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Contactless Input system

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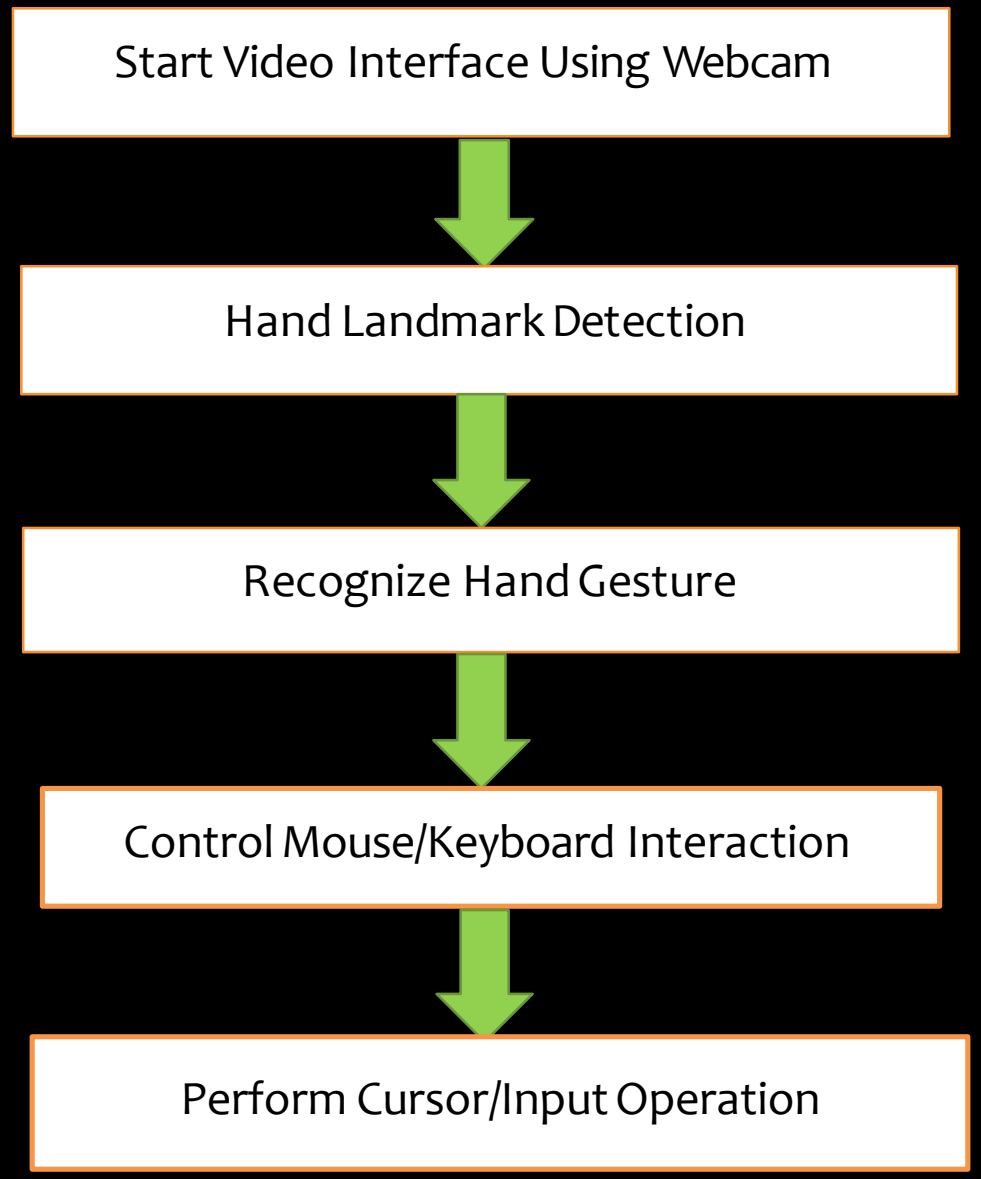
Introduction

- This project is to develop a contactless Input system using Hand Gestures Recognition.
- The hand gestures are the most effortless and natural way of communication.
- The aim is to perform various operations of the cursor.
- Instead of using more expensive sensors, a simple web Camera can identify the gesture and perform the action.
- It helps the user to interact with a computer without any physical and hardware device to control mouse operation.

Problem Statement

- To design a Virtual mouse and Keyboard which detects hand gestures and perform operations only using fingers.
- We used different combinations of fingers to perform various operations of the mouse and keyboard according to which particular combination of fingers is recognized.
- In proposed system users don’t have to color their fingers with a specific color and are not required to use any device or sensors.
- Easy to use and cost effective.

Proposed System



Methodology (MOUSE)

Operations Of Cursor

- Hand Landmark Detection (fingers up(1) and down (0))
- Move
- Left click
- Double click
- Right click

Steps:

- It will detect the Camera Video interface will be start.
- The camera can extract and recognize human hand gestures from video interface.
- Hand tracking functionality is done by mediaPipe
- After the recognition the cursor move accordingly , to perform various operations.

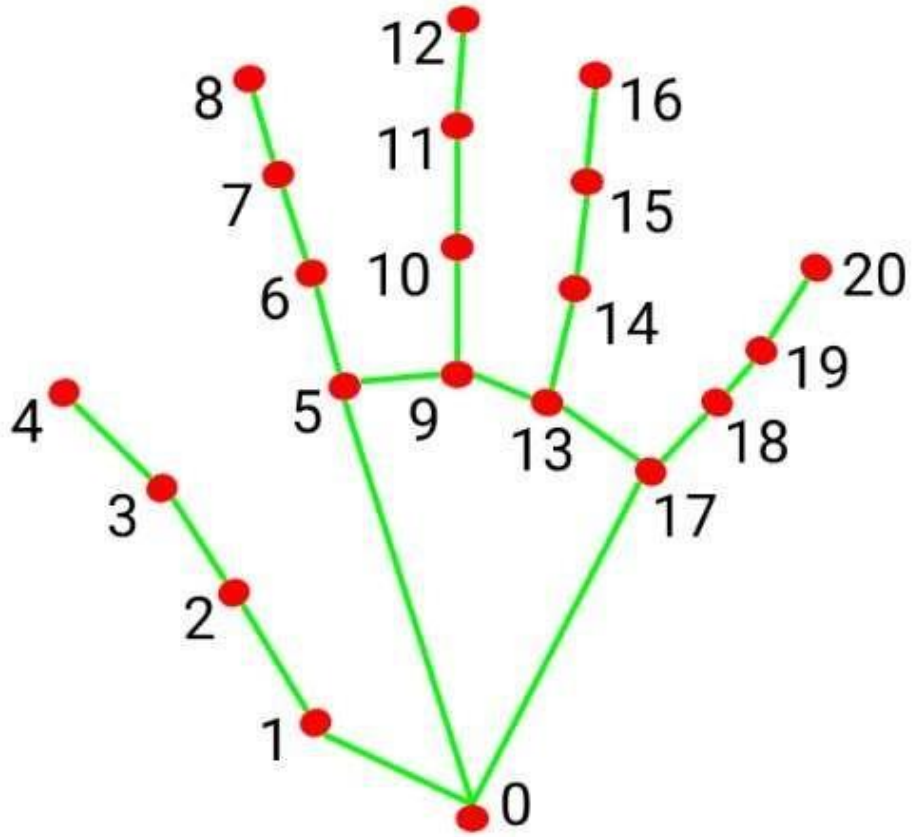
Methodology (Keyboard)

Operations Of keys

- Hand Landmark Detection (fingers up(1) and down (0))
- Move
- Hover over keys
- Takes input

Steps:

- It will detect the Camera Video interface will be start.
- The camera can extract and recognize human hand gestures from video interface.
- Hand tracking functionality is done by mediaPipe
- After the recognition the script will calculate the difference between different finger of the hands and their joints thus triggering the key.



0. WRIST
1. THUMB_CMC
2. THUMB_MCP
3. THUMB_IP
4. THUMB_TIP
5. INDEX_FINGER_MCP
6. INDEX_FINGER_PIP
7. INDEX_FINGER_DIP
8. INDEX_FINGER_TIP
9. MIDDLE_FINGER_MCP
10. MIDDLE_FINGER_PIP
11. MIDDLE_FINGER_DIP
12. MIDDLE_FINGER_TIP
13. RING_FINGER_MCP
14. RING_FINGER_PIP
15. RING_FINGER_DIP
16. RING_FINGER_TIP
17. PINKY_MCP
18. PINKY_PIP
19. PINKY_DIP
20. PINKY_TIP

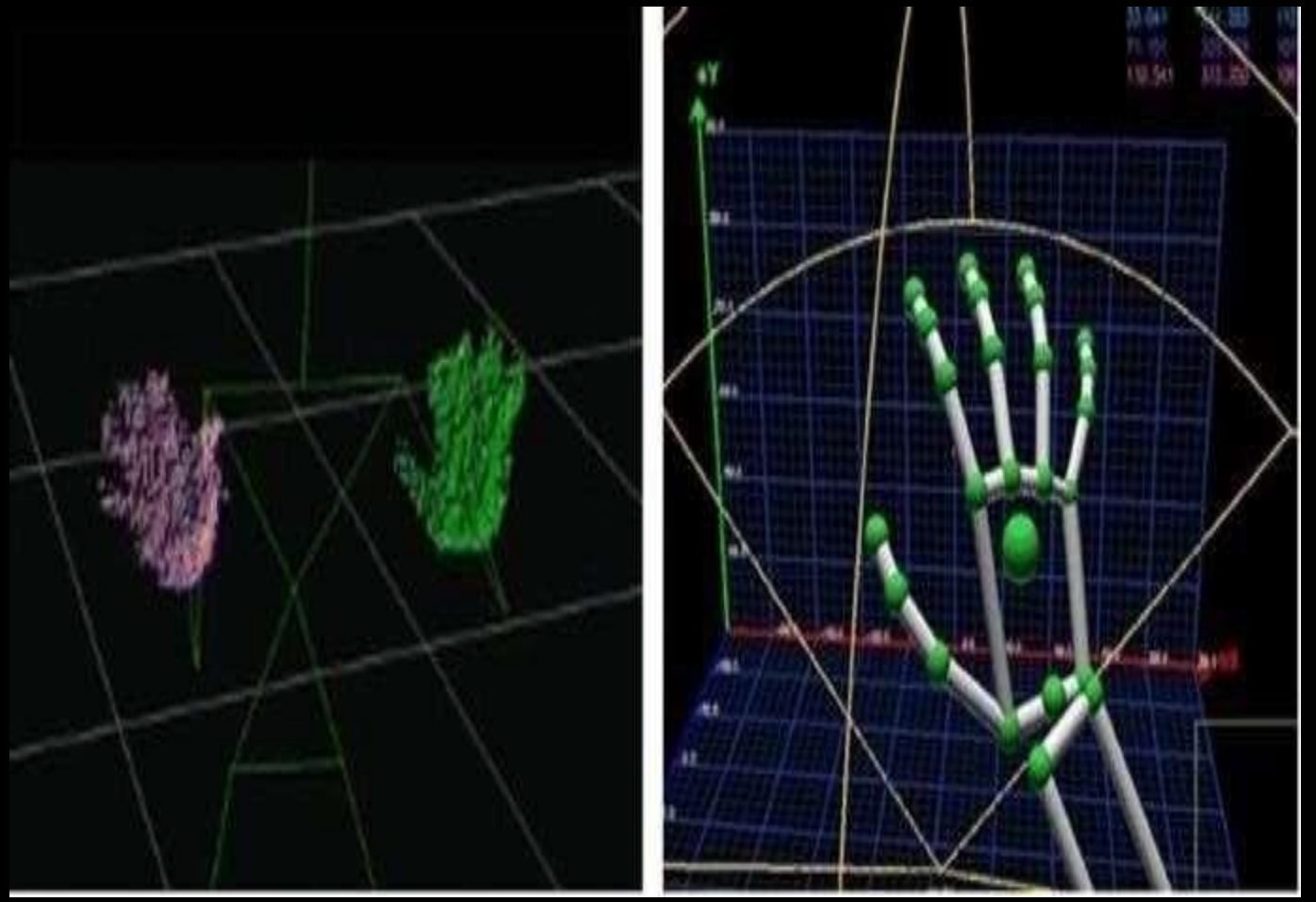
Classification Model

Deep Learning

- Deep learning is a subset of machine learning. It is basically learning and improving on its own by examining other algorithm.
- It works on artificial neural network that was design to imitate human think and learn capabilities

MediaPipe

- MediaPipe is to recognize the hand and the hand key points.
- MediaPipe returns a total of 21 key points for each detectedhand.



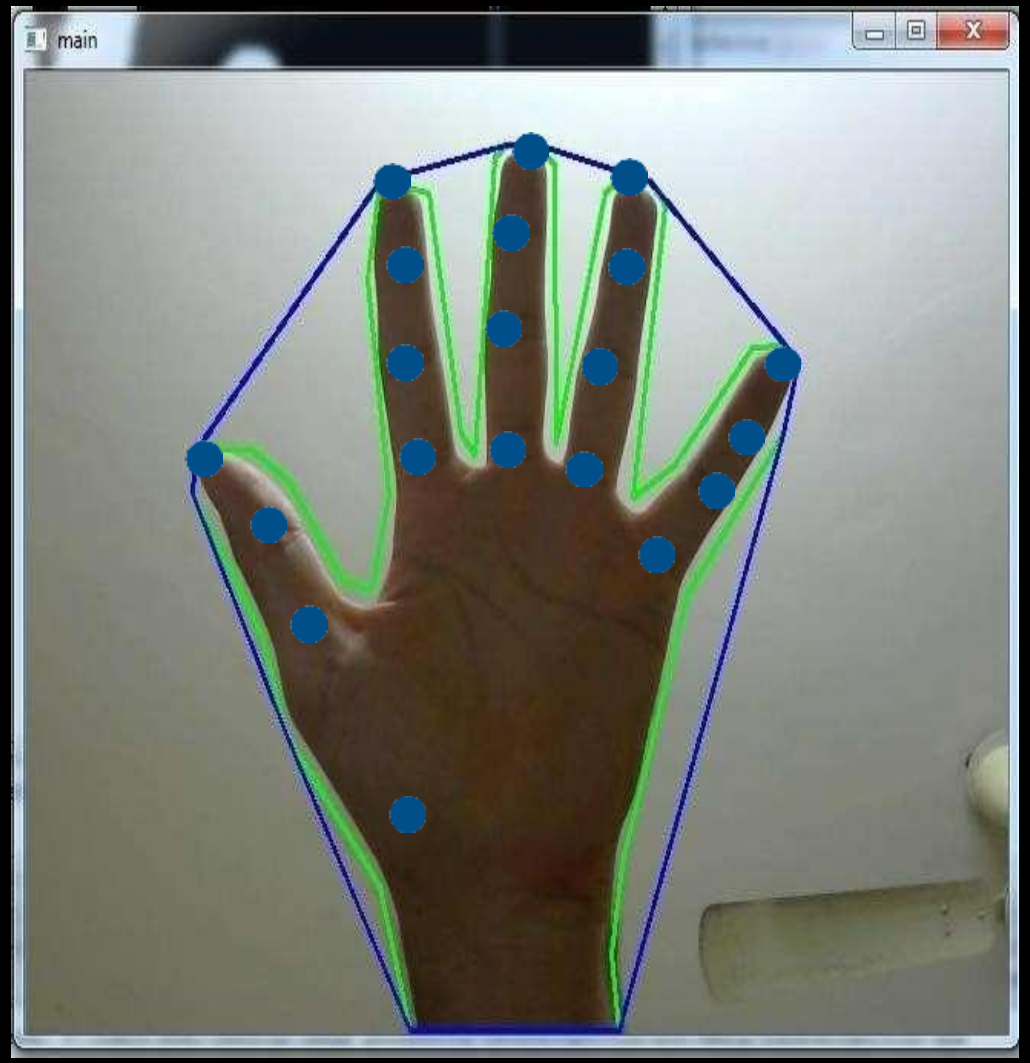
HANDS RECOGNISATION

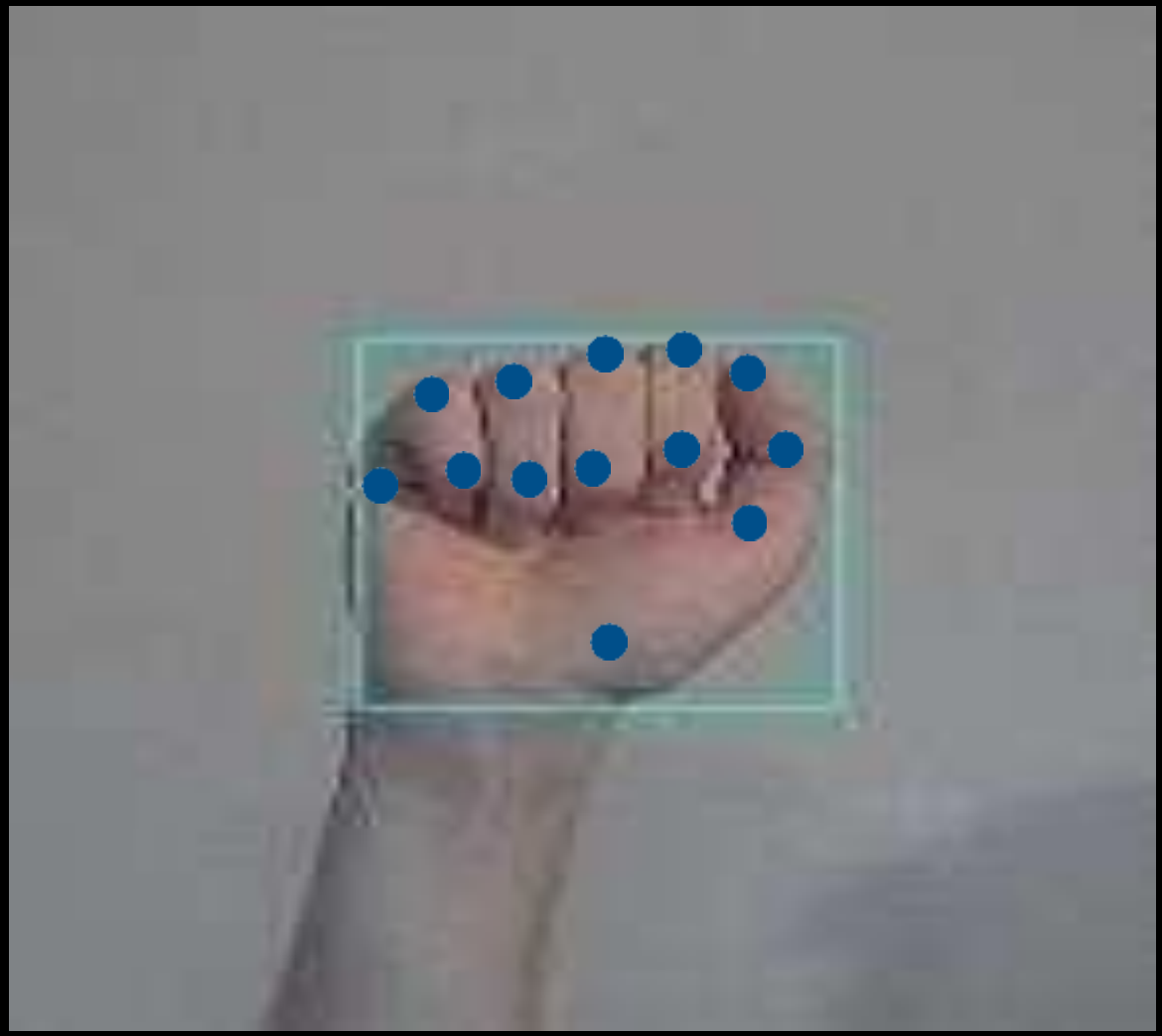
Camera traces the movment of the hand and perform arthmeritc operation and take input as the index finger hovers over the key.

Convolution Neural Network

- To recognize various features of image or video frame cnn make use of layers.
- Cnn used layers to detect the features of input image.
- Apply convolution to each feature detection and get the recognize output image.

Implementation





Resources

Used libraries:

- Python
- Open Cv
- MediaPipe
- Pyautogui
- Pycaw
- CVZONE

Future Scope

- reduces workspace and burden of extra hardware devices.
- It removes the burden of devices , but brings the user and the workspace more closer.

Conclusions

- We are developing a system to control the mouse cursor using a real time camera.
- This system is based on computer vision algorithms and can do all mouse tasks.
- However , it is difficult to use hardware devices in conditions like covid 19 so it gives us the best output.
- this system could be useful in presentations and to reduce work space.
- Features such as enlarging and shrinking windows, closing window, etc by using palm and multiple fingers.