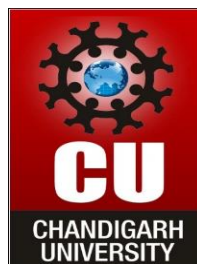*Project Phase II*

Report

On

SIGN LANGUAGE RECOGNITION USING PYTHON

BACHELOR OF ENGINEERING

COMPUTER SCIENCE & ENGINEERING

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INTRODUCTION:

OVERVIEW OF PROJECT:

In this Sign Language recognition project, we create a sign detector, which detects numbers from 1 to 10. We can easily extend this project and add the alphabet too.

In this, the Model can be trained to recognize different gestures of sign language and translate them into English. This will help a lot of people in communicating and conversing with deaf and dumb people.

ESSENTIAL STEPS:

This project can be done with the help of 3 steps: -

Creating the dataset.

Training a CNN on the captured dataset.

Predicting the data.

This project is all about the interaction between deaf & dumb people with normal people for making communication easy, better, and efficient**.**

LITERATURE REVIEW:

Building up a project on sign language was a great piece of experience, it not only helped me in gathering information and learning about the programming language python but also made me realize that we can use programming for doing such minimal tasks and make our life much easier.

Discussing how this learning process started and the journey up to building up this project goes like this.

Firstly, We have created three jupyter notebooks and named them as

Create_gesture_data, DataFlair_trainCNN and model_for_gesture.

We have created 2 folders named train and test. The train folder contains 10 folders named 1,2,3,4,5,6,7,8,9 and 10 and the same for the test folder.

Using the Create_gesture_data notebook, WEhave calculated the accumulated weighted average and classified the ROWE(region of interest).

After we have the accumulated average for the background, we subtract it from every frame that we read after 60 frames to find any object that covers the background.

We have to calculate the threshold value for every frame and determine the contours using cv2.findContours and return the max contours.

When contours are detected (or hand is present in the ROI), We start to save the image of the ROWEin the train and test set respectively for the letter or number we are detecting it for.

Images got saved in test and train folders for all the numbers by changing the element number (for all images one by one).

In DataFlair_trainCNN, we load the data using ImageDataGenerator of Keras through which we can use the flow_from_directory function to load the train and test set data, and each of the names of the number folders will be the class names for the images loaded.

Now we must design CNN.

Now we fit the model and save the model for it to be used in the last module (model_for_gesture.py)

After every epoch, the accuracy and loss are calculated using the validation dataset and if the validation loss is not decreasing, the LR of the model is reduced using the Reduce LR to prevent the model from overshooting the minima of loss and, we are using the early stopping algorithm so that if the validation accuracy keeps on decreasing for some epochs, then the training is stopped.

The word_dict is the dictionary containing label names for the various labels predicted.

In **model_for_gesture,** we create a bounding box for detecting the ROWEand calculate the accumulated_avg as we did in creating the dataset. This is done for identifying any foreground object.

And we find the max contour and if the contour is detected that means a hand is detected so the threshold of the ROWEis treated as a test image.

 imports for model_for_gesture.py

```
import NumPy as np
import cv2
import Keras
from Keras.preprocessing.image import ImageDataGenerator
import TensorFlow as tf
```

Now we can test the project by showing your hand on the ROWE region and it starts detecting the numbers between 1 to 10.

PROBLEM DEFINITION:

As communication plays an important role in our day-to-day life. We can exchange our thoughts, and ideas with each other through communication. Deaf and Dumb people communicate through a language called "Sign Language".

DEAF – Deaf is the inability to hear.
DUMB – Dumb is the inability to speak.

As Normal people like "us" don't know sign language. So, it is found difficult for normal people to communicate with deaf and dumb people. To solve this difficulty "Sign Language Recognition" is used, which acts as a mediator between normal people and deaf & dumb people.

ASL Sign Language Numbers 1-10
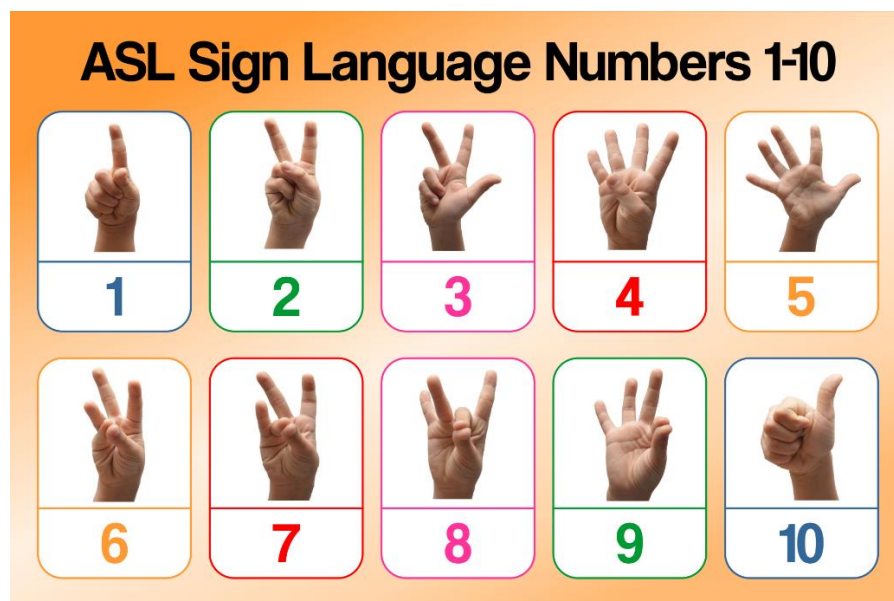
OBJECTIVE:
We will try to recognize signs which include motion. Moreover, we will focus on converting the sequence of gestures into text i.e., words and sentences, and then converting it into speech that can be heard.