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# PROJECT REPORT

## (COMPUTERS IN SOCIETY 2 CREDIT COURSE)

# AI VIRTUAL MOUSE

## With

# HAND GESTURES

# Introduction:

- As technology is developing people are having smaller and smaller devices
- The importance of Human Computer Interaction (HCI) and in particular vision based gesture and object recognition
- In this project, the approach of using a video device to control the mouse system and tasks like click and double click is suggested

# Objective:

- Most laptops have a physical touch pad or desktop use a physical device such as mouse or joystick to control the cursor on the screen
- The aim is to manage the application of a mouse by using gestures and simple hand movement
- The ai is to remove the requirement of having a physical device
- This could reduce cost of hardware required to build a computer

# Libraries used for the project:

- MediaPipe
- Autopy
- Numpy
- OpenCV-Python

# Steps involved in processing:

- The library of MediaPipe has been use in the project
- MediaPipe is a framework by google thats provides solutions to live media.
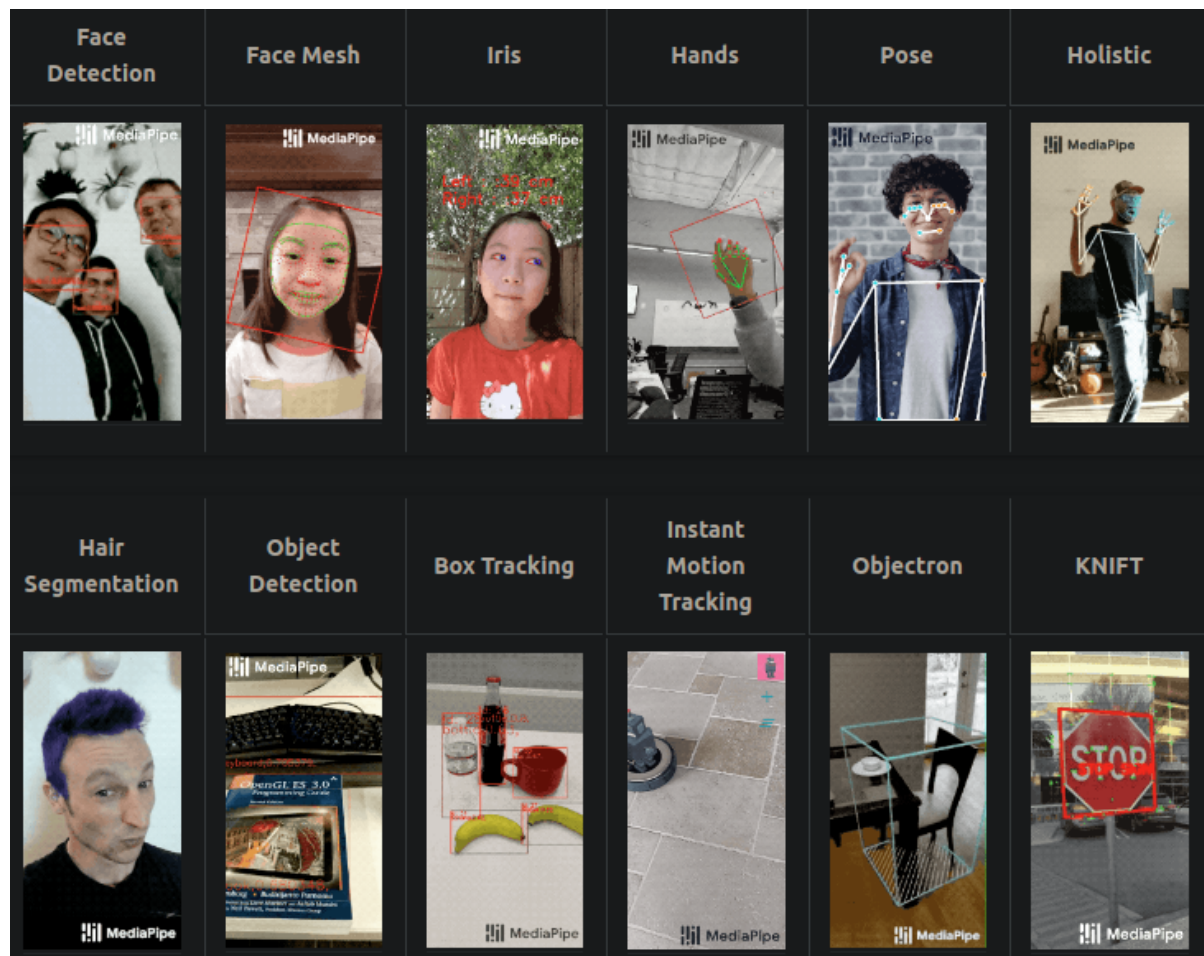
## Hand landmarks in mediapipe:

- Mediapipe has over 50,000 images trained in their models
- Media pipe recognized hands when images are provided to the library and returns landmarks which are points designated to identify various points on the hand and they have been given a number
- We feed the image data of each moment from the live cam to mediapipe which recognises the hands if present and then returns the coordinates of the various 20 points set by mediapipe.
- We then use those coordinates to track the position of the index finger and move the mouse to the calculated coordinate on the screen
- To move the mouse we use the autopy library which is a GUI automation library in python
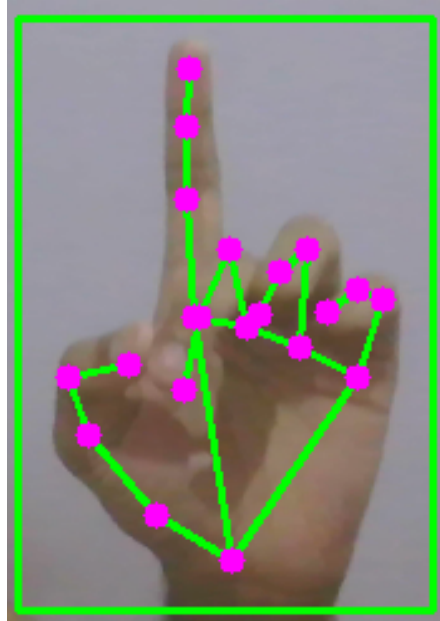
- Next we find the distance between the points on the tips of the index finder and middle finger and draw a line between them.
- We then see if the length is smaller than a particular value, we perform a click.
- This allows us to click on anything by snapping the raised index finger and middle finger
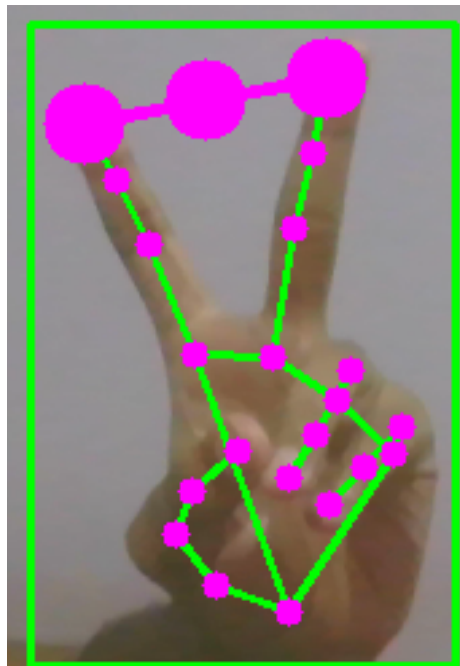
# Conclusion:

- The virtual mouse has pretty good accuracy, but fails sometimes when the background color is indistinguishable with the skin color.
- In such cases sometimes the coordinates of points is miscalculated
- This can be improved by training more and more images in various lighting conditions various backgrounds etc
- Future scope of this project includes adding more and more gestures and maybe even use palm for various gestures
- We can let the user create his own set of gestures for various commands

# Code:

The code for the project can be found on my github at
https://github.com/Subham-Panda/VIT-J-Components/tree/master/CSI%20-%202%20credit%20course/python%20virtual%20mouse/AiVirtualMouse