

HAND GESTURE RECOGNITION FOR CONTROLLING THE BRIGHTNESS AND VOLUME OF THE COMPUTER

Report

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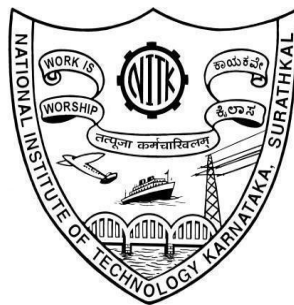
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Abstract—With the development of automation and the improvement of technologies, Gesture recognition is becoming more and more popular. Hand gesture recognition system received great attention in the recent few years because of its manifoldness applications and the ability to interact with machine efficiently through human computer interaction. Gesture recognition helps computers to understand human body language. This helps to build a more potent link between humans and machines, rather than just the basic text user interfaces or graphical user interfaces (GUIs).

I. INTRODUCTION

Hand gestures are spontaneous and powerful communication mode for Human Computer Interaction (HCI). Traditional input devices are available for interaction with computer, such as keyboard, mouse, joystick as well as touch screen; however they do not provide natural interface. The proposed system will consist of desktop or laptop interface, the hand gesture may be used by the users may need to wear any data glove, or may use the web camera for capturing the hand image.

The history of hand gesture recognition for computer control started with the invention of glove-based control interfaces. Researchers realized that gestures inspired by sign language can be used to offer simple commands for a computer interface. This gradually evolved with the development of much accurate accelerometers, infrared cameras and even fibre-optic bend-sensors (optical goniometers). Some of those developments in glove based systems eventually offered the ability to realize computer vision based recognition without any sensors attached to the glove. These are the colored gloves or gloves that offer unique colors for finger tracking ability that would be discussed here on computer vision based gesture recognition. Over past 25 years, this evolution has resulted in many successful products that offer total wireless connection with least resistance to the wearer.

Gesture Recognition pertains to recognizing meaningful ex-

pressions of motion by a human, involving the hands, arms, face, head, and/or body. It is of utmost importance in designing an intelligent and efficient human-computer interface. The applications of gesture recognition are manifold, ranging from sign language through medical rehabilitation, monitoring patients or elder people, surveillance systems, sports gesture analysis, human behaviour analysis etc., to virtual reality.

With widespread development in Automation and Technology in the world, the importance of the Gesture Recognition Systems have become more popular. Many gesture detection systems have been applied successfully to different fields with some good results. The reason for choosing hand as the gesture detection input in controlling the Brightness and Volume is, the hand is more flexible than any of the body part and more no gestures that a hand can be generated than that can be generated by the head or face.

It's an efficient, convenient and easy to use. Users with a decent camera of the computer can use its functions efficiently. At the same time, a better solution is needed to make the Working distance of this to more. Because its detected and working for a short-range distances. Its very inaccurate for medium-range distances also. A primary goal of gesture recognition is to create a system which can identify specific human gestures and use them to convey information for device control and by implementing real time gestures recognition a user can control a computer by doing a specific gesture in front of a video camera linked to a computer. In this project we will develop a hand gesture volume control system with the help of OpenCV module. Here the system can be operated using hand gestures without using keyboard and mouse.

II. LITERATURE SURVEY

For instance, a research paper titled ' HAND GESTURE RECOGNITION: A LITERATURE REVIEW ' by Rafiqul Zaman Khan and Noor Adnan Ibrahim published in July 2012,

published by International Journal of Artificial Intelligence and Applications (IJAIA) was analyzed. This article gives a basic idea and overview to the hand gesture recognition and image processing techniques. It gave a basic overview of the Features extraction and image pre-processing. We also got an idea of what are the hand landmarks and their respective points to use it for the controlling the brightness and volume. We got to know what each library we are including will be doing what exactly in the control. It gave a basic clear understanding of how we approach this problem statement and solve it out. It also gave a basic flow of how this process will be running and what all modules it will be using for the working.

III. PROBLEM STATEMENT

In this era of technological revolution, where everything is becoming automated, the physical touch between the system and the user is also becoming redundant. The concept of Gesture Recognition using various methods has widely been studied. This project aims to provide comprehensive research on the topic of Hand Recognition using python by employing the frameworks of OpenCV libraries.

The main aim of this project is to provide the users with a way to operate their system in a more efficient and appealing manner. A hand gesture recognition system requires only a webcam can give way to: many more such works making this more efficient with days to come. Develop an efficient Machine learning model which analyses the previous year sales pattern and build sales prediction model.

IV. METHODOLOGY

A. Software requirements

Software used to execute this project is

- Python Python is an interpreted, high-level, general-purpose programming language. Created by Guido van Rossum and first released in 1991. It supports multiple programming paradigms, including structured (particularly, procedural), object-oriented, and functional programming.
- OpenCV OpenCV (Open Source Computer Vision Library) is a library of programming functions mainly aimed at realtime computer vision. Originally developed by Intel, it was later supported by Willow Garage then Itself (which was later acquired by Intel). The library is cross-platform and free for use under the open-source BSD license.
- Numpy Numpy is a general-purpose array-processing package. It provides a high-performance multidimensional array object, and tools for working with these arrays.
- Mediapipe Mediapipe is graph based framework for building multimodel (Video audio and sensor) applied machine learning pipelines. Mediapipe also facilitates the deployment of machine learning technology into demos and applications on a wide variety of different hardware platforms (e.g Android, iOS, workstations).

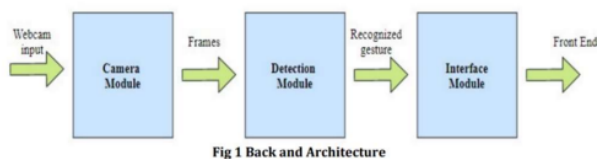


Fig. 1. Overflow

B. The Overview of the method

The overview of the hand gesture recognition is described in Fig. . First, the hand is detected using the background subtraction method and the result of hand detection is transformed to a binary image. Then, the fingers and palm are segmented so as to facilitate the finger recognition. Moreover, the fingers are detected and recognized. Last, hand gestures are recognized using a simple rule classifier.

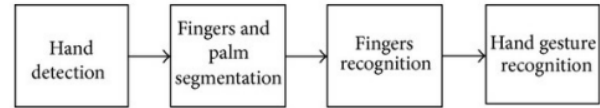


Fig. 2. workflow

C. Hand Detection

The original images used for hand gesture recognition in the work are demonstrated in Figure 2. These images are captured with a normal camera. These hand images are taken under the same condition. The background of these images is identical. So, it is easy and effective to detect the hand region from the original image using the background subtraction method. However, in some cases, there are other moving objects included in the result of background subtraction. The skin color can be used to discriminate the hand region from the other moving objects.

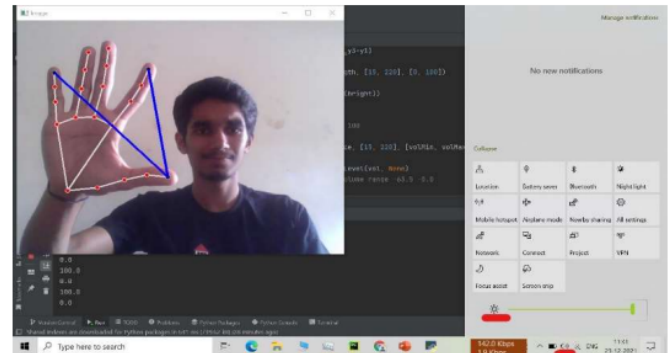


Fig. 3. marking the distances

D. Fingers and Palm Segmentation

The output of the hand detection is a binary image in which the white pixels are the members of the hand region, while the black pixels belong to the background. An example of the hand detection result is shown in Figure 4. Then, the following procedure is implemented on the binary hand image to segment the fingers and palm. With the help of the palm mask, fingers and the palm can be segmented easily. The part of the hand that is covered by the palm mask is the palm, while the other parts of the hand are fingers. A segmentation result of fingers and the palm is shown in Figure .

- We have used the media pipe framework to detect the hand gestures.
- We also have used the OpenCV library for image processing.
- It will detect hand landmarks.
- Our python code will be calculating the distance between thumb and the index fingers and giving the respective brightness of the computer.

TABLE I
SUMMARY OF LITERATURE SURVEY

Paper Title	Authors	Description
Hand Gesture Recognition: A Survey	J.Yashas, G.Shivakumar	Survey of recent work related to hand gesture is done here
Sign Language Recognition Using Two-Stream Convolutional Neural Networks with Wi-Fi Signals	Chien-Cheng Lee, Zhongjian Gao	Sign Language detection
The research and design of Smart mobile robotic arm based on gesture controlled	Hongli He, Yongping Dan	Robotic Smart Car control(speed control, direction control, start and stop)
Hand-Gesture-Based Touchless Exploration of Medical Images with Leap Motion Controller	Safa Ameur; Anouar Ben Khalifa; Med Salim Bouhlef	Medical Images control(image selection, contrast control, zooming in and out, image navigation etc)

- Maps the distance of the thumb tip and the index finger tip with the brightness range.

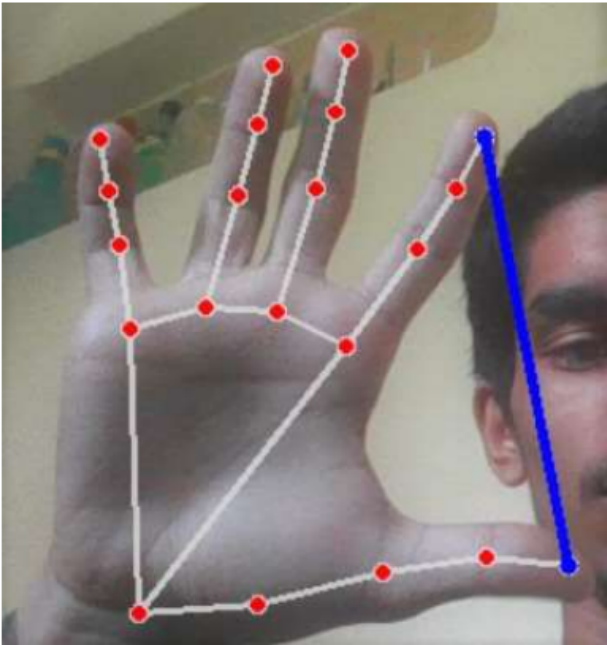


Fig. 4. marking the distances

V. OUTCOMES

- After running the python code, we will be getting the interface displaying webcam.
- As the distance between the fingers decrease, the brightness of the computer decreases and viseversa.

VI. CONCLUSION AND FUTURE WORK

- Gesture recognition helps computers to understand human body language. This helps to build a more potent link between humans and machines, rather than just the basic text user interfaces or graphical user interfaces (GUIs).
- In this project for gesture recognition, The fingers motions are read by computer camera. The computer then makes use of this data as input to handle applications.
- In this Python OpenCV Project also includes a downloadable source code for free.

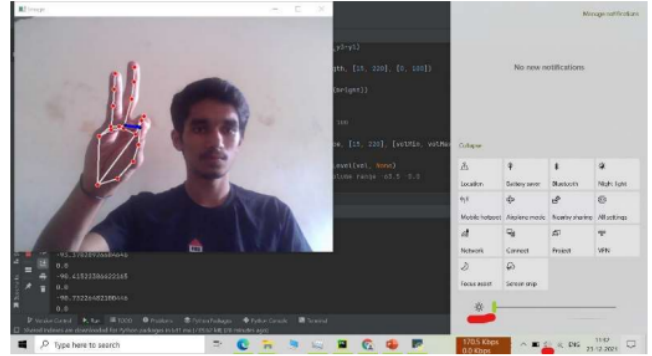


Fig. 5. change in brightness

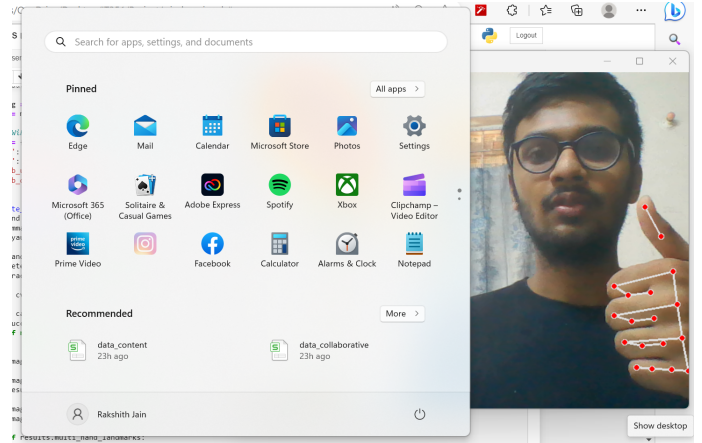


Fig. 6. Windows Start using Thumbs Up

VII. REFERENCES

We have used the following references, apart from our base paper, for our paper:-

- [1] S. M. M. Roomi, R. J. Priya, and H. Jayalakshmi 2010 Hand Gesture Recognition for HumanComputer Interaction (J. Comput. Science vol. 6) no. 9 pp. 1002– 1007.
- [2] S. N. Karishma and V. Lathasree 2014 Fusion of Skin Color Detection and Background Subtraction for Hand Gesture Segmentation (International Journal of Engineering Research and Technology) vol. 3 no 1 pp 13– 18.

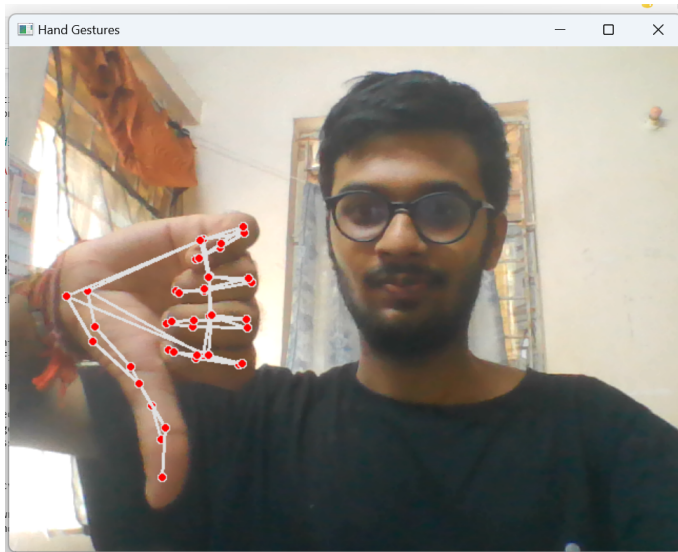


Fig. 7. Windows Start Menu closed using Thumbs Down

[3] A. Dhawan and V. Honrao 2013 Implementation of Hand Detection based Techniques for Human Computer Interaction (International Journal of Computer Applications) vol. 72 no. 17 pp 6– 13.

[4] C. Von Hardenberg and F. Bérard 2001 Bare-hand human-computer interaction (Proceedings of the 2001 workshop on Perceptive user interfaces) pp 1– 8.