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Virtual Mouse Using Hand Gesture

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ABSTRACT: This paper proposes a way to control action on an electronic screen with bare hands. Actions like clicking, scrolling, dragging will be performed using different hand gestures. hardware webcam as an input device and software OpenCV and Python are required to implement the proposed system. Hand gestures are a natural and effortless way of communication.

KEYWORDS: Human Computer interaction, Virtual Mouse, Hand Gesture Recognition, Computer Vision, OpenCV

I. INTRODUCTION

As for human's hand gestures are the most efficient and expressive way for communication and the computer mouse helps us to interact with the computer with whatever is being pointed. Therefore various types of mouse are being developed to improve the accuracy but being a hardware device no matter how much accuracy of mouse increases, there will always be limitations. so as technology has advanced everything has become virtualized so then why not apply it to machines. The proposed system works on real-time hand gestures. Initially, hand gesture is captured from the webcam then image-processing, region extraction and feature matching is done. By this paper, we aim to create a cost-free virtual mouse software for devices with web-cam support.

II. PROBLEM STATEMENT

Our proposed system aims to design a virtual mouse that detects hand gestures patterns instead of a physical mouse. Basically, we use hand gestures for detection which are captured by a webcam. Here, hand fingers act as an object which the webcam senses. The camera is positioned such that it recognizes the moment of hand and performs the operations of a mouse. The proposed virtual mouse can be used to overcome problems in the real world such as situations where there is no space to use a physical mouse and also for the persons who have problems in their hands and are incapable of handling a physical mouse.

III. LITERATURE REVIEW

REFERENCE PAPER	AUTHOR	YEAR	TECHNOLOGY USED	RESULTS
INTERNATIONAL JOURNAL ON ARTIFICIAL INTELLIGENCE	PAUL ROBERTSON ROBERT LADDAGA VAN KLEEK	2012	NEURAL NETWORK MATLAB	RECOGNIZE HAND GESTURES BY APPLYING GAUSSIAN DISTRIBUTION ON SEGMENTED IMAGE
HAND GESTURE RECOGNITION USING DEPTH IMAGES	ROBIN MURPHY JESUS SUAREZ	2014	KINNECT OPENNI LIBRARIES	HAND SEGMENT IS ACCOMPLISHED USING DEPTH THRESHOLDING
REAL TIME FINGER TRACKING FOR GESTURE RECOGNITION. USING OPENCV	RUCHI GAURAV PREMANAND KADBE	2015	ADABOOST CONVEX HULL ALGORITHM	CONTOUR IS VERY IMPORTANT TO DISCRIMINATE TWO DIFFERENT GESTURES

IV. OBJECTIVE

To find out virtual mouse using hand gesture recognition allows the user to control the mouse with the help of hand gestures to check systems webcam for tracking hand gestures. to control computers and other electronic devices with gestures rather than pointing and clicking a mouse. to check packages from OpenCV called video capture which is used to capture data from a live video are able to use for gesture recognition.

V. EXISTING SYSTEM

As currently, Computer Mouse is the best input device that helps to interact with Computer AI. There are different types of mouse in the current trend, there's the mechanical mouse that consists of a single rubber ball that can rotate in any direction and the movement is determined by the motion of the ball. Optical Mouse makes use of a led sensor to detect the motion of the pointer. After some time the laser mouse was introduced to improve the accuracy, efficiency and to overcome the drawbacks.

VI. PROPOSED SYSTEM

Using our project, we could make use of a webcam and by recognizing the hand gesture we could control the mouse and perform basic operations like mouse pointer controlling, select and deselect using left click, and many more. The project done is a "Zero Cost" hand recognition system, which uses simple algorithms to determine hand movements. The proposed system which we are implementing has been written in python programming language. For easy implementation and more responsiveness, we have used python since it is a simple language, platform-independent, and portable which is desirable for creating a program that is focused on the aim of creating a Virtual Mouse and Hand Recognition system.

VII. ALGORITHM

The Algorithm Used for Hand Tracking

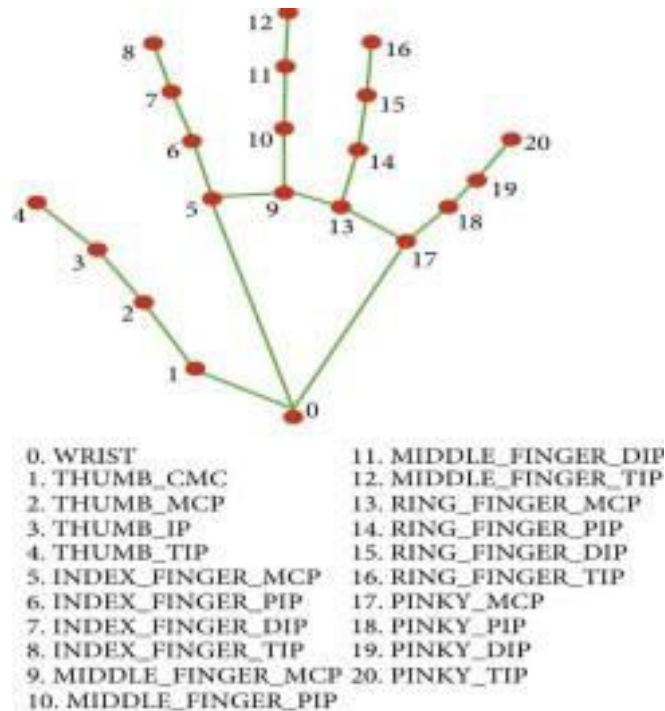
For detecting the hand gestures and for detecting the hand tip Mediapipe library is used, and for capturing the real-time video we made use of the OpenCV library. the Mediapipe library makes use of various machine learning algorithms to track and recognize the hand tip and hand gestures.

Mediapipe :

Mediapipe which was developed by Google is a framework that is used for application in a machine learning pipeline. Mediapipe is an open-source framework developed by Google. Mediapipe framework is built using the time series data hence it is useful for cross-platform development. Mediapipe is used by developers for building and analysing the systems with the help of graphs. To make use of the Mediapipe framework various steps are involved that are carried out in the pipeline configuration by the system. The pipeline implemented is highly scalable as it can run on various devices like mobile and desktop. Mediapipe framework is based on a total of three fundamentals; they are evaluated on the basis of performance, a framework for retrieving data from sensors, and a collection of various components called calculators.

The pipeline is a graph that contains various components which are called calculators, wherein each calculator is connected by streams through which the packet of data flows through. The streams and calculators together create a data-flow diagram.

The model that is used for detecting and recognizing a hand or palm is known as a Single-shot Detector. The Mediapipe Framework makes use of a Single-shot Detector model for detecting and recognizing a hand or palm in real-time. We have trained Mediapipe for a palm detection model inside the hand tracking module because it is easy to train palms. The diagram below shows a model of a hand landmark consisting of locating 21 joint or knuckle coordinates in the hand region.



OpenCV :

OpenCV is the computer vision library that makes use of various image processing algorithms for object detection. OpenCV is a library present in python which is used for real time image and video capturing and also for image and video processing.

VIII. CONCLUSION

Gesture recognition enables humans to interface with machines in a more natural way. This technology has wide application in the field of gaming, computer graphics, and reality. A virtual mouse can be used for virtual reality kit and virtual brush and even can be used to help patients who don't have control of their limbs. This proposed system aims to demonstrate the potential in simplifying user interaction with personal computers and hardware systems.

IX. FUTURE SCOPE

Since gestures can be in any form, therefore, eye tracking can be used to control the mouse pointer with the help of our eyes. It can easily replace mouse in the future. In the future, we plan to add more features such as shrinking of windows by using more hand gestures.

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