



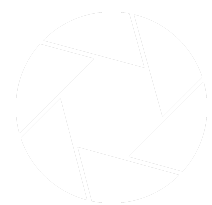
GURUSHIYA SP

Project Plan



SIH - NR1167 (DRDO)

**Gesture Enabled Commands
for Operating Laptop or PC**



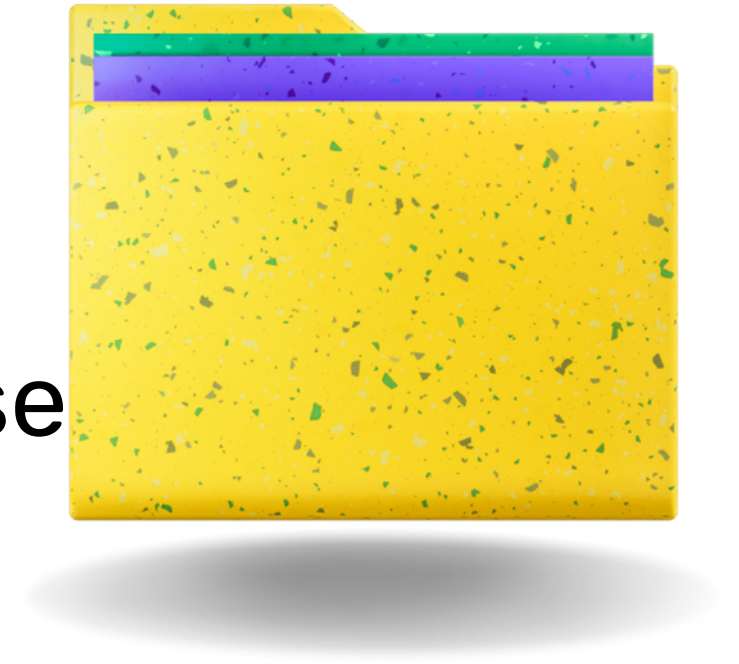
Problem Statement

“Developing a solution for Gesture enabled commands for operating Laptops/PCs for frequently used operations on daily basis” has been listed in the official Smart India Hackathon (SIH) portal by DRDO.

Few gestures could be defined for frequently used tasks- save, exit, print, screen-lock, screen unlock, system shut down, system restart. Save, print and exit operations are context sensitive meaning that it is applicable for current application. For example if word document is open and the gesture for save is done then the document will be saved, if print gesture is done then printer dialog will open etc. Similarly a gesture could be defined for close/exit which will close the current application. If no application is opened then it will work as system shut down. It is similar to Alt+F4 key press functionality on windows PC.

Overview

Humans operate computers basically with the help of mouse and keyboard.



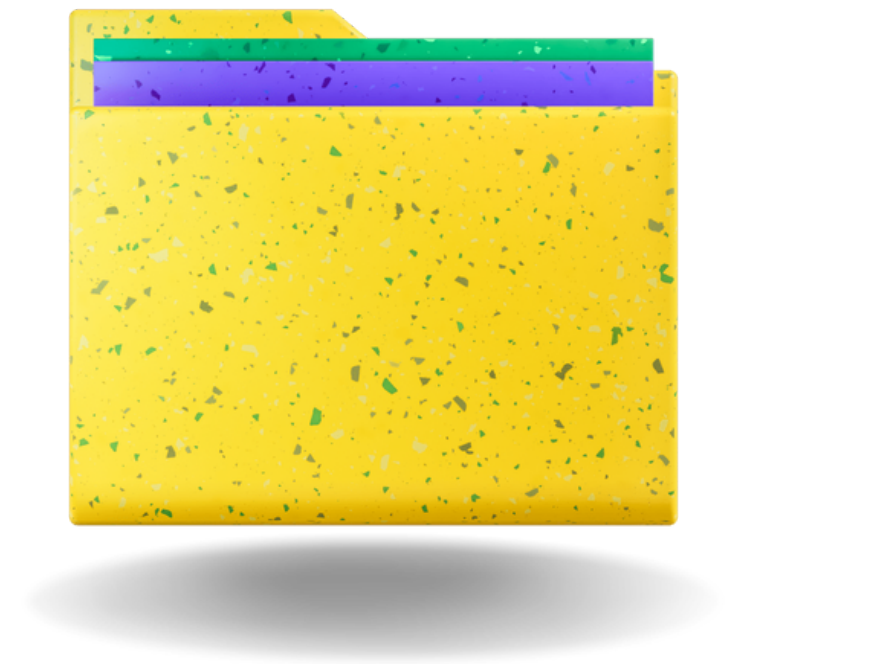
Apart from these two methods, computers can also be operated using physical hand.

This project aims to develop a solution for Gesture enabled commands to operate Laptops/PCs for frequently used operations.



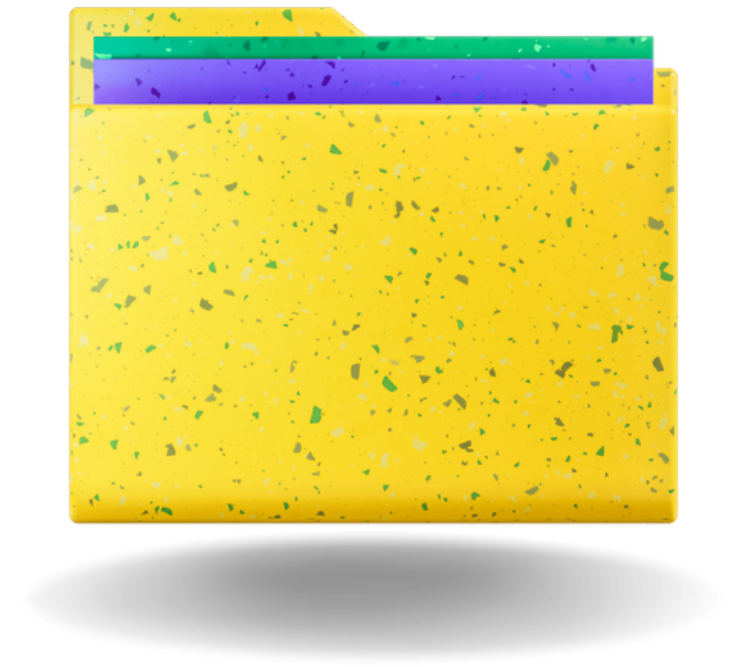
Media Pipe

MediaPipe is a customizable machine learning solutions framework developed by Google. It is an open-source and cross-platform framework, and it is very lightweight. MediaPipe comes with some pre-trained ML solutions such as face detection, pose estimation, hand recognition, object detection, etc.

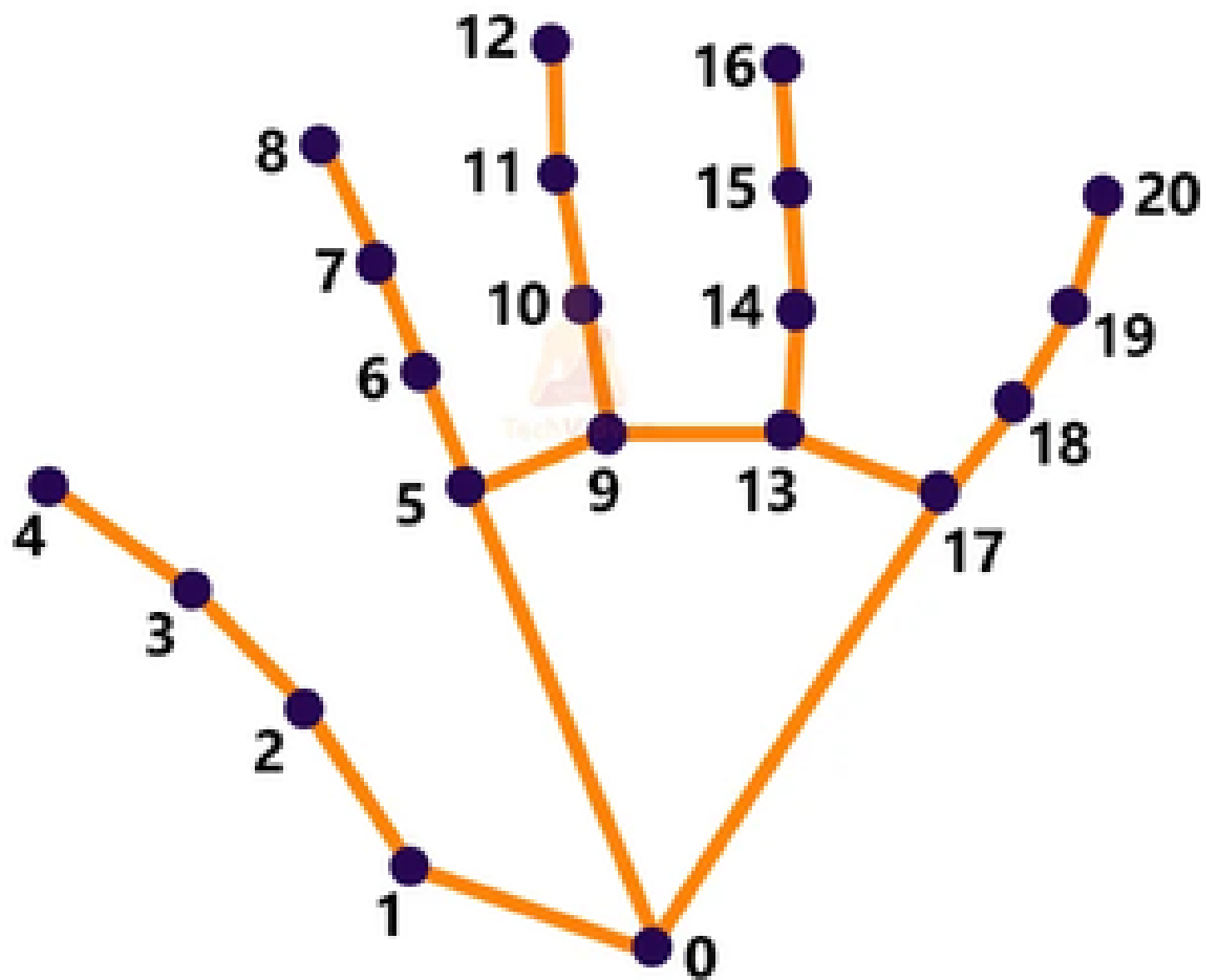


Media Pipe Hands

MediaPipe Hands is a machine learning solution developed by Google that allows for real-time hand tracking and gesture recognition in videos. It uses a deep neural network to detect 21 3D landmarks of the hand, including the fingertips, knuckles, and wrist, in each frame of a video. This technology can be used for a variety of applications, such as augmented reality, sign language recognition, and hand gesture-based control systems. MediaPipe Hands is available as a pre-built TensorFlow Lite model, making it easy to integrate into mobile and web applications.



21 Key Points



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

10 different gestures that the model recognises



Okay



Stop



Peace



Rock



Thumbs Up



Live Long



Thumbs Down



Fist

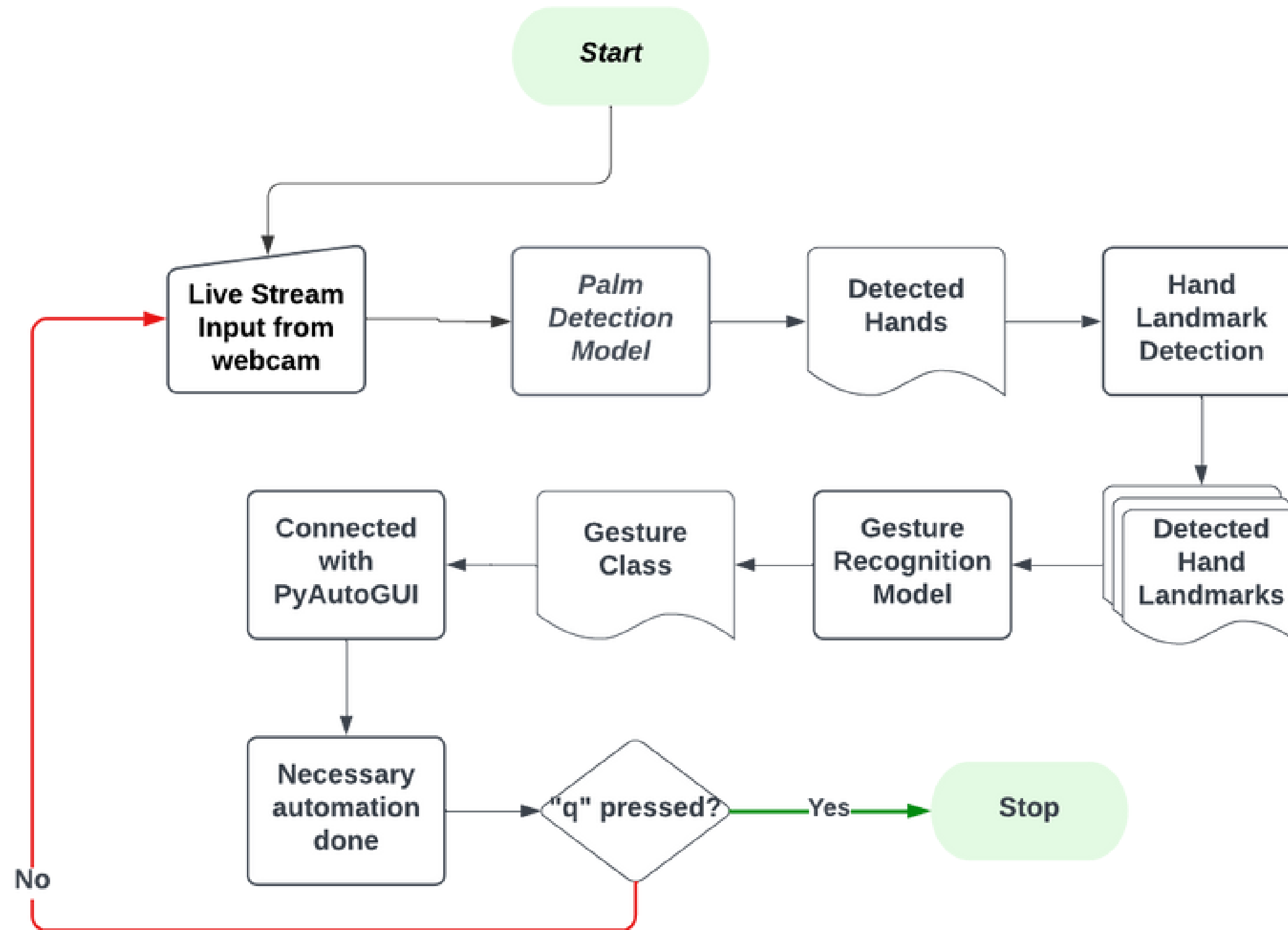


Call me



Smile

Process Flow



Operations and respective gestures



Okay - Enter



Class 0



Rock - Print (ctrl + P)



Class 6



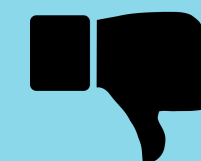
Thumbs Up - Save (Ctrl + s)



Class 2



Thumbs Down - Close (Alt + F4)



Class 3



Stop - Close current tab (ctrl + w)



Class 5

Connect class_ID with PyAutoGUI

```
classID = np.argmax(prediction)
if (classID == 2):
    pyautogui.hotkey('ctrl', 's')
elif (classID == 3):
    pyautogui.hotkey('Alt', 'f4')
elif (classID == 0):
    pyautogui.press('enter')
elif (classID == 6):
    pyautogui.hotkey('ctrl', 'p')
elif (classID == 5):
    pyautogui.hotkey('ctrl', 'w')
```



Rock sign in a word doc

Chapter 5 - Word

Print

Copies: 1

Print

Printer: Microsoft Print to PDF Ready [Printer Properties](#)

Settings

Print All Pages: The whole thing

Pages: [i](#)

Print One Sided: Only print on one side of th...

Collated: 1,2,3 1,2,3 1,2,3

Portrait Orientation

A4: 8.27" x 11.69"

Normal Margins: Top: 1" Bottom: 1" Left: 1" Ri...

1 Page Per Sheet [Page Setup](#)

Close the chrome window. If "thumbs up" gesture is performed meanwhile, then the "Save As dialog box" prompts to save the webpage. If "Okay" gesture has performed, the webpage starts downloading.

Then, if Excel workbook turns to be the current active window, then "thumbs down" sign would close the workbook, if there are no changes made and if user made any changes, then a dialog box with a question "What to save changes to your "Slideshow"? with three options: 1. Save, 2. Don't save, 3. Cancel.

Showing Okay gesture would save the document and eventually closes the Excel workbook. If Rock sign is performed, then window appears to print the document. Showing "thumbs up" at any point in time would directly save the document or prompts the save as dialog box.

S.N	Name	Total images	No. of Categories
1	Facebook Instagram	20000	8

S.N	Name	Total images	No. of Categories
1	Facebook	1000	8
2	Adi Photo	800	8
3	LOFLs	500	8
4	Stock Photos	1.17 million	8
5	Median	2.25	8
6	Twitter 1	1.500	2
7	Twitter 2	800	2
8	Facebook	80000	2
9	Instagram	41.800	2

The datasets that have eight categories mostly has Amusement, Love, Anger, Contentment, Disgust, Excitement, Fear and Sad as categories.

The datasets that have six categories mostly has Anger, Disgust, Fear, Joy, Sad, Surprise as categories.

3 of 4

49%

11:25 PM 4/25/2023

Operations and respective gestures specific to media player



One - Right Arrow (Frwd 5 seconds)



Two - Left Arrow (Bkwd 5 seconds)



Three - Up Arrow (Raise volume)



Four - Down Arrow (Low volume)



Five - Space bar (Pause or Play)



Connect finger counts with PyAutoGUI

```
if (cnt == 1):  
    pyautogui.press("right")  
elif (cnt == 2):  
    pyautogui.press("left")  
elif (cnt == 3):  
    pyautogui.press("up")  
elif (cnt == 4):  
    pyautogui.press("down")  
elif (cnt == 5):  
    pyautogui.press("space")
```



Calculate number of fingers

```
def count_fingers(lst):  
    cnt = 0  
    thresh = (lst.landmark[0].y * 100 - lst.landmark[9].y * 100) / 2  
    if (lst.landmark[5].y * 100 - lst.landmark[8].y * 100) > thresh:  
        cnt += 1  
    if (lst.landmark[9].y * 100 - lst.landmark[12].y * 100) > thresh:  
        cnt += 1  
    if (lst.landmark[13].y * 100 - lst.landmark[16].y * 100) > thresh:  
        cnt += 1  
    if (lst.landmark[17].y * 100 - lst.landmark[20].y * 100) > thresh:  
        cnt += 1  
    if (lst.landmark[5].x * 100 - lst.landmark[4].x * 100) > 6:  
        cnt += 1  
    return cnt
```



Showing one – right arrow

Simulating Keyboard Presses. x (2595) DESCRIPTIVE STATISTICS / x +

youtube.com/watch?v=efj-HVQIfUE&list=PLaeB7Z3CE8rT0D58P4b8fZz3jdOtw0DII&index=3

YouTube

Search

DESCRIPTIVE STATISTICS IS

"THE WAY OF DESCRIBING & SUMMARIZING

THE MAIN CHARACTERISTICS OBSERVED IN THE DATASET

THROUGH TABLES, CHARTS AND SUMMARY MEASURES".

5 seconds

0:15 / 2:27

DESCRIPTIVE STATISTICS AND IT'S TYPES

gurushiya 279 subscribers

Subscribed

106

Share

3.7K views 2 years ago UNI-VARIATE DESCRIPTIVE STATISTICS

UNI-VARIATE DESCRIPTIVE STATIS...

gurushiya - 3 / 14

4 gurushiya 3:55

5 QUALITATIVE DATA WITH EASY EXAMPLES gurushiya 4:46

6 NOMINAL AND ORDINAL WITH EASY EXAMPLES gurushiya 14:08

7 QUANTITATIVE DATA gurushiya 4:49

8 TYPES OF SERIES IN STATISTICS gurushiya 2:53 views • 2 years ago

Arrows.png

Show all

12:32 AM 4/26/2023



GURUSHIYA SP



Thank You

[Back to Agenda Page](#)

