VIRTUAL MOUSE USING ARITFICIAL INTELLIGENCE

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Abstract— A novel camera vision-based cursor control system, using hand gestures captured from a webcam was proposed through a color detection technique. The system will allow the user to navigate the computer cursor using their hand bearing color caps or tapes and left click and dragging will be performed using different hand gestures. The proposed system uses a low-resolution webcam that acts as a sensor and it is able to track the user's hand bearing color caps in two dimensions. The hand gesture is the most effortless and natural way of communication. The output of the camera will be displayed on the monitor. Shape and position information about the gesture will be gathered using detection of color. Hand gestures can be used to play an important role for establishing Human-Computer Interaction interface (HCI) in modern techniques. Direct use of hand as input device is an attractive method for providing natural HCI. Human gestures can substitute the use of mouse and keyboard as inputs to computer.

Keywords - Webcam, Human computer interaction, Hand gestures

1 INTRODUCTION

RESEARCH /OBJECTIVES OF THE PAPER

The main objective of the proposed AI virtual mouse system is to develop an alternative to the regular and traditional mouse system to perform and control the mouse functions, and this can be achieved with the help of a web camera that captures the hand gestures and hand tip and then processes these frames to perform the particular mouse function such as left click, right click, and scrolling function.

2 LITERATURE REVIEW

2.1 TITLE: Hand Gesture Control for Human–Computer Interaction with Deep Learning

The use of gesture control has numerous advantages compared to the use of physical hardware. However, it has yet to gain popularity as most gesture control systems require extra sensors or depth cameras to detect or capture the movement of gestures before a meaningful signal can be triggered for corresponding course of action. This research proposes a method for a hand gesture control system with the use of an object detection algorithm, YOLOv3, combined with handcrafted rules to achieve dynamic gesture control on the computer. It utilizes a single RGB camera for hand gesture recognition and localization. The dataset of all gestures used for training and its corresponding commands, are custom designed by the authors due to the lack of standard gestures specifically for human–computer interaction. Algorithms to integrate gesture commands with virtual mouse and keyboard input through the Pynput library in Python, were developed to handle commands such as mouse control, media control, and others. The mAP result of the YOLOv3 model obtained 96.68% accuracy based on testing result.

2.2 TITLE: Cursor Manipulation with Hand Recognition Using Computer Vision

It aims to make a software program which will Track/Monitor the hand movement in front of the screen through a webcam and will move the cursor of the computing system with respect to the hand movement and can do certain fixed tasks like Right Click, Left Click, Scroll, Drag, Switch Between Programs, Go back, Forward, etc. This program will work in background and use convolutional Neural Networks Model (SSD) to convolve each and every video frame coming from input and at the end will classify the image into classes after further processing of the predicted class it will do necessary operations on Mouse/ Track pad driver to perform desired operations.

2.3 TITLE: Gesture Recognition Based Virtual Mouse and Keyboard

Nowadays, computer vision has progressed to the point where a computer can recognize its user using a basic image processing algorithm. People are using this vision in many parts of daily life at this point of development, such as face recognition, color detection, automatic cars, and so on. Computer vision is employed in this research to create an optical mouse and keyboard that uses hand motions. The computer's camera will scan the image of various movements made by a person's hand, and the mouse or pointer will move in response to the movement of the gestures, including doing right and left clicks using distinct gestures. Similarly, different gestures can be used to control the keyboard, such as a one-finger gesture to choose an alphabet and a four figure gesture to swipe left and right. With no wires or other devices, it will function as a virtual mouse and keyboard. The project's only piece of hardware is a webcam, and the coding is done in Python using the Anaconda platform. The Convex hull defects are created first, and then an algorithm is created by mapping the mouse and keyboard functions to the flaws using the defect calculations.

3 SYSTEM DESCRIPTIONS

3.1 SYSTEM ARCHITECTURE

A system architecture is the conceptual model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system. The system we are implementing which is been written in python code be much more responsive and is easily implemented since python is a simple language and is platform independent with a flexibility and is portable which is desirable in creating a program which is focused in such an aim for creating a Virtual Mouse and Hand Recognition system.

3.2 EXISTING SYSTEM

The existing system consists of the generic mouse and track pad system of monitor controlling the non-availability of a hand gesture system. The remote accessing of monitor screen using the hand gesture is unavailable. Even-though it is largely trying to implement, the scope is simply restricted in the field of virtual mouse. The existing virtual mouse control system consists of the simple mouse operations using the hand recognition system, where it could perform the basic mouse operation like mouse pointer control, left click, right click, drag etc. The further use of the hand recognition is not been made use of. Even-though there are a number of systems which are used for hand recognition, the system uses the static hand recognition which is simply recognition of the shape made by hand and by defining an action for each shape made, which is limited to a number of defined actions and a large amount of confusion.

DISADVANTAGES
•   Consumption of RAM is high.
•   Operation is a slow process.

3.3 PROPOSED SYSTEM

This Virtual Mouse Hand Recognition application uses a simple color cap on the finger without the additional requirement of the hardware for the controlling of the cursor using simple gestures and hand control. This is done using vision based hand gesture recognition with inputs from a webcam. Using the current system even-though there are a number of quick access methods available for the hand and mouse gesture for the laptops, using this system the laptop or web-cam and by recognizing the hand gesture it could control mouse and perform basic operations like mouse pointer controlling, select and deselect using left click, and a quick access feature for file transfer between the systems connected via network LAN cable.

The project is a "Zero Cost" hand recognition system for laptops, which uses simple algorithms to determine the hand, hand movements and by assigning an action for each movement. But it mainly focusses on the mouse pointing and clicking actions along with an action for the file transfer between connected systems by hand action and the movements. The system is much more responsive and is easily implemented since python is a simple language and is platform independent with a flexibility and is portable which is desirable in creating a program which is focused in such an aim for creating a Virtual Mouse and Hand Recognition system. The system is much more extendable by defining actions for the hand movement for doing a specific action. It could be further modified to any further extent by implementing such actions for the set of hand gestures, the scope is restricted by the user imagination.

ADVANTAGES
•   This technology can be used to help patients who don't have control of their limbs.
•   Easy to interact with computers.
•   Operation speed is high.
•   Proposed method consumption of RAM is less than existing method.

3.4 SYSTEM IMPLEMENTATION

3.4.1 MODULE LIST

•   Data collection
•   Data preprocessing
•   Model development
•   Model Selection

3.4.2 MODULE DESCRIPTION

3.4.2.1 DATA COLLECTION

A numerical value and in this data using multiple purpose. Kaggle supports a variety of dataset publication formats, but it strongly encourage dataset publishers to share their data in an accessible, non-proprietary format if possible. Not only are open, accessible data formats better supported on the platform, they are also easier to work with more people regardless of their tools.

3.4.2.2 DATA PREPROCESSING

Data pre-processing is a process of preparing the raw data and making it suitable for a deep learning model. It is the first and crucial step while creating a deep learning model. When creating a machine learning project, it is not always a case that it come across the clean and formatted data. And while doing any operation with data, it is mandatory to clean it and put in a formatted way. So for this, it use data pre-processing task.

3.4.2.3 MODEL DEVELOPMENT

The use of Machine Leaning (ML) has increased substantially in enterprise data analytics scenarios to extract valuable insights from the business data. The ML model development involves data acquisition from multiple trusted sources, data processing to make suitable for building the model, choose algorithm to build the model, build model, compute

performance metrics and choose best performing model.

3.4.2.4 MODE SELECTION

Model selection is the process of selecting one final machine learning model from among a collection of candidate machine learning models for a training dataset. It can be applied both across different types of model and across models of the same type configured with different model hyper parameters.
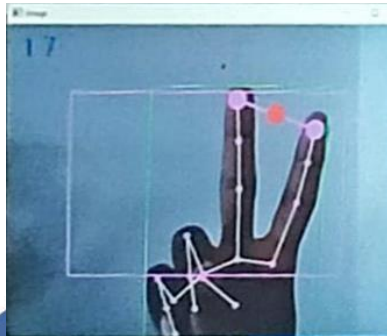
4 RESULTS AND OUTPUT

4.1 SELECTING FOLDER

FIG 4.1 SELECTING FOLDER

4.2 DOUBLE CLICK PROCESS SYSTEM

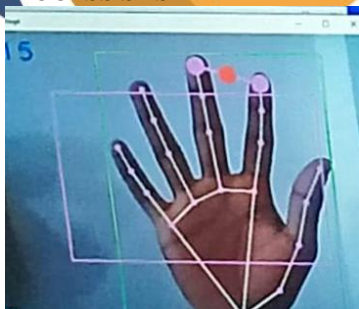FIG 4.2 DOUBLE CLICK PROCESS SYSTEM

4.3 SYSTEM PROCESS SYSTEM

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5. CONCLUSION

5.1 CONCLUSION

Gesture recognition gives the best interaction between human and machine. Gesture recognition is also important for developing alternative human computer interaction modalities. It enables human to interface with machine in a more natural way. Gesture recognition can be used for many applications like sign language recognition for deaf and dumb people, robot control etc. Digital Canvas is an extension of our system which is gaining popularity among artists, by which the artist could create 2D or 3D images using the Virtual Mouse technology using the hand as brush and a Virtual Reality kit or a monitor as display set. This system project show the different gesture operations that could be done by the users but it also demonstrated the potential in simplifying user interactions with personal computers and hardware systems.

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