HAND GESTURE DETECTION AND RECOGNITION USING PYTHON AND OPENCV

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Abstract— **The target of the project 'Hand Gesture and Recognition' is to develop a system which will be used for interfacing between laptop and human victimization hand gesture. This work presents a way for a person's laptop interface through hand gesture recognition that's ready to acknowledge the user hand gesture. The target of this project is to develop a formula for recognition of hand gestures with cheap accuracy. Within which we tend to would like to form a windows-based application for live motion gesture recognition victimization digital camera and open CV library. This project may be a combination of live motion detection and gesture identification. This application uses the digital camera to observe a gesture created by the user to perform basic operations consequently. The user has got to perform a selected gesture. The digital camera captures this and identifies the gesture, acknowledges it (against a collection of familiar gestures) and acts love it.**

Keywords—image processing, hand detection, finger count.

I. INTRODUCTION

In which we tend to want to form a windows-based application for live motion gesture recognition victimization digital camera and open CV library. This project could be a combination of live motion detection and gesture identification. This application uses the digital camera to find a gesture created by the user, and perform basic operations consequently. The user should perform a selected gesture. The digital camera captures this and identifies the gesture, acknowledges it (against a group of identified gestures) and performs the action appreciate it. In which we tend to square measure victimization python language. As we know, the vision-based technology of hand gesture recognition is crucial apart from human-computer interaction (HCI). Within the last decades, the keyboard and mouse play a major role in human-computer interaction. However, due to the fast development of hardware and software systems, new sorts of HCI strategies are needed. Especially, technologies like speech recognition and gesture recognition receive nice attention within the field of HCI. The gesture could be an image of physical behavior or emotional expression. It includes body gestures and hand gestures. It falls into two categories: static gesture and dynamic gesture. For the previous, the posture of the body or the gesture of the hand denotes a symptom. For the latter, the movement of the body or the hand conveys some messages. Gesture will be used as a tool for communication between laptop and human. It's greatly completely different from the standard hardware-based mostly strategies and may accomplish human-computer interaction through gesture recognition. Gesture recognition determines the user intent through the popularity of the gesture or movement of the body, or body components. Within the past decades, several researchers have strive to enhance hand gesture recognition technology. Hand gesture recognition has nice worth in several applications like language recognition, increased reality (virtual reality), language interpreters for the disabled, and mechanism management. In this, the authors find the hand region from input pictures then track and analyze the moving path to acknowledge the America language. Zing, et al. Improve medical service through hand gesture recognition. The HCI recognition system of the intelligent chair includes five hand gestures and three compound states. Their system performs faithfully within the setting of an indoor and outside, and within the condition of lighting amendment. The workflow of hand gesture recognition represented as follows. First, the hand region is detected from the initial pictures

from the input devices. Then, some styles of options square measure extracted to explain hand gestures. Last, the popularity of hand gestures is accomplished by measuring the similarity of the feature knowledge. The input devices providing the initial image data includes a traditional camera, stereo camera, and TOF (time of flight) camera. The stereo camera and TOF camera to boot give the depth data thus it's simple to phase the hand region from the background concerning the depth map. For the traditional camera, the color-sensitive to the lighting condition, and have pointed to square measure combined to robustly find and phase the hand region. Once the region of interest (ROI, the hand region within the case) is detected, options square measure required to be extracted from the ROI region. Color, brightness, and gradient values square measure wide used options. For the popularity of hand gestures, numerous classifiers, as an example, SVM (support vector machine), HMM (hidden Markov model), CRF (conditional random field), and tailored boosting classifier square measure trained to discriminate hand gestures. Though the popularity performance of those refined classifiers are nice, the time price is incredibly high. In this paper, we tend to gift associate economical and effective techniques for hand gesture recognition. The hand region is detected through the background subtraction technique. Once the fingers square measure recognized, the hand gesture will be classified through easy rule classifier. The novelty of the projected technique is listed as follows.

(i) The initial novelty of the projected technique is the hand gesture recognition relies on the results of finger recognition. Our approach solely uses a traditional camera to capture the vision data of the hand gesture in the meantime doesn't like the assistance of the special tape to find hand regions.

(ii) The second advantage of the projected technique is that it's extremely economical and fit period applications.

II. METHODOLOGY

1. In this project, we have to recognize the hand gesture and then count the finger according to the given input and show the sign of ok and best of luck with the help finger as input and display the output according to that. Here is some method to get output from given input.

2. The aim of the project is to develop a hand gesture recognition program that can recognize the different gestures of hands. The python script detects an object of specified object color from the webcam video feed.

3. Using OpenCV library for Vision tasks and HSV color space for detecting an object of given specific color. The role of the camera is to capture the image of the hand in the frame and then convert the BGR color to HSV color.

4. Then the cosine formula is used to find the angle between the fingers. The different gestures are differentiated on the basis of the contour and the convex hull area ratio and also on the basis of the angle between the finger of the hand shown inside the frame (if the angle is smaller than ninety degrees than it is considered as a defect). The number of fingers is equal to the number of defects plus one in it.

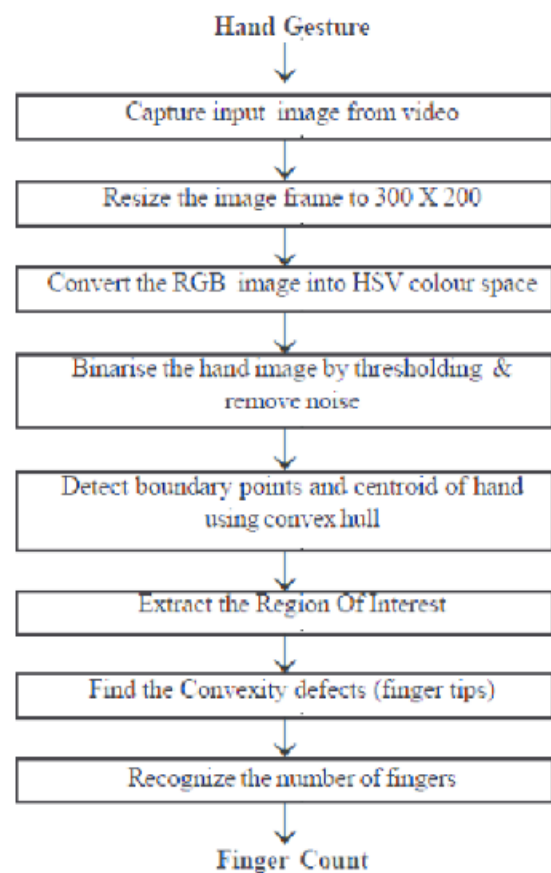5. The goal of this program is to recognize the gesture from the given input stream.

Hand Gesture

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| Capture input image from video |

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| Resize the image frame to 300 X 200 |

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| Convert the RGB image into HSV colour space |

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| Binarise the hand image by thresholding & remove noise |

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| Detect boundary points and centroid of hand using convex hull |

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| Extract the Region Of Interest |

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| Find the Convexity defects (finger tips) |

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| Recognize the number of fingers |

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Finger Count

FIG.1 REPRESENT THE FLOW OF APPLICATION WORK

III. ACKNOWLEDGMENT

IV. RESULT

1. **Zero:** In which number of defect is null and the output is zero.
2. **One:** In which also the number of defect is null and the output is one. It comes under the else condition and its output depends on its area.
3. **Best of Luck: -** In which number of defect is null and the output is best of luck. It also comes under the else condition and its output depends on its area.
4. **Two:** In which number of defect is one and add one so that the output is two.
5. **Three:** In which number of defect is two and, add one so that the output is three.
6. **Four:** In which number of defect is Three and add one so that the output is four.
7. **Five:** In which number of defect is four and add one so that the output is five.
8. **Then ok:** In which number of defect is two and add one so that the output is ok.

V. CONCLUSION

The system is built to recognize gestures and trigger events based on it. It will recognize the human hand using an open CV library. We can count the number of fingers in our hand, best of luck and ok sign according to the given input. It converts BGR color into HSV color. This can also be used to set a numeric password for a lock-in computer. The result shows a significant high accuracy. Currently, the system is in two dimensions we also plan to implement in three-dimension making depth as the third parameter.

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