

AI Virtual Cursor

Abstract

In the proposed AI virtual mouse system, a webcam or a built-in camera is used for capturing of hand gestures and hand tip detection using computer vision. The algorithm used in the system makes use of the machine learning algorithm. Based on the hand gestures, the computer can be controlled virtually and can perform left click, right click, scrolling functions, and computer cursor function without the use of the physical mouse. The algorithm is based on deep learning for detecting the hands.

1. Introduction

A webcam or built-in camera is implemented in the intended AI virtual mouse system to capture hand motions and recognise hand tips using computer vision. The machine learning algorithm is utilised by the system's algorithm. Without using a real mouse, the computer can be virtually controlled using hand gestures to accomplish left-click, right-click, scrolling, and computer cursor tasks. Deep learning is the foundation of the algorithm used to find the hands.

The proposed AI virtual mouse may be used to control the PC mouse functions without using the physical mouse during the COVID-19 condition because it is not safe to use the devices by touching them because it may result in a situation where the virus is propagated by touching the devices. Without the need of gadgets, the system can be utilised to control robots and automation systems. The AI virtual system can draw both 2D and 3D pictures using hand motions. Without using a wireless or wired mouse, an AI virtual mouse can be utilised to play games based in virtual reality and augmented reality. These controls can be used by those with hand issues to use the computer's mouse.

1.1 The goal of the design project

The main goal of the proposed AI virtual mouse system is to create a replacement for the conventional mouse system that can perform and control mouse functions. This can be done with the aid of a web camera that records hand gestures and hand tips and then processes these frames to perform the specific mouse function, such as the left click, right click, and scrolling function.

The proposed AI virtual mouse system can be utilised to solve real-world issues, such as those where there isn't enough room to use a physical mouse or for people who have hand issues and aren't able to handle one. The proposed AI virtual mouse can be used to solve these issues because hand gesture and hand Tip detection is used to control the PC mouse functions by using a webcam or a built-in camera. In the COVID-19 situation, it is also not safe to use the devices by touching them because it may result in a possible situation of virus spread by touching the devices.

1. Project Milestones

The following are the main milestones in the progress of a project:

1. Project Topic Selection
2. The Project Proposal
At this stage the following needs to be clearly specified: a.
Algorithm design
b. Experiment design
3. Project Execution
4. Final Report

2. The Experiment Design

2.1 The hypothesis

The primary goal of the suggested system is to replace the use of a typical mouse device with a web camera or a built-in camera in the computer to perform computer mouse pointer and scroll tasks. A HCI [1] with the computer is used to recognise hand gestures and hand tips using computer vision. Using a built-in camera or web camera, we can monitor the fingertip of a hand gesture with the help of the AI virtual mouse system, perform mouse cursor operations, perform scrolling, and move the cursor along with it.

However, in this study, the user uses his or her built-in camera or webcam and uses his or her hand gestures to control the computer mouse operations. When using a wireless or Bluetooth mouse, some devices, such as the mouse, the dongle to connect to the PC, and also, a battery to power the mouse to operate, are used. The suggested system uses a web camera to take pictures, analyse those pictures, identify different hand gestures and hand tip gestures, and then carry out the relevant mouse action.

2.2 Project Types

This Project can be classified under work of machine learning and image segmentation.

For segmentation the objective of the algorithm/model is to identify the set of pixels in the image belonging to the region of interest (ROI). The usual approach is to document a set of images by indicating the through annotation the true values (i.e, the pixel set belonging to the ROI) and to measure the similarity of this to the algorithm outcome.

For feature extraction projects, there are two problems: (a) having segmented images as an input and (b) of realizing a method for evaluating the effectiveness of the features (with a classifier). It is best to have a complete analysis system available and to experiment with different feature sets to determine if better outcomes can be achieved by adding the new features to the system.

Classification tasks are challenging to conduct since they require a set of features and a corresponding set of known outcomes. Most know classifiers have robust implementations that are available on the internet for packages such as R, Python. The project then becomes determining a unique aspect of a specific classifier. Then Combining two class segmentation label(human or background) per pixel.

2.B Algorithm Specific Experiment Design

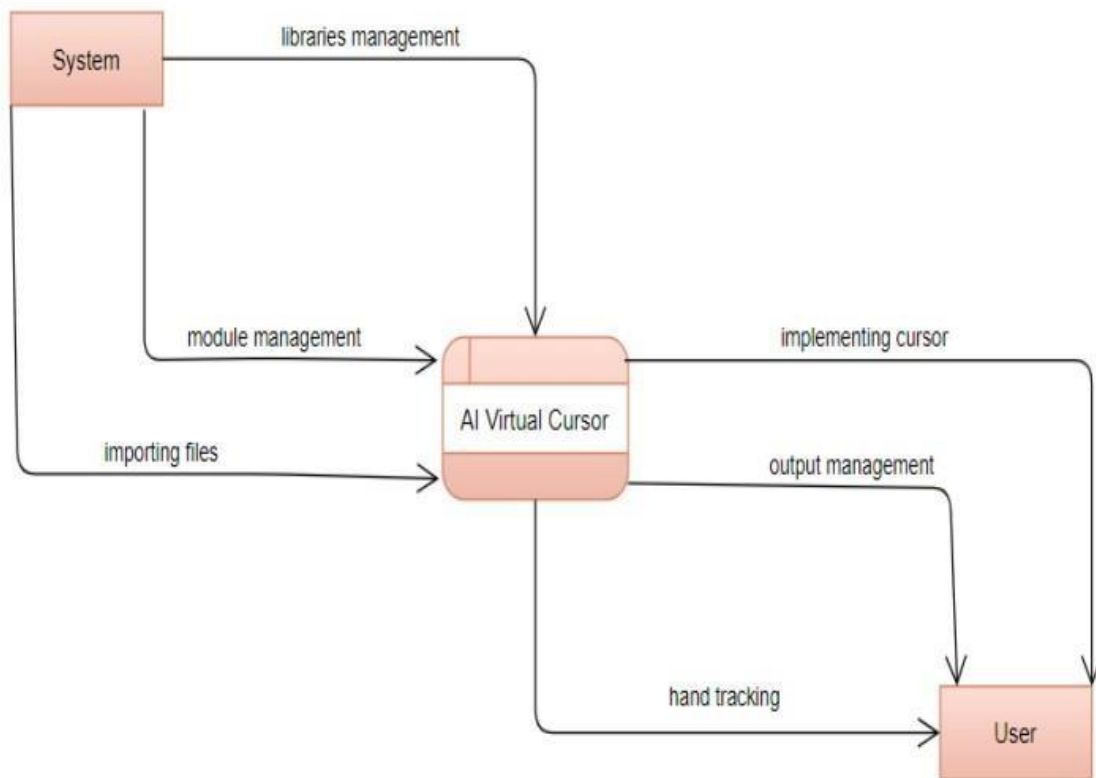


Figure 1 : Algorithm Flowchart

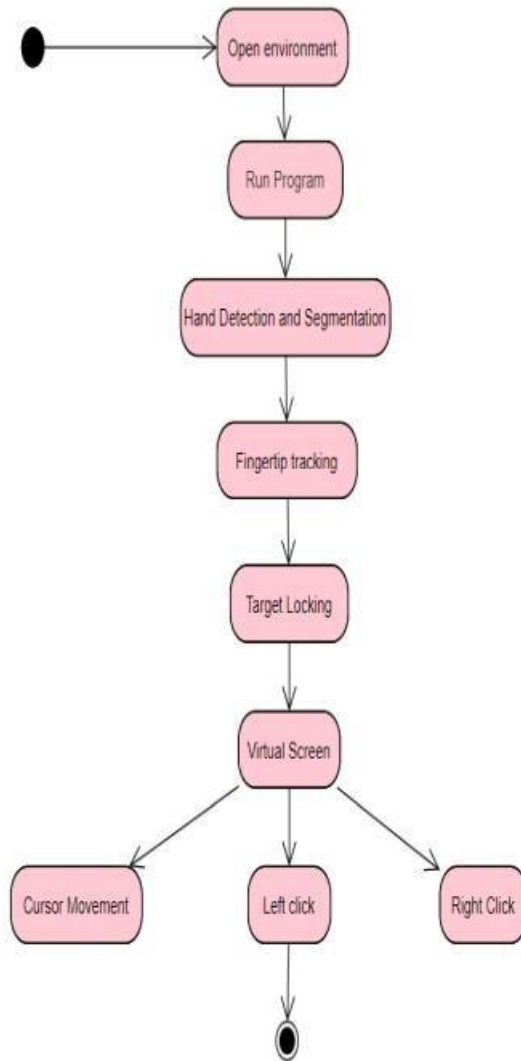


Figure2 :- Activity Diagram

3. Project Reports

3.1 Abstract

The machine learning algorithm is utilised by the system's algorithm. Without using a real mouse, the computer can be virtually controlled using hand gestures to accomplish left-click, right-click, scrolling, and computer cursor tasks. Deep learning is the foundation of the algorithm used to find the hands. As a result, the suggested method will stop the spread of COVID-19 by doing away with human interaction and the need for external devices to operate the computer.

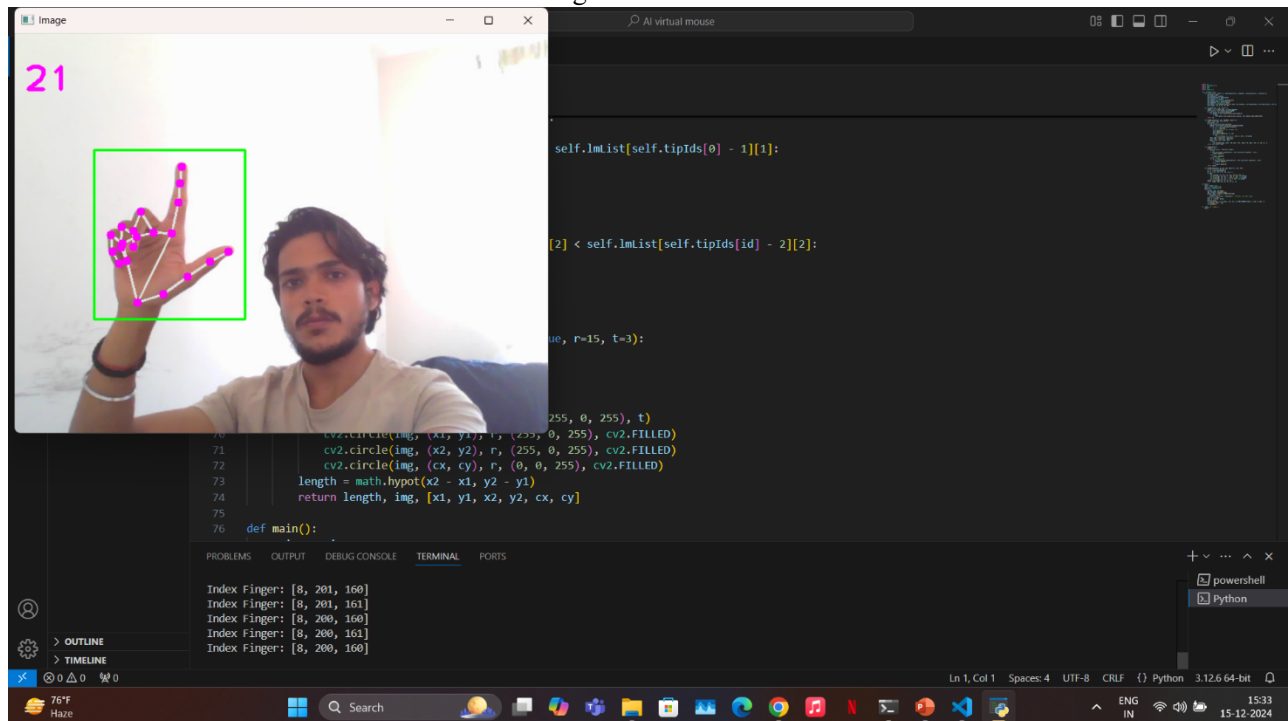
The primary goal of the AI virtual mouse system is to replace the use of a physical mouse with hand gestures for controlling mouse cursor functionalities. The suggested system can be implemented utilising a webcam or an integrated camera that recognises hand movements and hand tips and processes these frames to carry out certain mouse actions.

3.2 Previous work done & Current Issues

There have been related studies on virtual mice that use gloved hands to detect hand gestures and color-tipped hands to recognise gestures, but these studies do not improve mouse functionality. The wearing of gloves causes the recognition to be less accurate; also, certain users may not be able to utilise the gloves; and occasionally, the failure to identify colour tips causes the recognition to be less accurate. There have been some attempts to detect the hand gesture interface using a camera.

3.3 Brief about experiment conducted and Results

Figure 1 Han



d tracking Module

Figure 2 Live demonstration



4.4 A conclusion, summarizing the achievements of the project and suggesting future work

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We may infer from the model's findings that the suggested AI virtual mouse system has done very well, has better accuracy than the existing models, and also gets beyond the majority of the drawbacks of the latter. The AI virtual mouse can be utilised for real-world applications since the suggested model is more accurate, and it can also be used to stop the spread of COVID-19 because the proposed mouse system can be operated virtually using hand gestures rather than the conventional physical mouse.

The model has some drawbacks, including a slight loss of accuracy in right-click mouse functionality and some challenges with dragging and clicking to pick text. In order to get over these restrictions, we will now work on making the finger tip detection algorithm more accurate.