Hand Gesture Recognition and PC Control

Mentor: Ms. Shobha Rai, Assistant Professor, CIC, Delhi University

Jayant Bhakar(jayant.bhakar@gmail.com, 11923), Md. Ahsan H. Moon(ahsanmoon992@gmail.com, 11925), Rakesh Meena(rakeshmeena_01@yahoo.com, 11937)

Abstract

As the technology improves, there has been more focus on improving the user interface and giving a more comfortable and efficient experience to the user. This includes the advancement of touch technology over buttons and many more gesture control mechanisms. In this project, we are developing gestures for controlling some basic PC options like volume, zoom, etc.

Introduction

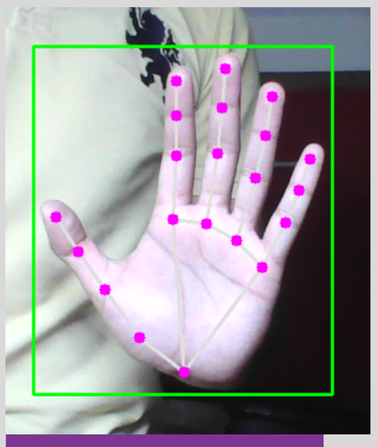
Computer vision is a field of artificial intelligence (AI) that enables computers and systems to derive meaningful information from digital images, videos, and other visual inputs, and take actions based on that information. For this project, we use hand gestures to perform different operations on the PC. The hand gestures are tracked by the camera and trigger a particular action/command on the system. Algorithms have been developed based on computer vision methods to detect hands using these different types of cameras. The algorithms attempt to segment and detect hand features such as skin color, appearance, motion, skeleton, depth, 3D model, deep learning detection, and more. We have used OpenCV and MediaPipe which are excellent tools for hand gesture recognition.

Methodology

We have written a python program for controlling different options like volume control, zoom in/out and drag and drop. The basic algorithm/steps are as follows:

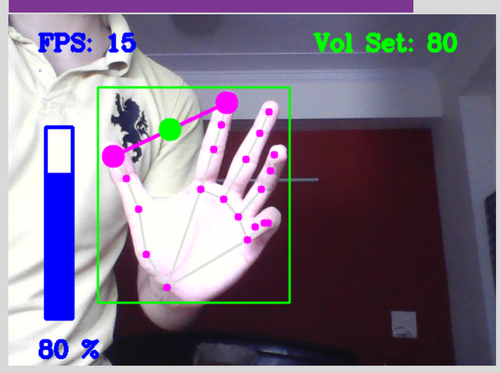
- Import necessary modules like cv2, Hand Tracking Module, pycaw, etc.
- Identify the marking points on the hand.
- for volume: use the pinky finger to activate volume mode. Track distance between index finger and thumb to control volume.
- for zoom: track distance between both hands to zoom in or zoom out.
- for drag & drop: Add path. Select tips of index and middle finger. If distance between them is 0, then hand can be moved to move the item.

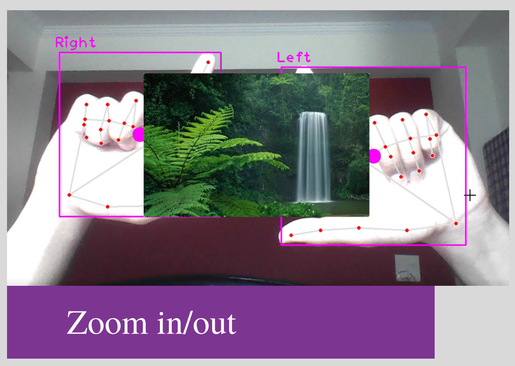
Results



Hand Tracking

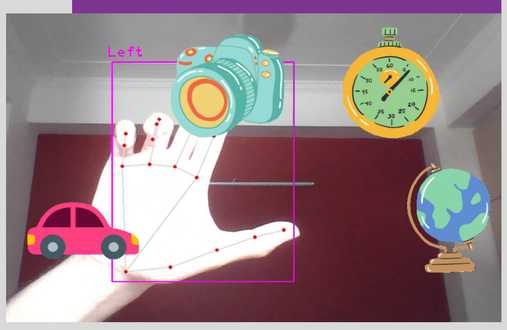
Volume Control





Zoom in/out

Drag & Drop



Conclusion

There are several advantages to this method. It is very easy and convenient to use, since it doesn't require external equipment. It has a good accuracy of 80-90%. Also, It is very interactive It comes with some disadvantages as well. It can't be used for long distances after a few meters. It requires a decent camera and doesn't work very accurately on low resolution cameras. Also, it gets confused when two hands are used simultaneously.