Applied GIS

ISSN: 1832-5505
Vol-5 Issue-03 July 2017

Edge Detection-Driven Real-Time Paint Toolbox for Gesture Control

Saurabh Bhavsar[1], Manish Shah[2], Sumit Hiray[3], Harsha Gavali[4], Prof.Sumit Dhotre[5]

[#]*Computer Engineering Department, Shri. Savitribai Phule Pune University*

Abstract— While each painting program has its own set of advantages and disadvantages, they are all hindered by the same thing: the usage of a mouse or keyboard. We present a paint box that operates on gesture controls alone, doing away with the need for any external gear. Users may sketch without the use of a mouse or other pointing device. Instead, we sketch with our fingers and the related gestures. Touchscreen technology eliminates the drawbacks of the mouse and other conventional pointing devices. Gesture technology is the next evolutionary step in computing, with the potential to reduce costs, increase efficiency, and improve precision by doing away with hardware user interfaces. The possibilities for conveying information to the system through gestures are almost endless. Drawing on a blank screen is made easier using the OpenCV library's hand tracking and associated actions.

Keywords— *Pointing devices, Hand Gestures, Hardware Interface, OpenCV, and Movement Detection;*

INTRODUCTION

Most individuals have some experience with digital painting programs. A user-friendly painting program is crucial in the era of digital social media, when photographs and graphics have gained increasing prominence. Conventional painting programs can only be controlled with physical pointing devices or a touchscreen. Most software systems need some kind of hardware interface. Use of hand motions as direct input to system, allowing for the creation of lines of varying thicknesses and other forms. If the computer system can be operated using simple gestures, it will be much easier to use.This project proposes a computer-human interaction system in which the user's hand motions are integral to the process of making and modifying visual art (painting). In this case, Open CV, a popular library for processing images, is our first choice. We found that Open CV offered more customization options than Matlab did for our planned solution. To enhance the learning process, our platform incorporates interactive artwork. Mechanisms for interacting with gestures include Multi-user, interactive art platform that uses hand tracking The suggested HCI system uses a high-resolution camera to record users' hand gestures, which are subsequently translated into the corresponding drawings.

LITERATURE REVIEW

In the paper Real-Time Paint Tools for Hand Gestures Using a Machine-Learning Approach [1], the authors described a gesture-based paint toolbox with support for six different gestures for creating basic shapes like lines and circles. This article details many methods for improving the precision of one's paint set. They employed a machine learning technique to improve accuracy beyond that of any previous method. The poll found that the machine learning method was 96% accurate.Continuous hand gesture recognition was the topic of "Gloved and Free Hand Tracking based Hand Gesture Recognition" [2]. It describes an effective and resilient algorithm for tracking and segmenting hands, which makes use of a novel technique based on the use of gloves. We've been working on a different kind of tracking algorithm, one that can identify the palm of your hand.This work presents a low-cost solution to Real-Time Sign Language Recognition [3] that clarifies how individuals who are unable to speak with others may nevertheless communicate with one another. Therefore, sign language will provide them with a more effective means of communicating with one another and the general public. The user may then utilize the results to learn and practice the signals.ICT-Human Interaction They presented a human-computer interaction (HCI) system based on face and gesture detection utilizing a single video camera [4]. Instead of using the usual ways of human-machine interaction, they employ a combination of head position and hand gesture to operate the machinery. Eye and mouth locations may be determined, and face center can be used to estimate head posture.In the paper, titled "Hand Gesture Recognition for Indian Sign Language" [5], the authors described a hand gesture recognition system for identifying ISL characters. We employ the hue, saturation, and brightness (HSV) color model and a camera shift technique to detect and categorize human hands. The Genetic Algorithm is utilized for gesture recognition. To properly identify both single- and two-handed movements, we present a user-friendly and low-cost method.

They spoke about recognizing 24 distinct hand movements to spell out words in real time using a consumer depth camera [6]. They employed a multi-layered random forest (MLRF) to classify data. As a result, home computers can automatically learn with less memory and less time spent in the forest. The MLRF method in use has the potential for great accuracy and requires little time to learn and retain.In a paper titled "Vision-based hand gesture recognition," the authors proposed a wearable glove dubbed a bulky glove-like device that contains sensors used to monitor the motions of hands and fingers. The information gathered by the sensors is subsequently sent to the computer. The data gloves used in this method have a high response speed and precision, but they are somewhat pricey. The price tag of roughly $12,500 is comparable to that of a well outfitted supercomputer. With this technique, precision of 85% is possible.

The Visual Recognition of Hand Gestures This research explored the topic of Human Computer Interaction (HCI) and hand motion categorization using Blob Analysis [8]. Blob Analysis was employed for gesture classification. The user of a contact-based device must make use of auxiliary hardware, whereas the user of a vision-based device need not do so. They

ISSN: 1832-5505
Vol-5 Issue-03 July 2017

also looked at the process of skin color detection and how it is affected by lighting conditions.

They discussed several pointing devices that would effectively replace current devices like hardware interfaces in the study Real Time Hand Gesture Recognition for Human Computer Interaction [9]. OpenCV makes gesture tracking and camera permission loading a breeze. Using the OpenCV library, the hand and palm may be customized with little effort. The OpenCV library is accessible on several operating systems. They suggested utilizing the OpenCV library in C++ to create a system for use on a desktop application. The system uses a Hand Color Model and Depth Segmentation to identify human hands. Once palm and hand configurations are made independently, detection may be tailored to specific motions.

Several Methods for Recognizing Hand Gestures This research compares and contrasts two algorithms for detecting edges and skin, both of which are based on artificial neural networks [10]. Capturing the video and then converting it into picture frames allows for grayscale processing, which in turn allows for plotting histograms, which in turn allows for edge recognition of the hand, as discussed. The picture is filled in according to the border of the form drawn. Vectorization is used to capture the diagram's edges and boundaries.

EXISTING SYSTEM :-

There are many different paint programs out there, each with its own set of advantages and limitations. However, they can only be used with the standard hardware interface. Python is used for the system's development. Python's library support allows for streamlined system creation and deployment..

PROPOSED SYSTEM

Using the user's hand gestures, this project proposes a simple computer-human interaction system for the creation and modification of visual art (painting). In this case, Open CV, a popular library for processing images, is our first choice. We found that Open CV offered more customization options than Matlab did for our planned solution. To enhance the learning process, our platform incorporates interactive artwork. Interactive painting system for many users based on monitoring hand gestures is a comparable gesture interactive technique. The suggested HCI system uses a standard-resolution camera to record users' hand gestures, which are subsequently translated into the corresponding drawings.

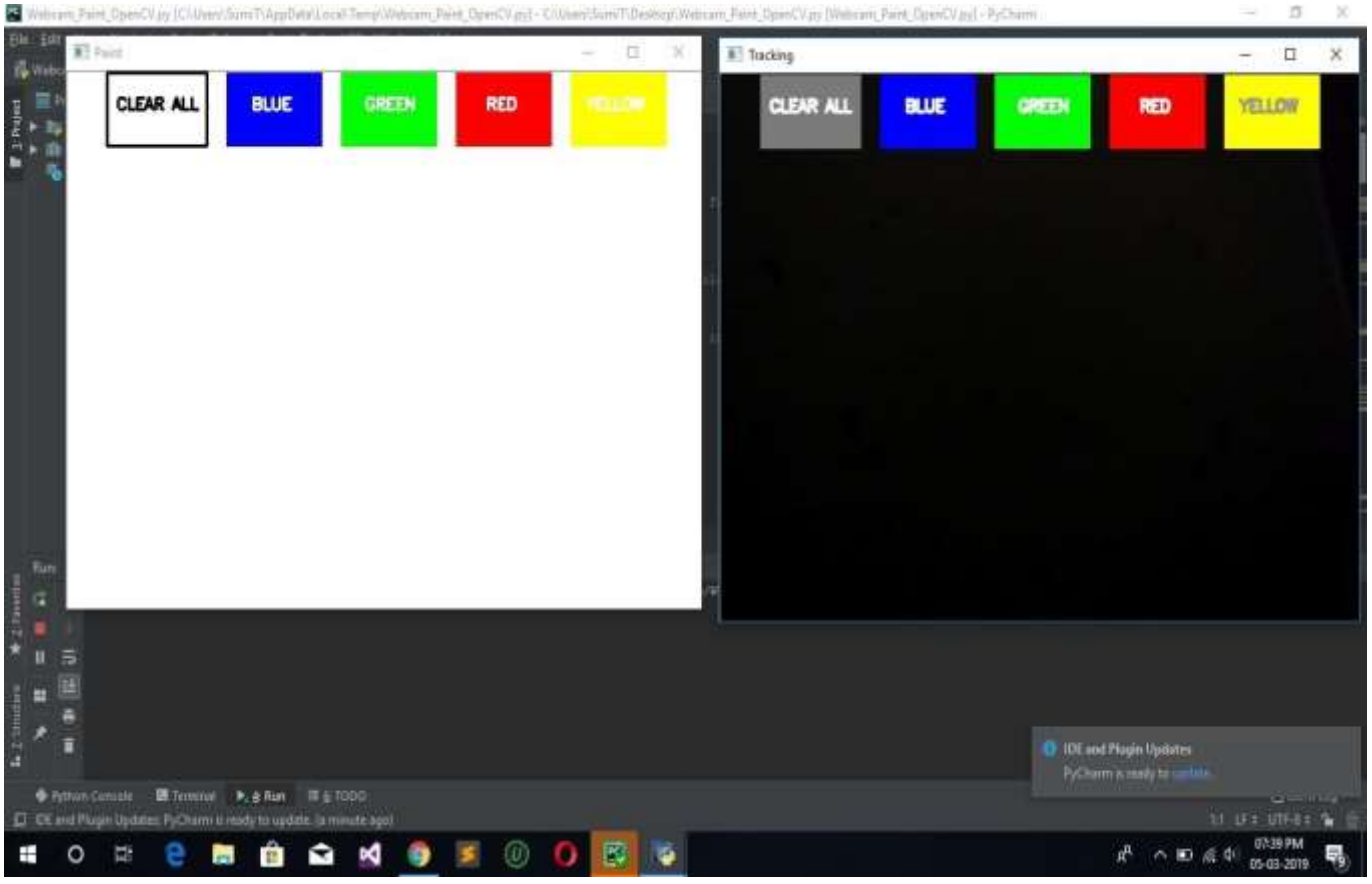

Fig. 1 Paint Box and Camera Module

Applied GIS

ISSN: 1832-5505
Vol-5 Issue-03 July 2017

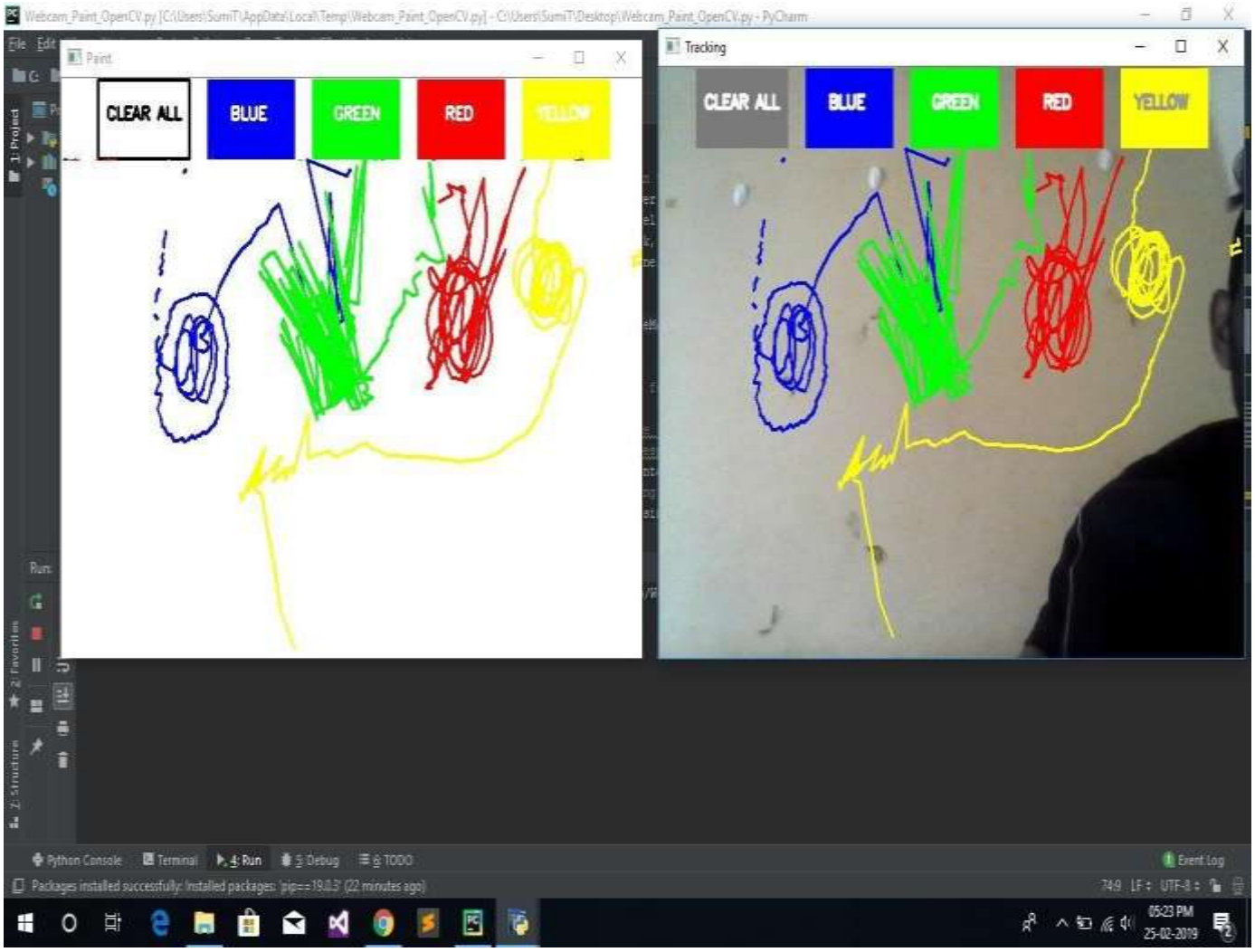

Fig. 2 drawing using Hands

I. System Architecture

A. *Description*

The camera, the display, and the user are the three essential components of the system. The user's motions are captured by the camera module, and from there, predetermined actions may be carried out. The user's actions are mirrored on the screen as a drawn line in which the user may choose the line's color. Pre-processing of captured gestures involves a comparison to a database. Then, the found color pixels are plotted on the screen once the hand's movement has been tracked. For best results, keep a distance of 20-50 cm and the resulting form will be drawn on the screen. After a comparison with a database and a search for a matching color pixel, the tracking output is used to inform the creation of an on-screen representation of the motion.

ISSN: 1832-5505
Vol-5 Issue-03 July 2017

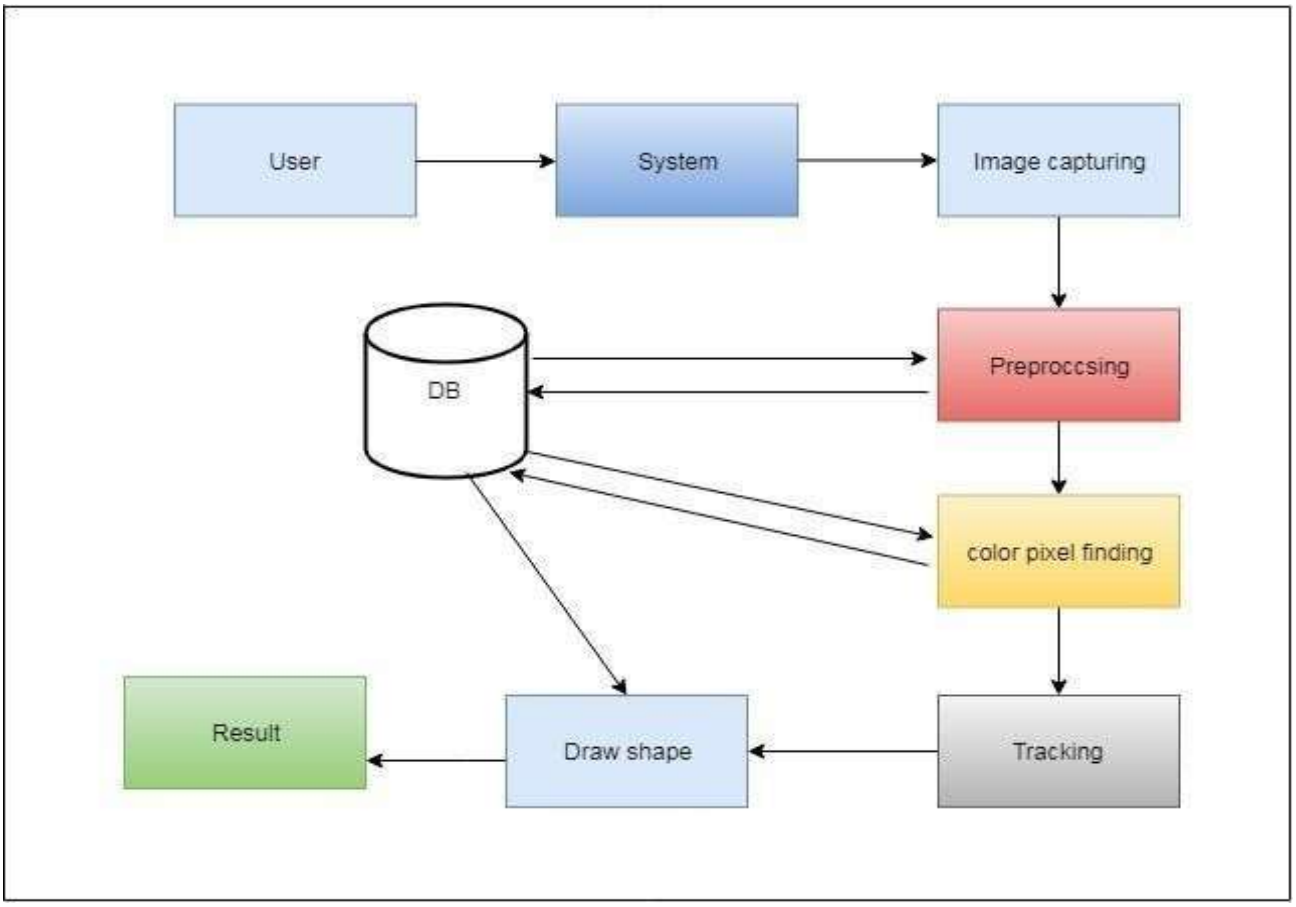

Fig. 3 System Architecture

METHODOLOGY

A. *Edge Detection*

Edge Detection algorithm used for detection of hands which can be captured by webcam or other camera module. Edge detection algorithm have three types: Horizontal, Vertical, and Diagonal. Captured image will be sharpen to produce better result. Its accuracy is better with python language which can be improved by sharpening method of edge detect. Detected hand image is two dimensional which then plotted on three dimensional graph. If independent viewpoint is captured and plotted easily then it will reflects three dimensional objects, which may be a surface shape or markings. Independent viewpoint can be easily plotted but if viewpoint is dependent edge then it reflects geometric scenes. Edge detection of hand is based on threshold value which decides edges with ten detection points.

B. *Haar-Like Classifier*

Haar-like classifier is used for classifying various body parts such as eyes, hands, face etc. After that, it will be easy for any algorithm to detect desired body part. Haar-like features used in object recognition. If the captured image matches with haar like classifier's image which has similarities it will forward the pre-processing. Haar-like classifier is designed for detection of hands, eyes, fingers, face. It is specially design for body organs and their tracking movements. This classifier can be easily integrate with machine learning approach. Haar-like classifier is the most popular classifier and mostly used offices where access cards, fingerprints used for check in and check out.

ISSN: 1832-5505
Vol-5 Issue-03 July 2017

ADVANTAGES

Our proposed system replaces the traditional pointing devices and has the following benefits.

- Infinite ways to communicate with the system-The user will be capable of explore the system in infinite ways.
- No additional workspace is needed - The proposed system use only camera for interacting with the system.
- Easy to use – Users can vary the direction and tempo of hand movements, making it easy and intuitive to create andinteract with system.
- Simple installation – User doesn't require any external hardware or software requirements for executing our system.

CONCLUSION & FUTURE WORK

The proposed system helps the user to perform hand gesturing in an efficient and cost effective manner. After system is setup, the User interaction can be increased drastically, which makes it even easier for a user because they can interact easy and effectively with the system, rather than usage of tradition software products. Our approach has better performance than those proposed in the previous applications. With small modification to the proposed system it can be used in many other fields. In other words it can replace every existing user interacting devices.

REFERENCES

[1] In IEEE International Conference on Power, Control, Signals, and Instrumentation Engineering, "Hand Gesture Real Time Paint Tool - Box: Machine Learning Approach" by Vandit Gajjar, Viraj Mavani, and Ayesha Gurnani.

[2] Kandarpa Kumar Sarma, Dharani Mazumdar, and Anjan Kumar Talukdar Department of Electronics and Communication Engineering, "Gloved and Free Hand Tracking based Hand Gesture Recognition" ICETACS 2013.

[3] [3]Those two gentlemen are Matheesha Fernando and Janaka Wijayanayaka. The paper "Low cost approach for Real Time Sign Language Recognition" was presented at the 2013 IEEE 8th International Conference on Industrial and Information Systems (ICIIS 2013) in Sri Lanka from August 18-20, 2013.

[4] Human Computer Interaction Using Face and Gesture Recognition" by Yo-Jen Tu, Chung-Chieh Kao, and Huei-Yung Lin is available at the Electrical Engineering Department at National Chung Cheng University in Chia-Yi 621, Taiwan, R.O.C.

[5] The 2012 International Conference on Computer Communication and Informatics (ICCCI -2012), held January 10-12 in Coimbatore, INDIA, included a paper titled "Hand Gesture Recognition for Indian Sign Language" by Archana S. Ghotkar, Rucha Khatal, Sanjana Khupase, Surbhi Asati, and Mithila Hadap.

[6] Reference: [6] "Real Time Sign Language Recognition using consumer depth camera" by Alina Kuznetsova, Laura Leal-Taix'e, and Bodo Rosenhahn. 2013 IEEE Workshops at the International Conference on Computer Vision.

[7] In the 2013 International Conference on ServiceScience, "Vision Based Hand Gesture Recognition" was presented by Yanmin Zhu, Zhibo Yang, and Bo Yuan.

[8] Department of Electrical Engineering, Chulalongkorn University, Bangkok, Thailand; Thittaporn Ganokratanaa, Suree Pumrin, "The Vision-Based Hand Gesture Recognition Using Blob Analysis" Science and Technology Conference, 2017 IEEE International.

[9] Rishabh Agrawal and Nikita Gupta [9] In the 2016 IEEE 6th International Conference on Advanced Computing, "Real Time Hand Gesture Recognition for Human Computer Interaction"

[10] Shweta K. Yewale and Pankaj K. Bharne "Hand Gesture Recognition with a Variety of Algorithms from an ANN" Badnera, India's Prof. Ram Meghe Institute of Technology and Research