

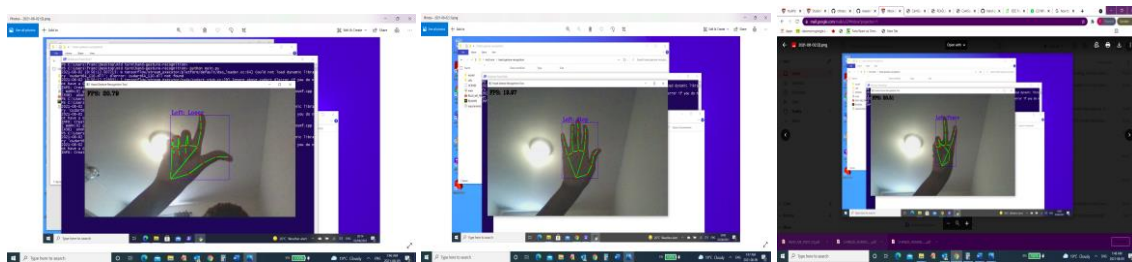
****THIS IS A GUIDE TO MY PROJECT ON HAND GESTURE RECOGNITION****

1. Project Name: Hand Gesture Recognition

2. Brief Description of the Project: My project is drawing on the recognition of the dynamic (motion) model using "mediapipe hands" which is a high-fidelity hand and finger tracking solution using the webcam. My approach was to access information relating to the datasets/images using the extracted features from the hand classifier, which were then sent to a machine learning algorithm that recognizes the hand signs accurately.

The overview of this hand gesture recognition is described by when the hand is detected using the background subtraction method and the result of hand detection is transformed to a binary image. Then, the fingers and palm are segmented so as to facilitate the finger recognition. Moreover, the fingers are detected and recognized. Lastly, hand gestures are recognized using a simple rule classifier.

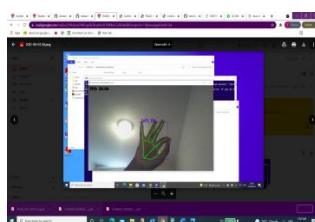
3. Some visuals from my project:



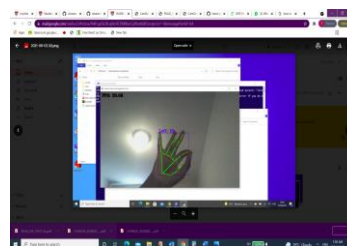
1. LOSER

2. STOP

3. PEACE



4. OK



5. THUMBS UP

4. Installation Guide:

- Before starting make sure you have installed python3 in your computer.
- Do not forget to select Add to path environment variable checkbox while installing python.
- Python version 3.7 is recommended version for this tool. Probably works fine with others as well. To install dependency use on terminal / cmd: `$pip install -r requirements.txt` or `$pip3 install -r requirements.txt` (select based on your pip version)

How to run hand gesture recognition application?

Mac user:

- in terminal go to folder via cd command: `$cd [NAME_OF_DIRECTORY]`
- use `$python main.py`
- camera will open automatically

Windows user:

- By just double click on main.py file you get command prompt AND camera.

OR

- in CMD/PowerShell go to folder via cd command: `$cd [NAME_OF_DIRECTORY]`
- use `$python3 main.py` OR `$python main.py`
- camera will open automatically.

5. Process description & guidelines (Usage):

- Camera will start automatically after you run command,
Important NOTE: To quit from the camera screen **press 'ESC'** from keyboard. Because close button will be inactive in web camera screen.
- Algorithm is divided into 2 parts:
 1. Hand detection: I used media pipe library for detecting hands (left/right) Reference link:
<https://google.github.io/mediapipe/solutions/hands.html>

2. Gesture recognition: I used deep learning base classifier to classify hand gesture based on the standard signs available in <https://brightside.me/wonder-places/15-hand-gestures-that-have-different-meanings-overseas-769110/>.

The 8 gestures of any hand (left or right) relate to the following:

1. Stop
2. Close hand
3. Raise finger
4. Thumbs up
5. Ok
6. Peace
7. Rock on
8. Loser

- With this code, you can successfully detect both left / right hand as well

6. List of features of this tool:

1. User level input functionality – user can try with any webcam / video / live stream.
2. Current accuracy of the system is more than 90% and system can successfully recognize multiple hands up to 2.5 meters with simple HD camera.
3. Modular based code easily separable according to requirement
4. Easy to deploy on server (compatibility)
5. Tool have powerful backend with such advanced deep learning techniques.
6. THRESHOLD available to manage detection. (HIGH THRESHOLD -> very accurate detection)
7. Output form the script should be further used directly with FROUNTEND/SERVERS/APIS.
8. Code is well documented; explanation is available on each line.

7. Future plan: My plans for the future relates and not limited to the following:

1. To be able to implement this project using the cloud storage which was my initial plan but was stalled due to the cost implications and time to completion of the project.
2. Also implement same on a mobile device.

8. Contribution:

This is an open source account and contribution is free subject to notification of same to me via my github account.

9. Acknowledgement:

reference script:

<https://google.github.io/mediapipe/solutions/hands.html>

reference code:

<https://github.com/Kazuhito00/hand-gesture-recognition-using-mediapipe>.

Youtube video - <https://youtu.be/f7uBsb-0sGQ>

10. Project Status:

This project is considered complete for the basis of my Course work for Research Methodology – 5112.

Overview of FILES & FOLDERS:

- main.py : Main script for gesture recognition
- requirement.txt: python dependency
- utils folder: contains files to calculate FPS
- model folder: contain classifier for recognize gesture of hand