

Air Art Interface

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Abstract—Artificial intelligence is proving itself in many aspects. There are many ways in which machine learning data science is used to perform task and predict the future scenarios. One such use is of detecting objects, gestures, colors. This can be used in many ways such as self-driving cars, in defense to detect aircrafts. One such use is of detecting a particular and the following the path of that color to trace the path and draw an object. This can be used in many ways such as pandemic touching foreign surfaces was consider unsafe so without touching the surface you can get the work done. So, it will reduce the risk of getting affected. Several Python libraries are available which makes work easier and fast. With the advancement of technology, we are finding ways to develop things and going towards era where robots will do the maximum work.

Index Terms— API, Air Art Interface, Database, Open-cv, Pandas, Array.

I. INTRODUCTION

In the world of digital world, traditional art of writing is being replaced by digital art. Digital art refers to form of art where we use latest technology to create drawings as in using a latest air art interface. Working with modern world we also need adapt certain new features.

Traditional art refers to the art form which was created

before the digital art started developing. Painting is a form of art where painters or the artist explains his/her feelings in the form of a drawing/sketch. For this he/she uses various forms such as brushes, colors, and many more. So, to add one more way of creating we can use Air Art Interface.

The difference between the other forms and Air Art Interface is that they all are done by either touching the surface but in the Air art interface it is done without touching the paper that is in air. This done by detecting a particular color or object which works as a reference and the movement of that object is then recorded to draw the pattern.

Looking forward towards the flow of the project the main execution starts with some instructions for using the interface such how to use it and the color which is detected. So, after selecting the draw option two different frames are opened one with camera and one with canvas. When the user brings a proper colored object in front a counter is formed as mentioned above.

[1] Image filtering: - It is the process of increasing the enhancing power of the image it makes it more detailed and easier to detect.

[2] Libraries in python makes it easier to detect the object and trace the path of it so that it could be drawn.

Secondly several colors can also be added so that the drawing looks good.

[3] The proposed work focuses on building an interface which would help the user to draw his imagination in absence of pencils and other material required for drawing. Using Open-cv makes it easier to read each frame with the help of camera.

Opencv is used for computer vision operations such as analyzing CCTV footages, image analysis, video reading. It has more than 2,500 optimized algorithms which makes it more effective.

[4] The Opencv library of python provide help so that the colors can be detected successfully and efficiently. So, after the detection of the color a counter area is created on the color detected which follows the movement of the hand and creates the line or drawing this way lines are created. Similarly, when the counter area or when the user takes his hand or the detected object over the colors a new color is selected and they now draw with that another new color. Similarly, when it is taken over a clear all function it completely clears the area of the screen on which the user was drawing.

[5] The RGB colors are converted to HSV colors because they are easy to detect. Using the cvtColor function they can be converted to HSV. The most fundamental part of the project is to detect a color because that is the basic thing by which the user can start drawing otherwise it would be a complete mess thus it is very important to detect colors and for that we are converting them to increase the accuracy.

[6] With this project we are trying to bring a new way of creating art other than using old styles such as using paint-brush, colors. Also, this would reduce use of papers and wood which is used to create paint brush. So, this we at the starting stage of the project going to introduce certain simple features such choosing diff colors and clear all function.

One frame/canvas would be used for the camera which would detect the color after which the user can start drawing.

Application: It can be used in various works where we don't want to touch the surface and get rid of carrying many pencils and colors.

Integration: With the help of a user-friendly front end the base code that is the backend can be accessed by the user effectively.

Efficiency: Successful detection of the object increases the efficiency of complete project.

II. LITERATURE REVIEW

Open cv is one of the widely used python library for computer vision projects. There are many projects which are successfully implemented using Opencv such as mask detection, finding a person, and many more. Many projects are made using the Opencv library which is used for object/color/face detection projects.

A. References

[1] Open Cv for Computer Vision Applications Authors in [1] The first paper mentions about the image processing. To understand the image and its parts. By understanding the image open-cv can detect the colors. This also throws light on the low level open-cv algorithms to high level face detection algorithms.

[2] Color Detection Using Opencv Python Project In this paper the authors speak about the certain features of image filtering such as adding more clear pictures as we can increase the efficiency and can detect colors easily.

[3] This paper author puts light on finding distance between them for this he also finds shortest distance between them for this base idea is to detect color and connect them to find the shortest distance.

[4] Air Canvas Application Using Opencv and NumPy in Python In the world of digital world, traditional art of writing is being replaced by digital art. Digital art refers to forms of expression and transmission of art form with digital form. So, after learning latest technology we can easily detect the colors.

[5] Color Detection of RGB Images Using Python and Opencv

This paper highlights the function of color detection how OpenCV works for detection different colors using the RGB values of the colors. The way RGB values are converted to HSV so that it can be detected easily.

[6] Authors in [6] talks about the writing in air process that how a it increases the human machine interface and detects the human writing.

[7] B. LED fitted finger movements

Authors here suggest a method in which an LED is mounted on the finger of the user for better detection and the web camera is used to track the finger. The character created is compared with that already present or already drawn. It returns the alphabet that looks similar to the pattern drawn. For this user uses a red color LED light for detection as after detection we can start. Also, the background needs to be free of another red colored objects.

[8] Air Canvas Application Using Opencv and NumPy in Python

With the advancement in technology writing in air is becoming one of the most fascinating and challenging research areas in field of image processing and pattern recognition in the recent years. It contributes immensely to the advancement of an automation process and reduces the gap between human and machine interface to make it easy for us to work in various fields. With the advancement of technology, we can now increase the efficiency of color detection.

[9] In 9 the author has explained in detail that how we can use open-cv for writing in air. Using object tracking we can track object its movement and then this movements are considered as writing in air. The initial and final position of the object is considered for the same.

[10] In 10 the author highlights the importance that how we can use OpenCV based text writing in day-to-day teaching. Just by doing gestures in air you can directly start writing on a particular surface without even touching it. Also makes it easy for teachers to teach as they are not needed to continuously change markers.

III. MOTIVATION

The motivation came through when we were thinking for one of our college projects and think of how we can modernize techniques of making art. So, we thought of using Opencv and making an interface which would help in drawing.

IV. PROBLEM STATEMENT

Design an interface which would help people to draw without using brushes and colors and also help in teaching.

V. METHODOLOGY/EXPERIMENTAL

Python is a widely used programming language because of several libraries and modules present because of which it makes programming easy and fast. Large lines of code can be short down to few lines of code.

For this project we need to use computer vision of detecting the object and also reading the movement of the object so that the path can be traced.

We started with learning open-cv and its features that how it detects colors and it would provide us help in our project.

Then went on learning NumPy as for string the RGB values of colors we would need arrays to their values which then would be used to compare with color which user is showing.

Firstly, we are needed to take a video as input in which we have colors for that we video capture function in OpenCV. It also opens camera of the device.

Then here we create two different frames one which would show the live video of the user and other would be a black blank frame which would show what user is drawing. Then upper and lower bound are defined so that for detecting a particular color such as in the project we are using green color.

Using the cvt-color function convert BGR to HSV color in HSV it is easy to detect color than in BGR. Also, it increases the performance of the complete project mainly the detection part. Then after detection of the color a counter area is selected of a particular area which act as the center point and the movement of this counter area is followed. The size of the counter area is defined. As the user moves the counter area or moves the object a line is drawn which is detected as if the initial point of the counter area is changed then a line is drawn following the path and in this way a picture is drawn.

The next part is of creating different color tiles on main frame so that user can select colors from them. This is done using the function rectangle in cv2 which as it coordinates where to keep the tiles then is add text function which help us to add text to main frame. Then when the counter area is taken over the tiles that particular is selected and if taken over the clear all function then all the drawing done so far is deleted.

Now so that user can also use it we started developing front end using Django/tinkter so that it easy and cool for user to use the project.

In Django we can create the front-end using HTML and run a python script with the help of it. So, in the website we are developing we have 3 pages on is the home page which consist of the main draw button then second one consists of steps of drawing and is basically a guide to the user for using the project. And the last one is the information of the developer so that the user can contact if he or she faces any problem while using the project.

Execution

For developing this project, we used PyCharm as the main platform. So, for executing we directly used the terminals provided and also sometimes google chrome so that the website could be tested. Also using the Django frame work it makes it easy to link HTML and python as the main backend code is developed in python.

VI. RESULTS AND DISCUSSIONS

At the end we were successfully able to detect colors and the counter area around the part for drawing. So, as you can see in the figure 2 it shows the home screen of the application in which in the top navigation bar you can basically go to the learn page and about page where it shows the steps to draw and information of the developer respectively. After clicking on the draw button, you can see the two frames coming up as shown in figure 1. And thus, later on by following the steps you can easily draw in air. In figure 1 on the left side of the image is a camera where user can bring the colored object and start drawing.

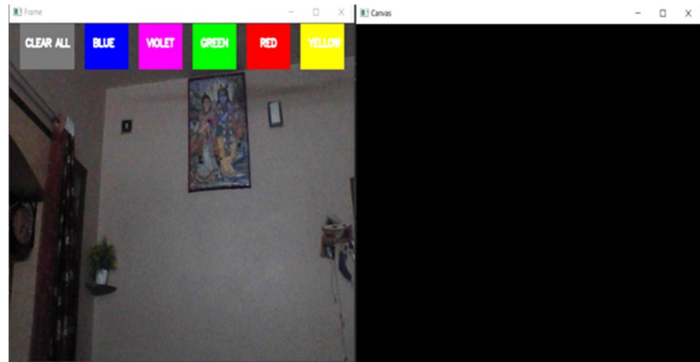


Fig 1: Shows two different frames one with camera on and other with the plain for drawing the art

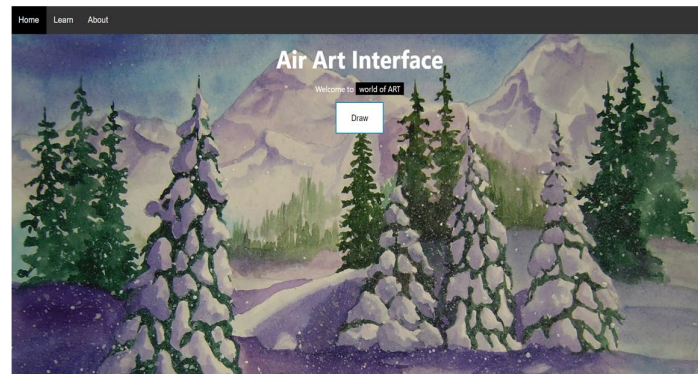


Fig 2: The home screen of the application

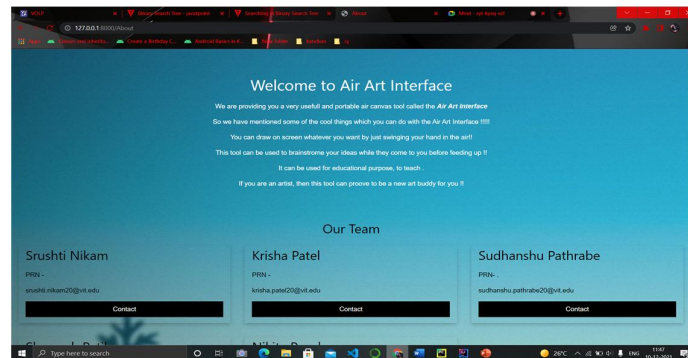


Fig 3 Shows the about page of the Interface containing information about the developer.

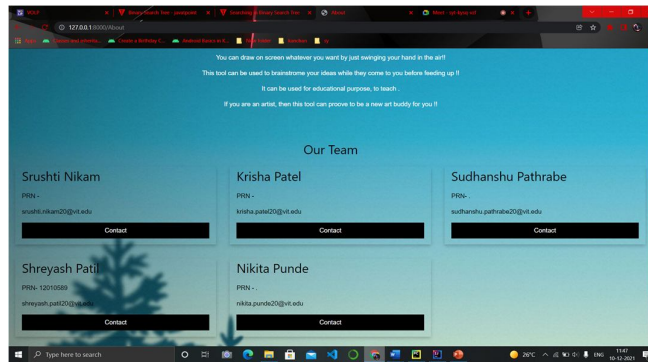


Fig 4 Shows the about page of the Interface containing information about the developer

VII. CONCLUSIONS

The interface can now successfully detect the colors and also look the movement of the detected object and draw a path along it which ultimately turns into a drawing. Also, this all can happen with the help of the OpenCV and NumPy library.

Future Scope: - 1. To increase the efficiency of detecting the colors and movement. 2. Add more textures of colors so that it would help user to create a masterpiece. 3. Adding autofill function so that if any shape is drawn the it can fill with colors and user is not needed to fill it with colors manually.

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