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VIRTUAL PAINT AND VOLUME CONTROL USING HAND GESTURE

Priyansh Thakur[1*], Aakanksha Agrawal[2]

[1] *Student, Computer Science and Engineering (AIML), Shri Shankaracharya Professional University*
[2]*Professor, Computer Science and Engineering, Shri Shankaracharya Professional University*

Abstract

In software, we customarily use painting tools that are accessible with gadgets used for pointing, such as a keyboard and mouse. These devices have certain advantages and disadvantages. Beyond that, they also have some limitations which cannot be simply expressed as disadvantages. Fundamentally, we are focusing on covering more users under the same software so that it can be used efficiently. As we are pointing using hand gestures, it has some uniqueness and it increases the usability of the software we are creating. Using hand gestures and volume control for virtual paint with different actions, it will draw different shapes on the paint screen. This system only requires a PC camera or webcam and hand gestures. For identifying the images, OpenCV is used and gesture recognition is performed using Media Pipe. Gesture recognition is an emerging technology field. We create a natural UI for interacting with MSPAINT on a Windows machine. The input will be hand gestures of the user which will be processed using the camera to give commands to the MSPAINT application. The paint application becomes virtual because the drawing occurs in the air through gestures and volume control. The virtual paint screen is created with the help of a user interface. The webcam is used to capture the hand gestures to achieve fast and stable gesture recognition in real time without any distance limitations.

Keywords: *Hand Gesture Recognition, Computer Vision, OpenCV, Media Pipe, Volume Control, Human Computer Interaction (HCI), Object Detection.*

1. Introduction

Almost everyone is affected by depression, be it Family/friends or even us. According to The World Health Organization, there are an estimated 280 million people worldwide who are currently experiencing depression. The COVID-19 Pandemic created an environment of added stress for these individuals because new cases of anxiety and depression increased by about 25% from the Pandemic alone. For many people, isolation, fear about their health, financial stressors, and disruption of their routine created an increase in stress due to depression.

The reality is that many of those who are suffering from depression do not get help. Many people do not seek help because of the stigma associated with having a mental illness, do not know where to go or have limited resources to help them with mental health services. Because of this, many individuals suffering from depression will continue to do so without help. Early intervention and early detection of depression will need to be enhanced.

2. Literature Survey

The following task shows a review of different proposed hand gesture and computer-based approaches to eliminate hardware interfaces at a lower cost.

Paint Using Hand Gesture: Machine Learning Approach

They discussed a gesture-based paint toolkit which has six gestures to draw lines and circles. This paper explains different methods through which paint toolkit accuracy can be achieved. To achieve higher accuracy compared to other approaches, they used a machine learning approach. According to the survey, the machine learning approach gives a 96% accurate result.

They used a Haar-like classifier to track the hands and also used edge detection for calculating the boundary value of the object in front of the camera. They implemented this using simple hand gestures and the webcam of a PC or desktop. The Haar-like classifier compares the captured image with the gesture present in the dataset. If a match is found, the corresponding action is performed on the screen.

Separated hands are captured and the classifier is used to separate them from the background image and other body parts. For color selection, they used a transformation method such as grayscale conversion when the selected color is black and white or in RGB color format. For color detection, they separated the color set used to analyze the color and draw colored shapes on the screen.

Gloved and Free Hand Tracking based Hand Gesture Recognition

They discussed real-time hand gesture recognition. It reports robust and efficient hand tracking and segmentation algorithms where a new method based on wearing gloves on the hand is used.Another tracking algorithm is also discussed which is based on the skin color of the palm area, known as free-hand tracking. A comparison between the two tracking methods is presented in this paper. A fingertip can be segmented for proper tracking even with the full hand present.

Waving goodbye is considered a gesture. Pressing a key on a keyboard is not a gesture because the movement of a finger while pressing a key is neither observed nor significant. In the gloved hand method, the values stored are dynamic for recognition. According to the paper, using gloves makes it difficult to select colors by detecting the glove color worn by the user. Free-hand tracking reduces the cost and complexity of the algorithm.

3. Methodology / Approach

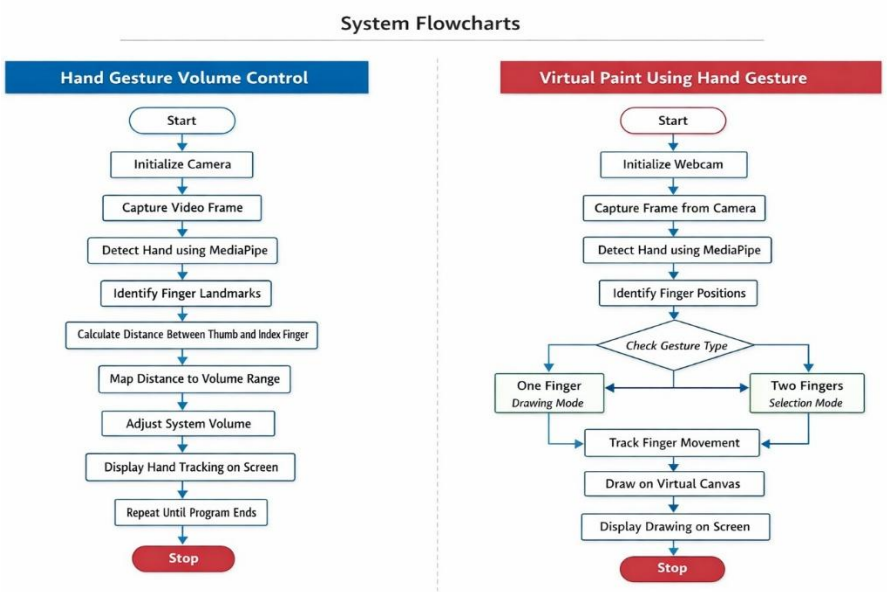
Hand signal acknowledgment and following are dealt with by the MediaPipe system, while PC vision is taken care of by the OpenCV library. To follow and perceive hand developments and hand tips, the program utilizes AI thoughts. 3.1 MediaPipe MediaPipe is a Google open-source structure that was at first delivered \in 2019. MediaPipe has some implicit PC vision and AI abilities. An AI deduction pipeline is executed utilizing MediaPipe. ML deduction is the method involved with running genuine data of interest. The MediaPipe structure is utilized to settle AI challenges that for the most part incorporate video and sound web based. MediaPipe is multimodal and stage free. Thus, cross-stage applications are made utilizing the structure. Face discovery, multi-hand following, hair division, object recognition, 1and following are only a couple of the applications that MediaPipe brings to

the table. MediaPipe is a system with an elevated degree of loyalty. Low inertness execution is given through the MediaPipe structure.

It's responsible for synchronizing time-series information. The MediaPipe structure has been utilized to plan and break down frameworks utilizing charts, as well as to foster frameworks for application purposes. In the pipeline arrangement, the framework's all's means are completed. The pipeline that was planned can run on different stages and can scale across work areas and cell phones. Execution assessment, sensor information recovery, and an assortment of parts are all essential for the MediaPipe structure. Adding machines are the pieces of the framework.

Flow chart:

In this AI application, we have created code by utilizing Python programming language alongside OpenCV library. Fundamental thought behind this calculation is to utilize live feed from camera and cycle each edge. Be that as it may, the calculations will be executed on characterized ROI (region of interest).



4. *Result*

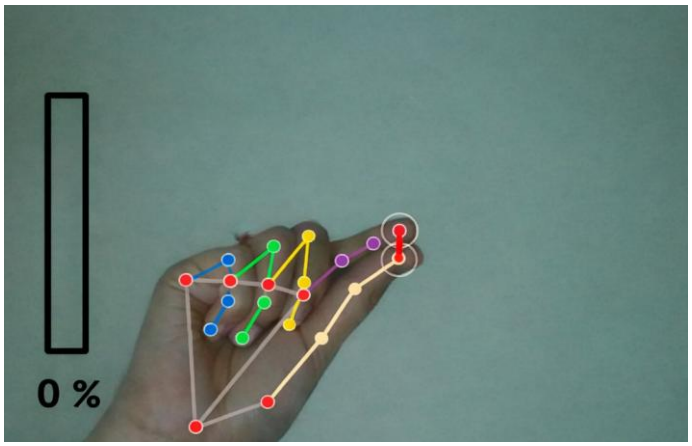


Fig: Volume Control

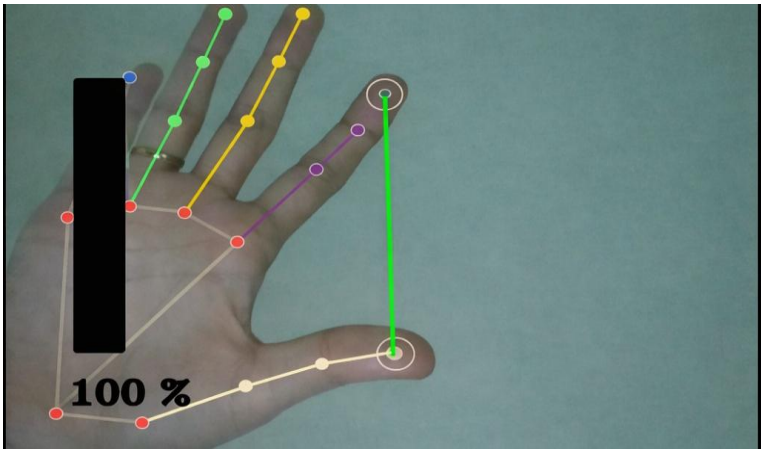


Fig: Volume Control

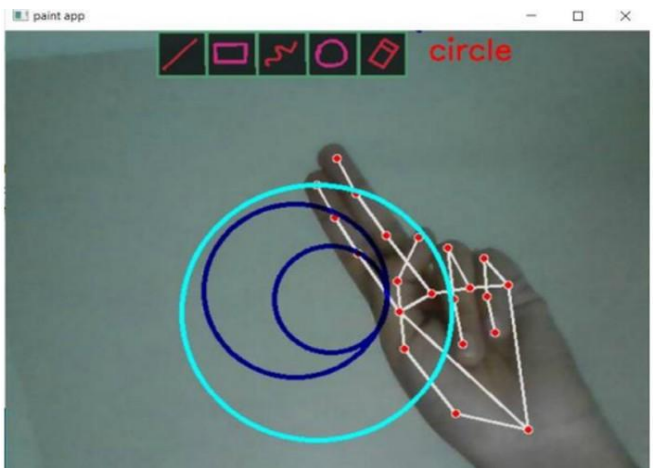


Fig: Virtual Paint using Hand Gestures

Fig: Virtual Paint using Hand Gestures

5. Conclusion

The project introduced a program that permitted client to perform hand signals for simple programming control. A dream-based hand Gesture framework that requires no unique markers or gloves and can work continuously on a item PC with minimal expense cameras. In particular, the framework can follow the tip places of the counters and pointer for each hand. The inspiration for this hand Gesture was a work area-based volume control framework in which a client has some control over volume and cursor route in real time utilizing normal hand movements.

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