

REAL-TIME SIGN LANGUAGE DETECTION AND RECOGNITION

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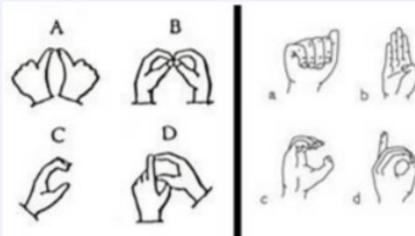
ABSTRACT:

Sign Language detection by technology is an overlooked concept despite there being a large social group which could benefit by it. There are not many technologies which help in connecting this social group to the rest of the world.

Understanding sign language is one of the primary enablers in helping users of sign language communicate with the rest of the society. So in this project we will be creating a Sign Language Detection System using OpenCV ,Machine Learning and Deep Learning which will detect Sign Language gestures in Real-time, which will be helpful for deaf and disabled people.

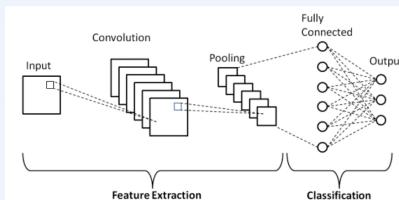
INTRODUCTION:

There have been several advancements in technology and a lot of research has been done to help the people who are deaf and dumb. Aiding the cause, Deep learning, and computer vision can be used too to make an impact on this cause. This can be very helpful for the deaf and dumb people in communicating with others as knowing sign language is not something that is common to all, moreover, we create a sign detector, which detects alphabets from A to Z that can very easily be extended to cover a vast multitude of various types of signs and hand gestures.



METHODOLOGY:

The first step of the proposed system is to collect data. For our system, we make use of the web camera to shoot the hand gestures. The images undergo a series of processing operations whereby the backgrounds are detected and eliminated. Segmentation is then performed to detect the region of the skin tone. Using the morphological operations, a mask is applied on the images. With openCV, the images obtained are amended to the same size so there is no difference between images of different gestures .Binary pixels are extracted from each frame, and Convolutional Neural Network is applied for training and classification. The model is then evaluated and the system would then be able to predict the alphabets.



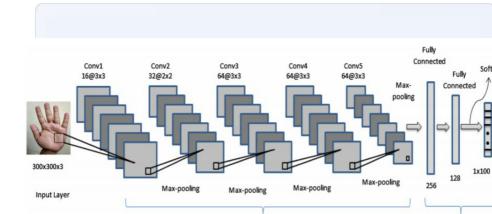
WORKING:

Let's understand the flow of our project: Data Processing, Training, Classify Gesture.

Data Processing: The load data.py script contains functions to load the Raw Image Data and save the image data as NumPy arrays into storage. This performs preprocessing on data. And make it ready for training the CNN model.

Training: The training loop for the model is contained in train model.py. The model is trained with hyperparameters obtained from a config that lists the learning rate, batch size, image filtering, and number of epochs. The configuration used to train the model is saved along with the model architecture for future evaluation and tweaking for improved results. The model is evaluated every epoch on the validation set and the model with best validation accuracy is saved to storage for further evaluation and use. Upon finishing training, the training and validation error and loss is saved to the disk, along with a plot of error and loss over training.

Classify Gesture: After a model has been trained, it can be used to classify a new ASL gesture that is available as a file on the system. The user inputs the file path of the gesture image and the test data.py script will pass the file path to process data.py to load and preprocess the file the same way as the model has been trained.



CONCLUSION:

In this Project, we have gone through an automatic sign language gesture recognition system in real-time, using different tools. Although our proposed work expected to recognize the sign language and convert it into the text which can be useful for deaf and dumb people there's still a lot of scope for possible future work. In this project, a survey on sign language recognition is presented and various techniques have been studied and analyzed for the same.

REFERENCES:

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- <https://data-flair.training/blogs/sign-language-recognition-python-ml-opencv/>

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