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A Specially Designed Customized Modern Approach for Contemporary Virtual Board and Power-Point Presentation Tool

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ABSTRACT

This project demonstrates a virtual paint program that can display and control PowerPoint presentations while allowing real-time painting and sketching on a canvas using hand gestures. The technology employs a web camera to record hand gestures, which are then processed instantly by Mediapipe and a single-shot detection model. A number of extra functions, such as slide show presentation, login, email sending, screen recording, and tool selection are also included in the application, along with a graphical user interface created with Py Simple GUI. Using precise hand gestures, the user can clear the screen or change tools while writing on the canvas with their index finger. A flexible and practical solution for a variety of situations, the virtual paint application offers users a natural and easy methodto engage with the system.

Keywords: Virtual paint application, Hand gestures, Real-time drawing, Sketching, Canvas, Web camera, Single-shot detector model, Mediapipe, Graphical user interface, PySimpleGUI, Slide show presentation, Login, Email sending, Screen recording, Tool selection, Intuitive interaction, Computer vision, Multimedia processing, Versatile solution.

INTRODUCTION

The ways in which we engage with our gadgets and systems are continually changing along with the technological world. In this innovative project, we demonstrate a cutting-edge virtual paint tool that uses hand motions to enable real-time sketching and drawing on a digital canvas. This application offers a natural and simple way for users to interact with the system by employing a web camera to capture and process hand movements in real-time. With this virtual paint tool, users may have a fluid and dynamic experience whether producing artwork, annotating presentations, or just expressing their creativity. Additionally, this project offers a fully comprehensive and adaptable solution for all your virtual paint needs with capabilities like slide show presentation, login, email sending, screen recording, and tool selection. Prepare yourself for a new level of technological interaction. The most recent computer vision and multimedia processing technologies, including a single-shot detector model and Mediapipe, power the virtual paint application. This makes it possible to recognize hand gestures quickly and accurately, creating a highly responsive and dynamic user experience. A user-friendly graphical user interface was also created for the application using PySimpleGUI. Users can use the UI with ease and speed, and they have easy access to all of the features and tools that are offered. The virtual paint application offers a variety of helpful features in addition to real-time sketching and drawing, including slide show presentation, login, email sending, screen recording, and tool selection. This makes it the perfect answer for a variety of situations, including artistic endeavors and formal presentations. Users of the virtual paint program have total freedom of expression and can develop and share ideas in real time. This application offers a platform for creativity and innovation whether working alone or in teams. The system may be quickly changed to match the unique needs of different users because it is made to be very flexible and adaptable. This virtual paint application is certain to offer an enjoyable and gratifying experience, regardless of whether you're an artist, a professional, orjust someone looking for a new method to express oneself.

LITERATURE REVIEW

Chetan Dhule And Trupti Nagra, Computer Science & Engineering Department, College Of Engineering Nagpur, India "Computer Vision Based Human-Computer Interaction Using Color Detection Techniques."

PUBLISHED BY IEEE Computer Society [1], the authors propose a real time controlling the motion of mouse in windows according to the motion of hand and fingers by calculating the change in pixels values of RGB colors from a video The major advantage is that it is a real time controlling the motion of mouse in windows according to the motion of hand and fingers by calculating the change in pixels values of RGB colors from a video. The major disadvantage are some problems with recognition speed, where the speed of controlling motion of the mouse is not 100% which needs to be improved for some of the gestures. This project can be very useful for people who want to control computers without actually touching the system or by using a wireless mouse which always needs a platform to operate. The accuracy is more when we are using red color markers in comparison to the case when other color markers were used individually. The problem of changing lighting conditions and color-based recognition has been solved in this work by giving the button to set the marker color at the starting phase of application. Still there are some issues with recognition speed, where the speed of controlling motion of the mouse is not 100% which needs to be improved for some gestures. All mouse movement and key action has already been mapped that is working well under given circumstances. As a part of future scope, the application can be improved to work with mobile phone and play stations. Other modes of human computer interaction like voice recognition, facial expression, eye gaze, etc. can also be combined to make the system more robust and flexible.

Vandit Gajjar, Viraj Mavani, and Ayesha Gurnani, Department of Electronics and Communication Engineering College of Engineering Ahmedabad, India "Hand Gesture Real Time Paint Tool Box: Machine Learning Approach" PUBLISHED BY IEEE International Conference on Power, Control, Signals and Instrumentation Engineering. [2], the authors present a hand gesture recognition of our hand using this contour, edge detection and Haar cascade methods. The use of Machine Learning Based the result of accuracy will be of approximately 96%, which are very good results for the Hand Gesture recognition. Hand gesture recognition is done by edge detection. An edge is defined by a continuity in gray level values. It is not efficient Secondly; some modifications were introduced on this base algorithm such as thresh holding the previously computed subtraction. The main purpose of this algorithm was reducing the amount of stationary foreground detected. We can create a graphical user interface software for this utilization and can amalgamate that graphical user interface with an extraneous camera module which will be in the saddle of a machine learning robot, and can be adequate to latch on to the video and the further refining of the video will take position with the help of the advanced graphical user interface. Then this Autonomous Robot can be used to teach the children about various activities and these concepts can also be used for virtual reality and augmented reality. Also, these applications are used for games like snakes etc. With the use of hand gestures you can play it.

Michal Lech, Bozena Kostek, And Andrzej Czyzewski, Multimedia Systems Department, Faculty of Electronics, Telecommunications and Informatics, Gdansk University of Technology, Gdansk, Poland "Virtual Whiteboard: A Gesture-controlled Pen-free Tool Emulating School Whiteboard" In: IEEE Access

8 (2020), INTELLIGENT DECISION TECHNOLOGIES, IOS Press. [3], In this paper, the authors propose that the hardware and software of the Virtual Whiteboard is presented with a special focus on utilizing Kalman filters for prediction of consecutive hand positions. By using Kalman filtering can highly improve the accuracy of writing texts or drawing shapes on the whiteboard. For the grouped gestures in some cases the recognition efficacy has decreased. Such a situation was due to the fact that grouped gestures performed by the users composed of fast movements with rapid changes of direction by 90◦. The template dimension should be equal to the reference image or smaller than the reference. The growing tendency to exchange classical school blackboards and whiteboards with electronic equivalents and the examined high efficacy and efficiency of the presented technology show the potential direction.

"A Review of Hand Gesture Recognition Techniques" by L. Galán et al. (2011) [4], This paper provides an overview of various hand gesture recognition techniques, including vision-based methods and data gloves. The authors compare and contrast the different methods, discussing their strengths and weaknesses, and also highlight the challenges faced in implementing these techniques. They also present a taxonomy of hand gesture recognition techniques and categorize them into different groups based on the type of sensors used, the type of gesture recognition ***"Real-Time Hand Gesture Recognition using Mediapipe" by Google AI (2021) [5***], This paper presents a real-time hand gesture recognition system using the Mediapipe framework. The system uses deep learning algorithms to recognize hand gestures, and is capable of running on various platforms, including mobile devices and desktops. The authors evaluate the performance of the system on a number of hand gesture recognition tasks, such as pointing, waving, and sign language recognition, and demonstrate its effectiveness for various use cases. They also discuss the challengesfaced in implementing the system and provide
suggestions for future work.

"Deep Learning for Hand Gesture Recognition: A Comprehensive Review" by X. Yang et al. (2020) [6], This paper provides a comprehensive review of deep learning-based hand gesture recognition methods, including convolutional neural networks (CNNs), recurrent neural networks (RNNs), and long short-term memory (LSTM) networks. The authors discuss the latest advances in the field, including the use of 3D CNNs for hand gesture recognition from depth images, and the use of generative adversarial networks (GANs) for data augmentation. They

also compare and contrast the different deep learning-based methods and provide insights into their effectiveness and limitations. The authors also present some of the most recent and popular datasets used for hand gesture recognition and provide an overview of the evaluation metrics used to assess theperformance of these methods.

PROPOSED METHOD

In this project, we present a virtual painting tool that lets users sketch or draw on a canvas in real time using hand movements. Utilizing cameras to record hand motion, hand gesture-based paint applications can be deployed. An intangible interface is designed and implemented using vision-based real-time dynamic hand gestures to carry out tasks including tool selection, writing on the canvas, and canvas clearing. The system's web camera techniques, and the type of hand gesture recognition systems.

Captures images of the hands, which are then analyzed in real time with a single-shot detector model and media pipe to enable the machine to communicate with the user in a split second. Additionally, PySimpleGUI was used to create the graphical user interface for this program. Two tasks are carried out by this program: a slide show presentation and a virtual board. By merely displaying actions, the user can adjust the slide. Additionally, users have the option to erase the drawing and utilize the cursor to write on the presentation.

On the landing screen, the user can insert their username and password to log in. The users' virtual boards can also contain photographs. The option to record their screen will be presented to them. The user has the option to email the session information after the presentation. The user must press the icon with both their index and middle fingers together to choose a different colour or eraser from the top of the canvas. We will be able to move the slides back and forward as well as use a pointer and sketch tools in the slide show presentation system. Additionally, we will include an erasing gesture to makeit more functional.

The web camera frames from the PC were used to create the virtual paint program. The web camera sends the system the frames that it has received. Each frame is captured using a web camera until the program is complete. To identify the hands in the video frame, the BGR colour video frames are converted to RGB colour. By comparing the tip ID of the corresponding finger discovered using the MediaPipe to the corresponding coordinates of the up fingers, the system then decides which finger is up and executes the necessary function. If the user raises his or her index finger, anything can be written on the screen. The user can move their position on the screen or use any tool from the application's toolbar if both their index and middle fingers are raised. The user can clear the screen if all fingers are up exceptthe thumb finger. When every finger is raised, nothing happens on the screen.

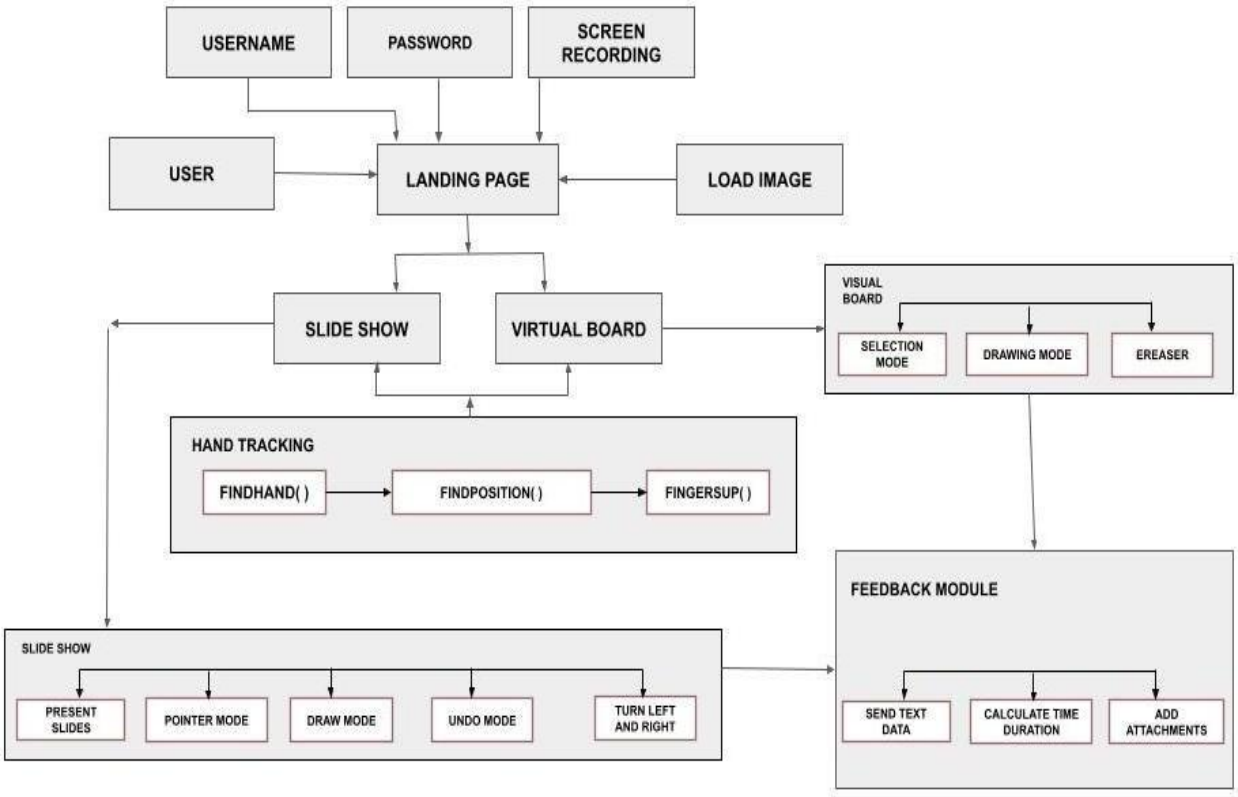

Fig. System Architecture

CONCLUSION

A Specially Designed Customized Modern Approach for Contemporary Virtual Board And Power-Point Presentation Tool" presents a novel approach to hand gesture-based painting and presentation applications. By using the Mediapipe framework and deep learning algorithms, the system is able to recognize various hand gestures in real-time and perform the appropriate functions, such as writing on the canvas, selecting tools, and clearing the screen. The system also has a user- friendly graphical user interface, developed with PySimpleGUI, and provides features such as screen recording, emailing session information, and adding images to the virtual board. The literature survey shows that hand gesture recognition is an active area of research, with a number of techniques and methods being developed for various applications. However, there are still challenges to be addressed, such as achieving real-time performance, robust recognition under different lighting conditions, and accurate recognition of complex gestures. The project presents a step forward in this field and has the potential to be applied to various domains, such as education, entertainment, and human-computer interaction. Further work can be done to improve the accuracy and usability of the system, as well as to explore new applicationdomains.

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