

Virtually Controlling The Computer and Media Player Using Hand Gesture and Voice Assistant

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Abstract

Gesture Controlled Virtual Mouse makes human computer interaction simple by making use of Hand Gestures and Voice Commands. The computer requires almost no direct contact. All i/o operations can be virtually controlled by using static and dynamic hand gestures along with a voice assistant. This project makes use of the state-of-art Machine Learning and Computer Vision algorithms to recognize hand gestures and voice commands, which works smoothly without any additional hardware requirements. It leverages models such as CNN implemented by [MediaPipe](#) running on top of pybind11. It consists of two modules: One which works direct on hands by making use of Media Pipe Hand detection, and other which makes use of Gloves of any uniform color. Currently it works on Windows platform.

Key Words: Virtual Mouse, Hand Gestures, Image capture, Processing, Masking, Voice Commands, Hand Tracking, Voice Assistant

1.INTRODUCTION

The most efficient and expressive way of human communication is through hand gesture. It is pretty much expressive such that the Blind people could understand it. In this work, real-time hand gesture system is proposed without using extra products it is done by using hand tracking. Experimental setup of the system uses fixed position low-cost web camera high definition recording and voice recognition mike feature mounted on the top of monitor of computer or a fixed camera on a laptop .This work is divided into four stages such as image processing, region extraction, feature extraction, Matching. The virtual mouse work on four phase first phase recognize the hand through the webcam and track the finger for the next process second phase work like recognition command and third phase belongs to execution of command final phase is the another features which means voice assistant controlling the computer using voice command also possible is a also work like a pipeline. where the output of the one process is used as a input for other process.

2. EXISTING SYSTEM

The existing system consists of the generic mouse and track pad system of monitor controlling and the non-availability of a hand gesture system without using features like “data gloves”. The remote accessing of monitor screen using the hand gesture is unavailable. Even-though it is largely trying to implement the scope is simply restricted in the field of virtual mouse. The existing virtual mouse control system consists of the simple mouse operations using the hand recognition system, where we could perform the basic mouse operation like mouse pointer control, left click, right click, drag etc. The further use of the hand recognition is not been made use of. Even-though there are a number of systems which are used for hand recognition, the system they made used is the static hand recognition which is simply recognition of the shape made by hand and by defining an action for each shape made, which is limited to a number of defined actions and a large amount of confusion

3. PROPOSED SYSTEM

Using the current system even-though there are a number of quick access methods available for the hand and mouse gesture for the laptops, using our project we could make use of the laptop or web-cam and by recognizing the hand gesture we could control mouse and perform basic operations like mouse pointer controlling, select and deselect using left click, and a quick access feature for file transfer between the systems connected via network LAN cable. The project done is a “Zero Cost” hand recognition system for laptops, which uses simple algorithms to determine the hand, hand movements and by assigning an action for each movement[2]. But we have mainly concentrated on the mouse pointing and clicking actions along with an action for the file transfer between connected systems by hand action and the movements. The system we are implementing which is been written in python code be much more responsive and is easily implemented since python is a simple language and is platform independent with a flexibility and is portable which is desirable in creating a program which is focused in such an aim for creating a Virtual Mouse and Hand Recognition system. The system be much more extendable by defining actions for the hand movement for doing a specific action. It could be further modified to any further extent by implementing such actions for the set of hand gestures, the scope is restricted by your imagination we can also control the media player by using different hand gesture and the second feature is voice assistant we can also gives the command to the computer like google search,show date,find navigation,copy and paste etc..

4. USE OF PROPOSED WORK

This Virtual Mouse Hand Recognition application uses a finger without the additional requirement of the hardware for the controlling of the cursor using simple gestures and hand control. This is done using vision based hand gesture recognition with inputs from a webcam.

LITERATURE SURVEY

1. Angel, Neethu.P.S: The hand tracking has to be specifically adapted for each user. This system was implemented only in a restricted to the indoor environment. This system is prone to noise and sensitive to the change of the illumination.
2. J.L. Raheja, A. Chaudhary, K. Singal: Proposed using hsv algorithm but this uses special sensor kinect to capture image and processes it. User has to spend more money for the sensor.
3. Abhik Banerjee, Abhirup Ghosh: The presence of other coloured objects in the background might cause the system to give an erroneous response. If the resolution of the camera is too high then the system might run slow

SYSTEM REQUIREMENTS

Hardware Requirements:

System : Pentium IV 2.4 Ghz

Webcam : Peripheral of at least 30 frames/second

Resolution: 640*480

Monitor : 15 VGA Color.

Software Requirements:

Operating System : Windows 7 and Above

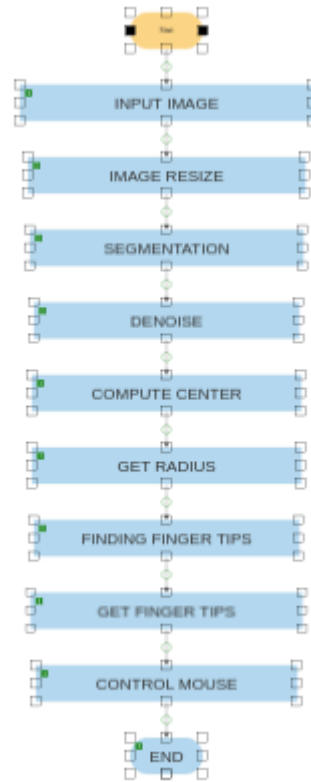
Coding Language : Python, OpenCV, MediaPipe

Tool Kit : Image Acquisition and Image Processing

IDE : Pycharm and Anaconda

FLOW MODEL

The flow model shows the working of the system with different functions. The system will first take the input of image from the web camera. It will also convert the video captured from the web camera and convert them into image. It will then resize the input image so that the segmentation can take place to calibrate the points on the image. It will de noise from the image and start showing the center radius of the image of the desired color. The radius points will be centered on the image of the color on the finger tip. The finger tips will now start moving according to the movement of the fingers. It will detect the points of the radius. We can now manipulate the cursor with fingertip movement



ALGORITHM USED

A. Gesture Tracking

For the characteristic of area of hand signals and hand development, the Media Pipe system is utilized, and Open-CV library is utilized for PC machine vision the standard purposes the AI contemplations to keep and see the hand developments and fingertip.

B. What is Media-Pipe?

Media-Pipe is a system that is utilized for applying in a different AI pipeline, partner with an open source structure of Google. The Media-Pipe system is useful for across stage improvement since the edge work is made abuse the measurement data. The Media-Pipe structure is multi-modular, any place this system is frequently applied to differed sounds and recordings .The Media-Pipe structure is utilized by the engineer for building and breaking down the frameworks through diagrams, and it conjointly been utilized for fostering the frameworks for the machine reason.

The means worried inside the framework that utilizes Media- Pipe square measure administrated inside the line setup. The The pipeline made will run in various stages allowing quantity friability in portable and work areas. The Media-Pipe structure is predicated on three rudimentary parts, they're execution investigation, system for recovering identifier data, and a gathering of parts that square measure known as mini- computers and those they square measure reusable. A pipeline might be a chart that comprises of parts known as number cruncher any place each mini-computer is associated by streams during which the parcels of information course through.

The number cruncher and streams joined produce an information stream outline; the diagram is made with Media-Pipe any place each hub might be an adding machine and thus the hubs square measure associated by stream.

Single-shot is utilized for location and perceiving a finger and palm progressively exploitation journal PC net cam. Finder framework is utilized by the Media Pipe, in the Hand discovery module of python, its style for a finger and hand recognition model because of it's easy to mentor hand. The planed model of hand reason mark comprises of 21 joint reason and co-ordinates inside the hand

C. Open-CV MODULE

PC vision is an interaction by which we can comprehend the pictures and recordings how they are put away and how we can control and recover information from them. PC Vision is the base or generally utilized for Artificial Intelligence. The primary Open- CV form was 1.0. Open-CV is delivered under a BSD permit and thus it's free for both scholar and business use. It has C++, C, Python and Java connection points and supports Windows, Linux, Mac OS, iOS and Android. At the point when Open-CV was planned the fundamental center was continuous applications for computational productivity.

Implementation

Camera Used in the Virtual Gesture Mouse project

Open-CV is python vision library that contains Associate in the organized AI virtual mouse system depends upon the edges that are gotten by the camera in Associate in nursing passing PC. Pictures can be conveyed in concealing layered with 3 channels (Blue, Green, and Red), Grayscale with pixel values fluctuating from 0 (dull) to 255 (white), and twofold portraying dim or white characteristics (0 or 1) specifically.

Moving Hand through the Window using Rectangular Area

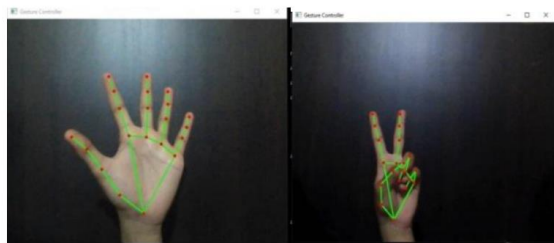
The AI virtual mouse framework utilizes the instructive algorithmic rule, and it changes over the co-ordinates of tip from the camera screen to the pc window full screen for the mouse. whenever the hands unit saw and keeping in mind that we've missing to see that finger is up for topic the specific mouse perform, Associate in Nursing rectangular box is attracted concerning the pc window at ranges the camera locale any spot we've a penchant to will every now and again move all through the window plan the mouse pointer

Detect the Finger tips & doing the Mouse Cursor Movements

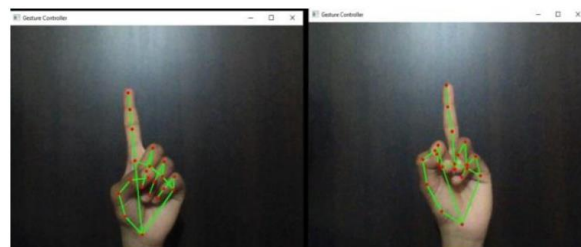
In this framework, AI mouse is police evaluation that finger is up misleading the spot co-ordinate of the particular finger that it'll found abuse the Media-Pipe and hence the singular bits of the fingers that region unit up, and according to that, the authentic mouse perform is played out its assignments.

Implementation

Hand Gesture



Mouse accuracy



voice assistant

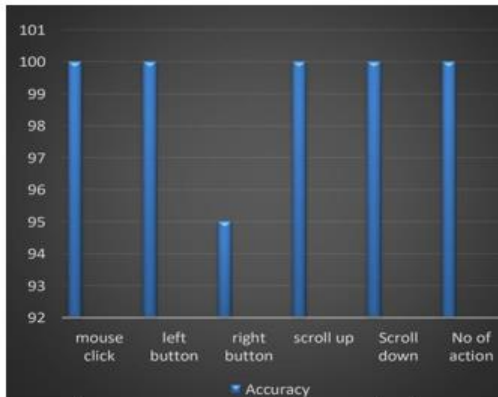
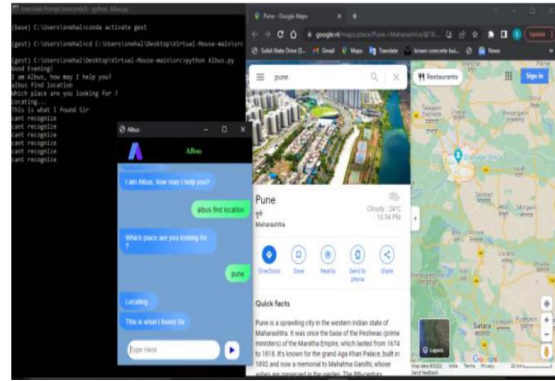


Fig 9: Accuracy Graph of Mouse functions



CONCLUSION

In this paper we have successfully implemented the cursor movement using the hand gesture. This is a project which uses the whole new technology making the human computer interaction in an easy and friendly way with a very minimal project cost.

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