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Real-Time Recognition of Sign Language Using Machine Learning

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ABSTRACT - Sign Language may be a language within which we tend to create use of hand movements and gestures to communicate with other people who are chiefly deaf and dumb. This paper proposes a system

to recognize the hand gestures employing a Deep Learning Algorithm, Convolution Neural Network (CNN) to map the image and predict the gestures. This paper shows the sign language recognition of 26 alphabets and 0-9 digits hand gestures of yank linguistic communication. The planned system contains modules like pre-processing and Our method provides 95.7 % accuracy for the 26 letters of the alphabet extraction, coaching and testing of model and sign to text conversion. In this project we have used ML, OpenCV and Tensor Flow to recognize face masks. Our dataset got a higher accuracy in recognition. Our method provides 95.7 % accuracy for the 26 letters of the alphabet.

Key Words **- Real-time Deep Neural Network, Convolutional Neural Network, Sign Language, Machine Learning, Alphabet predictions**

1. INTRODUCTION

American signing could be a predominant signing Since the sole incapacity D&M folks have is communication and that they cannot use spoken languages thus the sole means for them to speak is thru signing. Communication is that the method of exchange of thoughts and messages in varied ways that like speech, signals, behavior and visuals. Deaf and dumb(D&M) folks make use of their hands to precise totally different gestures to precise their concepts with others. Gestures square measure the non-verbally changed messages and these gestures square measure understood with vision. This non-verbal communication of deaf and dumb folks is termed signing.

2. EXISTING SYSTEM

Sign language is a visual language and consists of 3 major components [1]:

Fig 1. Sign Language Recognitions Technique

Fingerspelling	Word level sign vocabulary	Non-manual features
Used to spell words letter by letter .	Used for the majority of communication.	Facial expressions and tongue, mouth and body position.

There is no such existing system that implements deep learning techniques that have been proposed in this paper, some attempts to use ML for sign recognition have been made but are less accurate.

3. PROPOSED SYSTEM

In our project we basically focus on producing a model which can recognize in fingerspelling based hand gestures in order to form a complete word by combining each gesture. The gestures we aim to train are as given in the image below.

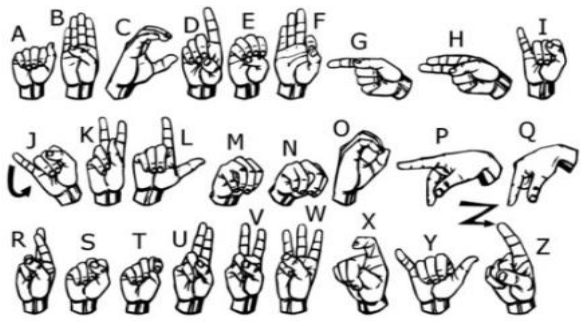


Fig 2. A-Z Sign Symbols

3.1 METHODOLOGY

The system may be a vision based approach. All the signs are delineated with blank hands so it eliminates the matter of victimization any artificial devices for interaction.

Data Set Generation

For the project we tend to tried to search out already created datasets however we tend to couldn't find dataset within the sort of raw pictures that matched our necessities.

All we could realize were the datasets within the sort of RGB values. Steps we tend to followed to make our information/data set are as follows. we tend to use Open computer vision (OpenCV) library as a source to provide our dataset. Firstly, we tend to capture around 1500 pictures of every of the image in ASL for coaching functions and around 200 pictures per image for testing purpose. 1st we tend to capture every frame shown by the digital camera of our machine. In every frame we tend to outline a section of interest (ROI) that is denoted by a blue delimited square.

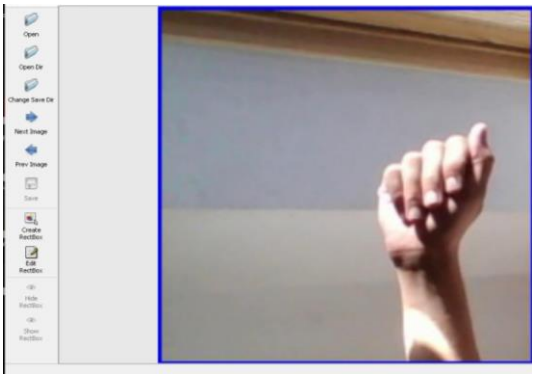


Fig 3. Sign Language Input

From this whole image we extract our ROI which is RGB Image as shown below.

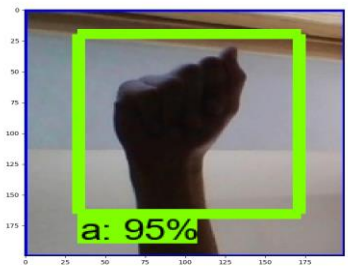
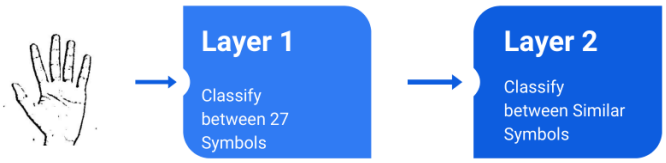


Fig 4. Sign Language Output

Gesture Classification:

- In [2] Hidden Markov Models (HMM) is employed for the classification of the gestures. This model deals with dynamic aspects of gestures. Gestures are extracted from a sequence of video pictures by pursuing the skin-color spots comparable to the hand into a body–face house targeted on the face of the user. The goal is to acknowledge 2 categories of gestures: deictic and symbolic. The image is filtered using a quick look–up categorization table. when filtering, coloring pixels are gathered into spots. Spots are applied mathematics objects supported the situation (x, y) and also the colourimetry (Y, U, V) of the coloring pixels so as to see undiversified areas.

- In [3] Naïve Thomas Bayes Classifier is employed that is a good and quick technique for static hand gesture recognition. it's supported classifying the various gestures consistent with geometric based mostly invariants that are obtained from image information when segmentation. Thus, not like



several alternative recognition ways, this technique isn't obsessed on coloring. The gestures area unit extracted from every frame of the video, with a static background. the primary step is to phase and label the objects of interest and to extract geometric invariants from them. Next step is that the classification of gestures by employing a K nearest neighbor rule power-assisted with distance coefficient rule (KNNDW) to produce appropriate information for a regionally weighted Naïve Bayes‟ classifier

Fig 5. Gesture Classification

4. FLOWCHART

Flow of system is as follows:

I. Start, Engage camera module for capturing any hand gestures in the frame.

II. Acquire Gesture, this node acquires/detects/recognizes any hand gestures that are being made in the vicinity of the frame of the camera and captures any hand gestures that are seen by the camera and feeds it to the ML model.

III. Compare, this node takes the acquired gestures captured in the previous node and the ML model compares it with the dataset that it has trained on.

IV. If match found, if the acquired gesture is found/matched/resembles any gesture in the dataset, it forwards to the next node else it returns that gesture made is not a letter/alphabet.

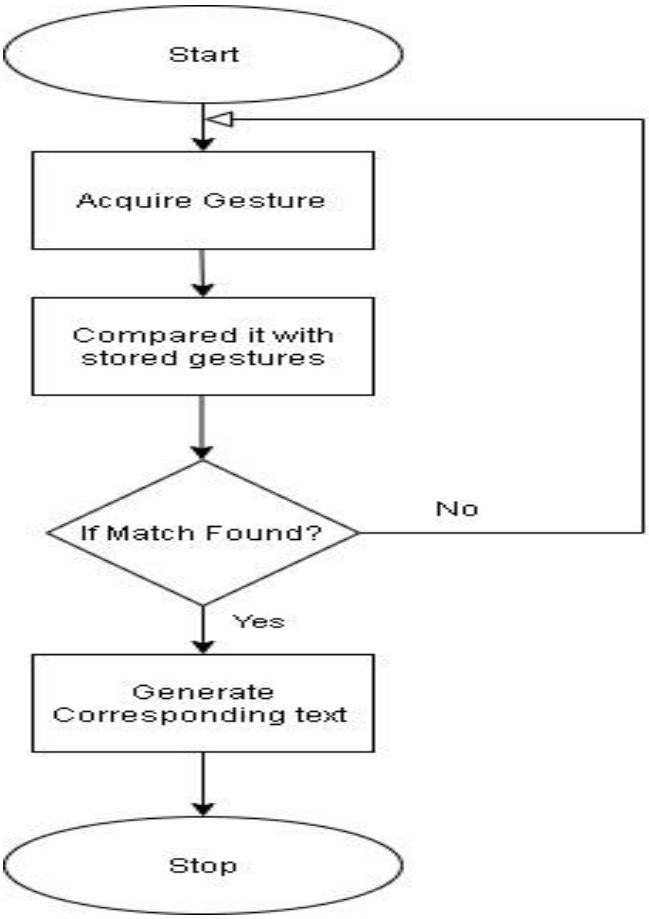


Fig 6. Flowchart

V. Generating Text, if the previous node returns that made gesture has matched and entry in the dataset, the model returns the corresponding value associated with the made gesture and displays it to the user.

VI. Stop, Programs stops its function.

5. SYSTEM PREREQUISITES

Owing to the compressed model used for our drowsiness detection system we have set the hardware requirements to a minimal. This system was developed and trained on a machine with a GTX 1650 which has 896 CUDA cores with a base clock speed of 1485 Mhz., It was also tested on Raspberry Pi 3B as an embedded board, it performed satisfactorily.

For software perquisites, one must have python (3.6 or higher) installed on their system with following packages for the program to run effectively:

- Keras
- Tensorflow
- Numpy
- OpenCV

6. CONCLUSIONS

- In this report, a functional real time vision based American sign language recognition for D&M people have been developed for asl alphabets.
- We achieved an accuracy of 95.7% on our dataset.
- Prediction has been improved after implementing two layers of algorithms in which we verify and predict symbols which are more similar to each other.

7. FUTURE SCOPE:

We are planning to achieve higher accuracy even in case of complex backgrounds by trying out various background subtraction algorithms. We are also thinking of improving the preprocessing to predict gestures in low light conditions with a higher accuracy**.**

REFERENCES

[1] http://www-i6.informatik.rwth-aachen.de/~dreuw/database.php

[2] T. Yang, Y. Xu, and "A. , Hidden Markov Model for Gesture Recognition", CMU-RI-TR-94 10, Robotics Institute, Carnegie Mellon Univ.,Pittsburgh,PA, May 1994.

[3] Pujan Ziaie, Thomas M¨uller , Mary Ellen Foster , and Alois Knoll"A Na¨ıve Bayes Munich,Dept. of Informatics VI, Robotics and Embedded Systems,Boltzmannstr. 3, DE-85748 Garching, Germany.

[4] https://en.wikipedia.org/wiki/Convolutional_neural_network

[5] https://en.wikipedia.org/wiki/TensorFlow

[6] https://opencv.org/