



Webcam Based Painting for Canvas Applications Using Opencv and Numpy

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ABSTRACT –

On displays of electronic devices, people can write, draw, and create various structures, symbols, works of art, and other things. By typing, writing by hand, or even just one tap. Nevertheless, for making it simpler to use and easier to express your emotions by using only your finger movements. We will use Python and OpenCV to develop an air canvas in this project because we are aware that painters frequently use canvas when making their works. A "air canvas" digital drawing uses free-hand sketching with a coloured object. Writing in the air has emerged as one of the most challenging and fascinating research subjects in the domains of pattern recognition and image processing in recent years. All you need to do is think about what you want to demonstrate or express, move the object to symbolise that, and that's all there is to it. In a variety of situations, it can improve human-machine interaction and considerably progress an automation process. New strategies and techniques that would hasten processing while enhancing recognition in numerous studies. The task of object tracking is regarded as vital in computer vision.

Object tracking systems are becoming more and more common as a result of the advancement of faster computers, the accessibility of affordable, high-quality video camera equipment, and the requirements for automated video analysis. Identification of the item, tracking its motions from frame to frame, and behaviour analysis of the objects are three steps of the video analysis approach. The four primary considerations are selecting a suitable object representation, picking tracking features, finding objects, and following them.

Numerous practical applications, such that autonomous surveillance, video indexing, and navigation of vehicle, depend upon object tracking algorithms. The project will close this gap by creating a motion-into-text converter that might be used as software for smart devices that support writing in the air. This project is a testimony to sloppy hand motions. It will follow the path of the colored object using computer vision.

Keywords: Canvas, OpenCV, python, computer vision, mask detection, air button, colored object, character recognition.

1. INTRODUCTION

In the age of the internet, digital art is displacing the traditional form of writing. Digital media are used in artistic expression and communication, which is referred to as digital art. One of the defining features of the digital manifestation is its reliance on contemporary science and technology. Anything created before digital art is considered traditional art. From the perspective of the audience, it can be simply split into visual art, audio art, audio-visual art, and audio-visual creative art, which encompasses music, dance, theatre, painting, sculpture, and other forms of art. There are connections between traditional and digital art.

Basic human needs nevertheless act as the main push for societal growth, despite the fact that it is not the outcome of popular demand. The requirement for a clean classroom atmosphere so that students could focus on their studies in peace was the main motivating factor. We're aware of a number of techniques, including touch screens and other electronic devices, What about, however, those educational institutions that cannot afford to purchase such substantial, expensive electronic devices, such as a television or single screen?. Since finger tracking would be feasible, we reasoned, OpenCV would be useful for these computer vision applications.

We all know that painters produce canvas paintings. But what if we could just create art in the air by waving our hands? So, to develop an air canvas for this project, we'll use Python and OpenCV. The same thing happens with art. Because traditional and digital art currently coexist in harmony, it's critical to carefully consider the key distinctions between the two forms of art. Chalk, a board, and a pen are the classic writing implements. The primary goal of digital art is the development of an object detection system that enables digital writing.

However, in system, colour recognition is done using Python programming and a deep learning method called OpenCV, resulting in a smooth interface between humans and machines. The use of Google vision ai API to recognize written text and transform it into computerised text is another development in this project. Additionally, we are creating a text-to-speech component that is integrated with the project so that any text we enter on the canvas will be said aloud.

2. LITERATURE SURVEY

2.1 Babu, S., Pragathi, B.S., Chinthala, U. and Maheshwaram, S., 2020, September. Subject Tracking with Camera Movement Using Single Board Computer. In 2020 IEEE-HYDCON (pp. 1- 6). IEEE.

The system described in the paper can follow topics and pan in real time as a result. By spotting people or other things and panning the camera appropriately to follow and record them, the system imitates a camera operator. This topic tracking camera system can be used in lectures to either assist teachers in recording video without the help of a camera operator or to make the job of a camera operator more manageable. These subject tracking cameras can be used for a number of events, including keynote speeches, guest lectures, and dance performances.

2.2 Chen, M., AlRegib, G. and Juang, B.H., 2015. Air- writing recognition—part i: modeling and recognition of characters, words, and connecting motions. IEEE transactions on human-machine systems, 46(3), pp.403-413.

Air-writing is the practise of using hand or finger movements to create linguistic symbols or phrases in a blank area. Here, characters or words are recognised using data from six-degrees-of-freedom hand movements. Isolated air-writing characters can be recognised in a similar way as motion gastrulas, although they are more complex and varied

2.3 Joolee, J.B., Raza, a., Abdullah, M. And jeon, s., 2020. Tracking of flexible brush tip on real canvas: silhouette-based and deep ensemble network- based approaches. IEEE access, 8,pp .115778-115788.

For tracking the position of the brush point during interactive sketching, we presented deep ensemble network-based and silhouette-based approaches in this study. The silhouette-based method effectively catches.

A pair of perfectly aligned infrared (ir) cameras are used to extract the deforming bristles' tips from their silhouettes, and the tips' 2d positions are then recreated using the tracking method we provide. This approach still has concerns with usability and needs a frame and strategically placed cameras. We only consider a standard-sized brush for the job at hand.

2.4 Kaur, h., reddy, b.g.s., sai, g.c. and raj, a.s., 2021. A comprehensive overview of ar /vr by writing in air

Dependency injection was used in this experiment. OpenCV is used to draw with a virtual pen on the camera. Any marker may be utilised to draw. The study looked at how frequently people could recognise letters and numbers written outside. During a leap motion, the motion trajectory is recorded and plotted as an uninterrupted stream of points. Major slopes would be determined from the major spots and lines would be combined. Geometry is used to transform significant slopes into directions..

2.5 Shetty, m., daniel, c.a., bhatkar, m.k. and lopes, o.p., 2020, june. Virtual mouse using object tracking. In 2020 5th international conference on communication and electronics systems (icces) (pp. 548-553). Ieee.

This system, which employs hand motions taken from a webcam using a hsv colour detection approach, is a computer vision-based mouse cursor control system. Through the use of coloured this technology enables users to move the system pointer and carry out mouse actions like clicking left, right, or double using a variety of hand motions. The system is implemented using real-time computer vision in Python and the opencv package. The monitor shows the camera output.

2.6 Zhou, l., 2019. Paper dreams: an adaptive drawing canvas supported by machine learning (doctoral dissertation, massachusetts institute of technology).

To depict their thoughts has the potential to provide a sizable portion of the public, from young people to the elderly, more influence. A web-based canvas called Paper Dreams.

Using a different of machine learning algorithm of methods for storyboarding and drawing, together with a multimodal user interface. Using sketch recognition, style transfer, and processing of natural language, the system can contextual what the user is creating. The image may then be correctly colored, recommended related objects for the user to create, and the user is offered the chance to add related images to the canvas by picking them from a database.

3. SYSTEM ARCHITECTURE

In the suggested system, a paint window and a mask window are created by the Python IDE, which reads the frame and tracks the item while a person is holding a green object in front of the web camera and the programme is running. A tracking window is integrated with several air ink buttons that allow us to observe the tracking of objects. This is very helpful for instructors to use when instructing children in a classroom setting because it is a creative approach to engage and educate young learners.

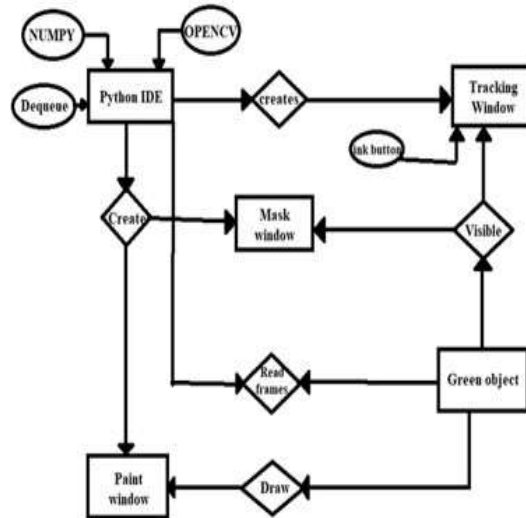


Figure 3. 1

It aids in a better ability to understand of the linkages in the model, as well as the libraries used and the methodical process through which the model operates.

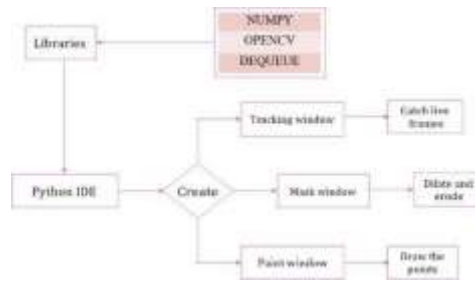


Figure 3. 2

4. STEPS INVOLVED

4.1 Reading frames

In the Python IDE, import the required packages, such as opencv and numpy.

constructing the track bars required for marker colour adjustment. Using these track-bars, their below and above ranges of the hsv required for a colour will be determined. delivering several arrays to accommodate input colour points of different colours. The points of a specific colour will be kept in these arrays, which will then be utilised to draw on canvas.



Fig. 4.1 colour detectors

4.2 Creation of a canvas window

Use the np.zeros() function to generate a zero matrix.

To modify the colour of the pencil, place some colour buttons on the window's top. These indexes will be used to identify where the pointers in the

colour array are located.

The kernel that will be utilised for dilatation. The hues that will be used as the drawings' ink. setting up the canvas.

Loading the webcam installed into the pc.

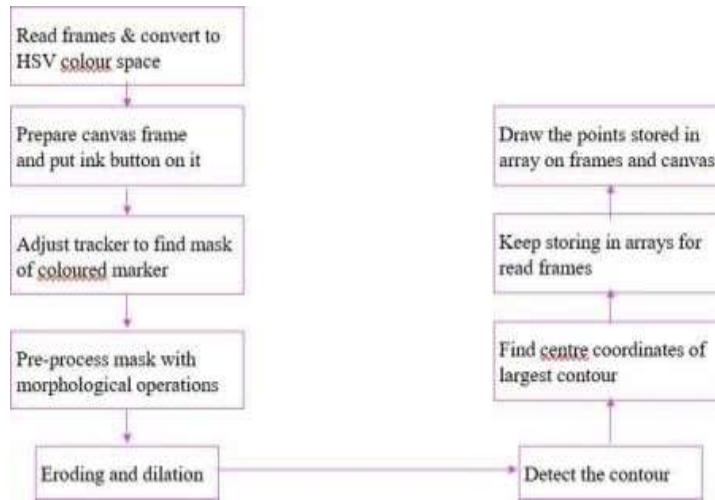


Figure- 4.2

4.3 Green colour detection

Making the pointer's mask to identify it. After locating the pointer, look for its outlines.

If contours have been produced, sort them to identify the largest one.

Obtain the diameter of the circle that contains the identified contour.

Circle-draw the shape in a circle. determining the contour's centre of detection.



Fig. 4.3 green coloured object detection

4.4 Drawing Canvas

the user's desire to click any of the buttons above the screen is now being ascertained. Check the colour range in which the circle's centre coordinates are present using the if/else statement. Choose that colour index to draw with if it is present in that range of colours. When nothing is discovered, append the subsequent dequeues to prevent confusion. Draw lines on the canvas and frame using all the colours.

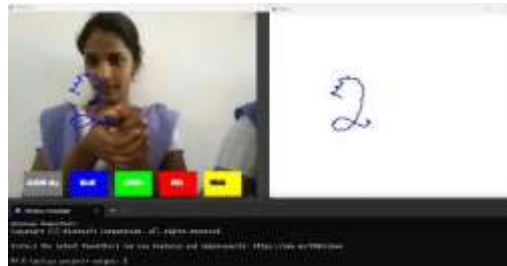


Fig. 4.4 drawing on a canvas

5. DETECTING WRITTEN CHARACTER AND CONVERTING IT INTO COMPUTARIZED TEXTFORMAT LIVELY USING GOOGLE VISION AI API.

The optical character recognition (OCR) and tagging of particular material, as well as image labelling, face and landmark identification, are all easily integrated into apps thanks to the google cloud vision api. Through rest and rpc arthropod genera, the Vision API provides robust pre-trained machine learning models. Give pictures labels to swiftly sort them into a large number of specified categories. Explore written and written material, find things, and add useful details to your photographic portfolio.

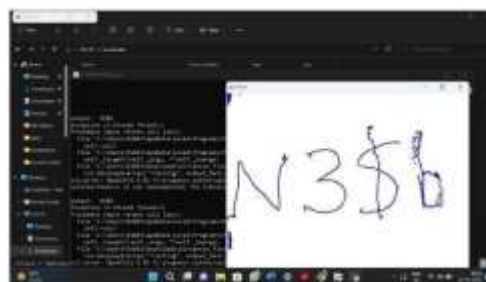
Output- 5.1



Output-5.2



Output-5.3



6. CONCLUSION

The system may measure the effectiveness of traditional writing methods. It removes the requirement that you have a phone in your pocket when taking notes and provides a practical way to do the same while you're on the go. Additionally, it will be quite beneficial for individuals who are particularly abled in terms of communication facilitation. Even elderly folks or those who have trouble using system. The system's adaptability will soon be increased by the addition of the ability to control IoT devices. In addition, pulling air is possible. Users of smart wearables will be able to interact with the digital world more successfully because to the technology. Augmented reality can bring text to life.

The system has a number of problems, but these can be fixed later. Using a handwriting recognizer rather than a character recognizer while writing word by word enables faster writing. Second, instead of employing the number of fingertips, hand motions with a pause can be employed to controlled the real-time system. Thirdly, our system occasionally detects fingertips that are far away and modifies their status. Air object-writing systems must only obey the control gesture motions of their master and must not be duped by nearby individuals.

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