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Project Topic

Block diagram

Conclusion

Under the guidance of : Dr Subodh Wariya

Sign Language Recognition Using F-R CNN and Text Conversion

Problem Statement

- Understanding the exact context of symbolic expressions of deaf and dumb people is a challenging job in real life and requires expert knowledge of sign language to be able to communicate/ understand people using these forms of expression.
- Sign language is learned by deaf and dumb, and usually it is not known to normal people, so it becomes a challenge for communication between a normal and hearing impaired person.

Introduction

Sign Language

Working

Application

Prezi

Introduction

- In this project, we identify the sign language gesture using Image recognition, which further trains the model using Faster Region based CNN for better accuracy. Thus, each trained gesture will be classified accordingly helping the user to translate sign language in real time.

- The recognized sign is thus converted to equivalent text and displayed on a LED screen for better comprehension.

- Implementation on **Android App**
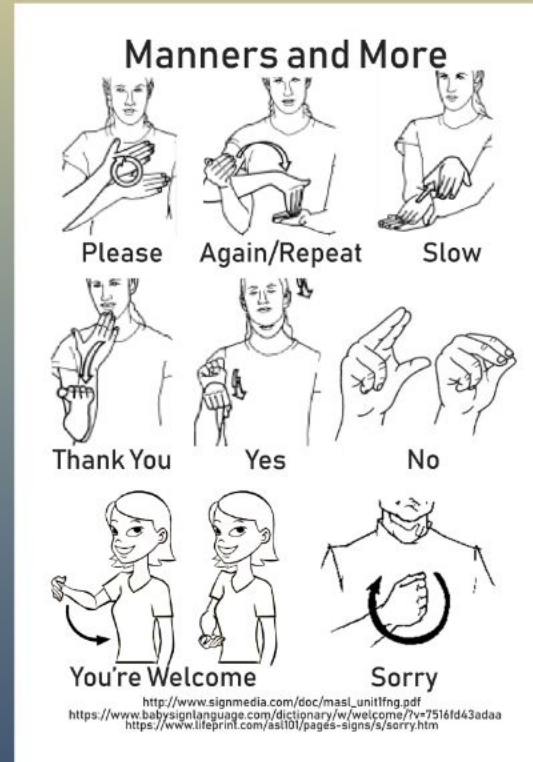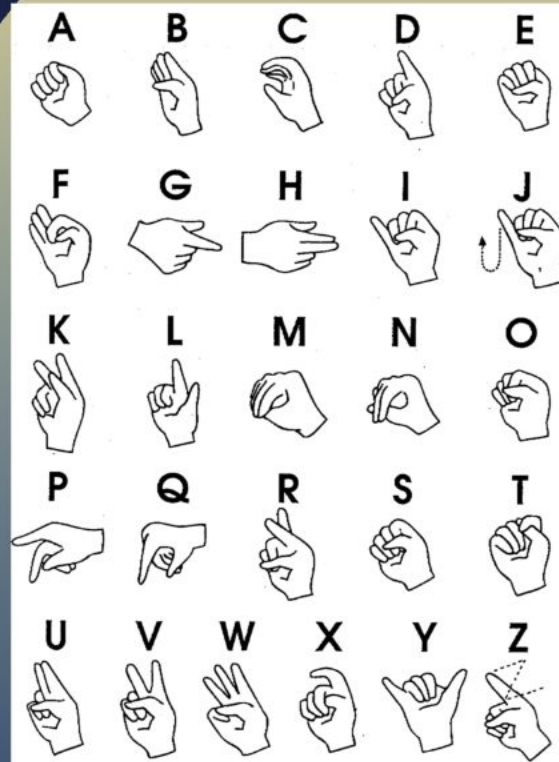
Basic Sign Language

Roadmap

- Researched & Strategy
  - Duration – 1 Nov 2021 – 10 Nov 2021
  - Objective – Research about the project problem definition.

- Selection of tools and frameworks
  - Duration – 15 Nov 2021 – 20 Nov 2021
  - Objective – Research about tools and methods for development of ML models.

- Setting-up environment and installation
  - Duration – 22 Nov 2021 – 24 Nov 2021
  - Objective – Set up the local environment for development via installing frameworks.

- Dataset creation
  - Duration – 26 Nov 2021 – 20 Dec 2021
  - Objective – Create Sign Language Training Dataset for training the ML model

- Training and Testing model
  - Duration – 21 Dec 2021 – Ongoing
  - Objective – Research about the ML models under work and training of CNN model using previously created dataset.

- Accuracy and parameter tuning
  - Duration – To be started
  - Objective – Testing the efficiency of ML model and fine tuning the model via experimentation.

- Deploying on an Android app
  - Duration – To be started
  - Objective – To deploy the working application on android platform.

Software Requirements

- Python 3.6.6
- TensorFlow 1.11.0
- OpenCV 3.4.3.18
- NumPy 1.15.3
- Keras 2.2.1

Why we created our own Dataset?

➔ For the project we tried to find already made datasets but we couldn't find dataset in the form of raw images that matched our requirements.

➔ All we could find were the datasets in the form of RGB values.

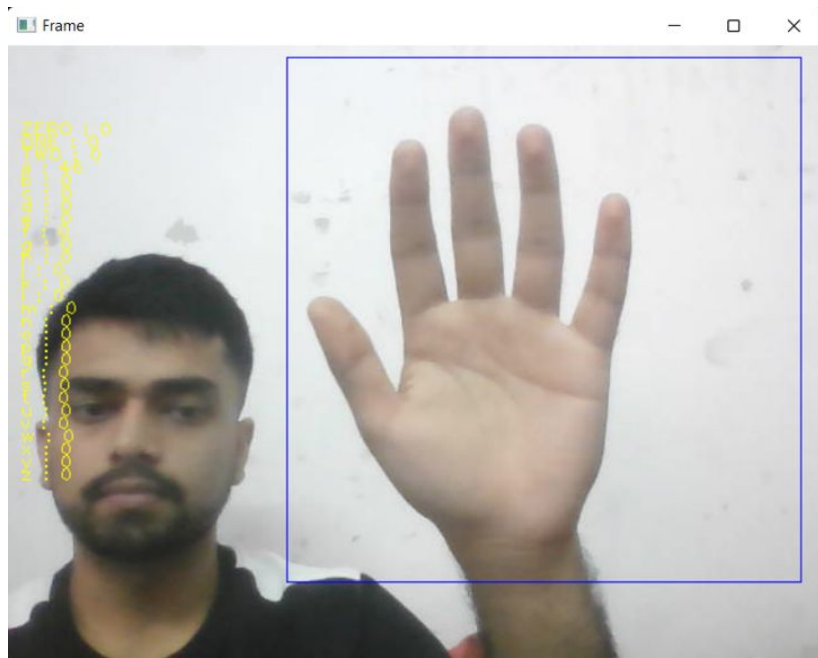➔ Hence we decided to create our own data set.
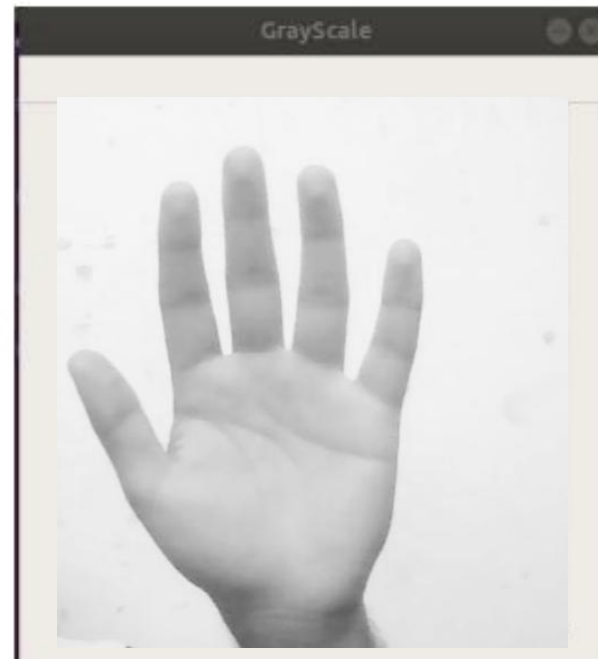
Steps for creation of Datasets
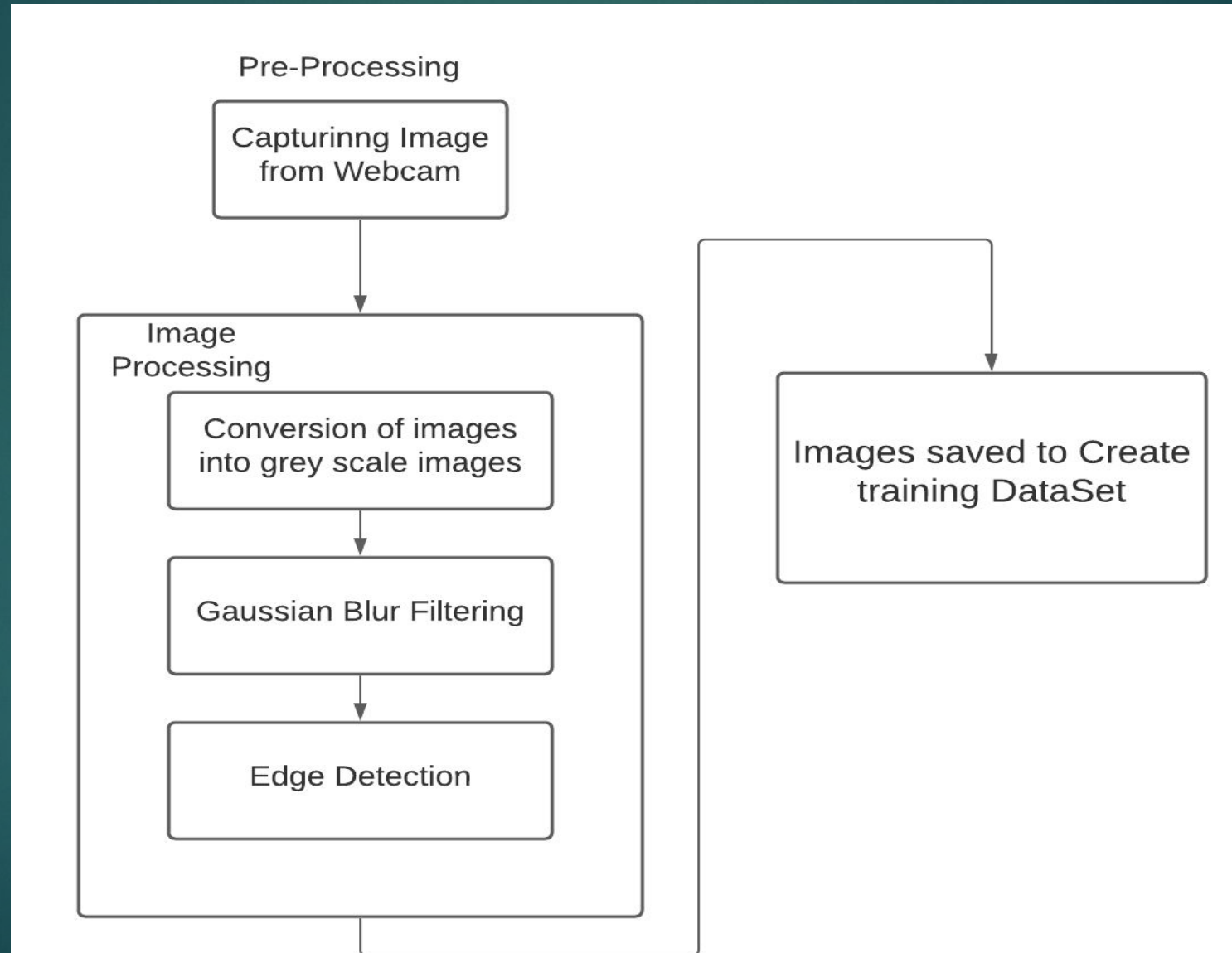
- We used Open computer Vision(OpenCV) library in order to produce our dataset.
- First we capture each frame shown by the webcam of our machine. In each frame we define a region of interest (ROI).
- This ROI is denoted by a blue bounded square, as shown below.

- We used grayscale representations for extracting descriptors instead of operating on color images directly is that **grayscale simplifies the algorithm and reduces computational requirements.**

- We used Gaussian filter (a linear filter) to blur the image and to reduce the noise. We used two of them and subtracted them for "unsharp masking" (edge detection). The Gaussian filter alone blurred the edges and reduced the contrast. Gaussian filter is faster because multiplying and adding is faster than sorting.

Capturing Raw Image → Gray Scale Image → Image Post Gaussian Blur

Conclusion

- In this project, we proposed an idea for feasible communication between hearing impaired and normal person with the help of deep learning and machine learning approach.

- There is ever the sounding challenge to develop a sign language system in which data the collection remains invariant of the constraint environment

Future Work

- This model can be implemented on mobile app using app development as a portable sign to text converter device analogous to google translate.

- Sign Language can be used as a gesture for smart home system.

References

[1] EA Kalsh, NS Garewal Sign Language Recognition System International Journal of Computational Engineering Research, 03 (6) (2013), pp. 15-21

[2] ER.Kanika Goyal, Amitoj Singh Indian Sign Language Recognition System for Deaf People. Journal on Today's Ideas - Tomorrow's Technologies, 2 (2) (2014 December)

[3]A Krizhevsky, I Skutskever, GE Hinton ImageNet Classification with Deep Convolutional Neural Networks Advances In Neural Information Processing Systems. (2012), pp. 1-9