# Real-time Hand Gesture Recognition

This project is a real-time hand gesture recognition system that utilizes the MediaPipe library for hand landmark detection and a trained Random Forest classifier for gesture classification. The system is capable of recognizing hand gestures captured from a webcam in real-time and mapping them to corresponding characters or actions.

# Installation

**Prerequisites**

- Python 3.x
- pip package manager

**Installation Steps**

1. Extract the .zip File

2. Navigate to the project directory:
   cd Sign Language Interpreter or directly select the folder and select “open with vs code”

3. Create a virtual environment using the following command:
   In VS Code Terminal
   Type: python -m venv myenv (or)
   python3 -m venv myenv

NOTE - Replace ‘myenv’ with the name you want to give to your virtual environment.

4. Activate the virtual environment by running the activation script:
   In VS Code Terminal
   Type: Scripts\activate

5. Install the required Python packages:
   pip install -r requirements.txt

   NOTE : This is a one step package installation method. This will automatically install all required modules and functions.

**At this point all your installation steps is completed.**

# Executing the Program

### Step 1 : Store_Sign_Language.py

This file is used to collect different hand gestures. So run this program and your camera will turn on to scan different sign or hand gestures.

NOTE:

```
# Number of classes (categories) to collect data for
number_of_classes = 3

# Number of images to collect for each class
dataset_size = 100
```

Here number_of_classes indicate the number of signs (or) hand gestures that you want to store. If you want to store A-Z alphabets then change it to 26.

Here dataset_size indicates the number of images to capture for  hand gesture (per).

For the above example it will automatically generate a Data Folder with 3 sub directories (images of 3 different hand gestures) . i.e
Data Folder/0
Data Folder/1
Data Folder/2

For optimization - Dont change the value, but for more accuracy and precision increase the size.
Remember that the more the size of data, the more the complexity of the program will be.

### Step 2 : Generate_Dataset.py

Just run it and it will generate a data.pickle file

### Step 3 : Train_Dataset.py

Just run it and it will generate a model.p file

### Step 3 : Main.py

This is the main file that will be used for sign language recognition.

In this file you can map your hand gesture with the output tha you want.

For Example -


In Data/0 you have stored first image
In Data/1 you have stored first image
In Data/2 you have stored first image

```
# Dictionary mapping class indices to labels
labels_dict = {0: 'PEace', 1: 'Hang Loose', 2: 'Loser'}
```

In main.py file go to line number 38 and map the TEXT that you want to associate with each image folder name.

In Case if you want to ADD “Hello, How Are you” for image 1, then simply modify the code in following way.

```
# Dictionary mapping class indices to labels
labels_dict = {0: 'PEace', 1: 'Hello, How Are you', 2: 'Loser'
```