get the desire results. The face and retina tracking is done by using Viola-Jones object detection algorithm. Viola-Jones is first object detection algorithm that later used for detecting the human face. This algorithm is trained by passing thousands of human faces through the dataset. After training the algorithm can be able identify whether the given image contains human face or not. This algorithm is easily implemented in OpenCV by using in build function of OpenCV. The Viola-Jones algorithm provides the successful result i.e. human face and retina is successfully detected using Matlab and OpenCv in real-time simulation. In [6] paper describes the various in which the eye retina tracks. It also describes how the blink detection work in various ways. The various face detection technique is used. The face detection is done in two ways,

- 1) Feature-based method: In this facial features are detected like nose, eyes, mouth, etc. This is done verify that the given image contains human face or not.
- 2) 2. Image-based method: In this method they simply used template matching technique to detect the human face. The various methods of face detection show desire output and provide the good results.

III. PROPOSED ALGORITHM

A. Viola-Jones Face Detection

The Viola-Jones object detection framework is the first object detection framework to provide competitive object detection rates in real-time and later used for face detection. This framework is proposed in 2001 by Paul Viola and Michael Jones. Although it can be trained to detect a variety of object classes like human face, animal face, non-human face. It was motivated primarily by the problem of face detection. This algorithm can easily implemented in OpenCV by using in build function `cvHaarDetectObjects()`. The function `cvHaarDetectObjects()` is called as HaarCascade Classifier. This function is not only used for face detection but also it is used for object detection. It is combination Haar Feature and Cascade Classification of Viola-Jones. The Haar Feature is the detection technique is based on the idea of the wavelet template that defines the shape of an object in terms of a subset of the wavelet coefficients of the image. Like Viola and Jones we use a set of features which are reminiscent of Haar Basis functions.

IV. CLASSIFICATION OF DIFFERENT GESTURE DETECTION TECHNIQUE

There are various technique for detection of head tracking and EOG systems for mouse control. Some of them are equipped with sophisticatedly designed systems which are discussed below.

A. Head Movement Tracking System

Using only the movement of the user's head, the movement of the mouse can be controlled, allowing 'The Head Mouse' to be used as an ordinary computer mouse. But problem with this technique is that some disabled people cannot even move their head comfortably, also the system becomes inaccurate if user's forehead is not facing the camera. Eye tracking is a technology in which a camera or imaging system visually tracks some features of the eye and then a computer determines where the user is looking at. Eye tracking technology can be divided into two areas; firstly a remote computer-mounted device, in which an IR camera is mounted on a computer screen, and secondly a head-mounted device, in which an IR camera is placed on user's head. This technique is accurate but expensive.

B. Hand Detection

It is the most difficult problem in building a hand gesture-based interaction system there are several cues that can be used appearance, shape, color, depth, and context. In problems like face detection, the appearance is a very good indicator [7]. Since our paper mainly focuses on gesture recognition, it is not harmful to assume that the hand is the major portion in the image. Since the hand is the major part. It would be easy to segment it by using the segmentation techniques proposed by Albioletal[2]. This method of segmentation is more related to human perception a sour eyes could easily recognize these kin tone from its background. This classical method for segmenting the skin pixels sets upper and lower bound values using which the hand was segmented. It classifies noisy objects as skin; therefore noise removal of the segmented image is absolutely necessary. The images are resized to a fixed resolution before performing the recognition process. In our case, the images were resized to 640 by 480 as that was the resolution of the camera used.

C. Electro-oculography (EOG)

It is a new technology of placing electrodes on user's forehead around the eyes to record eye movements. EOG is a very small electrical potential that can be detected using electrodes. The majority of the people using this setup may have severe cerebral palsy or been born with a congenital brain disorder or suffered traumatic brain injury, for example from automobile or drowning accidents. This technique is adapted because it is inexpensive and accurate. The anatomy of the eye is shown in the Fig. 1. The light entering the pupil, is focused, inverted by the cornea and lens and projected onto the back of the eye (fovea). The fovea defines the center of the eyes with the region of highest visual acuity. The eyes houses seven layers of alternating cells and processes which convert a light signal into a neural signal (transduction). The actual photoreceptors are the rods and cones, but the cells that transmit to the brain are the ganglion cells. Cones provide the focus on fine detail and distinguish color. They require relatively high levels of illumination to operate. Rods, on the other hand, are much more sensitive to light, providing superior capability to detect movement in low levels of illumination. The axons of the ganglion cells make up the

optic nerve, the single route by which information leaves the eye.

V. CONCLUSION

Camera based face detection and tracking makes it easy for human computer interaction. Which makes easy for mouse control? The non-intensive technique makes it comfortable for user. The gesture can be detected and used for the future use of controlling of PC or TV or any other controlled parameters.

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