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SIGN LANGUAGE RECOGNIZATION SYSTEM FOR DUMB AND DEAF PEOPLE

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ABSTRACT

Deaf and Dumb people use sign language to communicate. There are various sign recognition techniques that produce output in the form of words or identified signs. The suggested method focuses on Sign Language Interpretation in correct sentences. In addition to sign identification several NLP (Natural Language Processing) techniques are applied. Input is given as video of sign language followed by framing and segmentation on video. Deaf people get isolated as result of this. However, if an android application can be developed to convert sign language into written and audio format, the gap between normal people and the deaf community can be narrowed.

1. INTRODUCTION

The way of transferring the information from one person to another is called communication. Most of the time people use signs and words for the communication. Natural language is used by normal people to communicate/interact with each other while tactile sign language is used by deaf and dumb people to interact. Nowadays people with disabilities experience difficulties to stand in the race because of ferocious competition in every field. The effort is to develop an application which to a survey, India consists of nearly 2.4 million deaf, dumb populations which approximately make up 20% of the world's total deaf and dumb population. For hassle-free interaction between the normal person and deaf and dumb person, there is a need of an interpreter (Person who has the knowledge of sign language, as well as normal language).

Sign language is divided into two i.e., Visual Sign Language & Tactile Sign Language. a) Visual sign language: It is used by hearing & speech impaired people b) Tactile sign language: It is used by hearing & sight impaired people. We are basically working on the visual sign language used by deaf & dumb. Sign Language varies country to country it depends on its culture as Sign language in India is ISL (Indian Sign Language) America uses ASL (American Sign Language), China uses CSL (Chinese Sign Language). Sign Language is a method of communication for deaf & dumb which is composed of various gestures formed by hand shapes, body orientation & facial expression.

2. METHODOLOGY

Problem Definition

Deaf and dumb people use sign language to communicate. There are various sign recognition techniques that produce output in the form of words for identified signs. Dumb people are usually deprived of normal communication with other people in the society. Also normal people find it difficult to understand and communicate with them. These people have to rely on an interpreter or on some sort of visual communication. The suggested method focuses on sign language interpretation in correct English sentences. Sign Language is the primary means of communication in the deaf and dumb community. As a normal person is unaware of the grammar or meaning of various gestures that are part of a sign language, it is primarily limited to their families and/or deaf and dumb community.

One of the fastest-growing areas of research is sign language recognition. In this field, many innovative techniques have lately been created. Sign Language is mostly used by deaf and dumb people to communicate. For hearing-impaired people, sign language is the most natural and expressive method. People who are not deaf never attempt to learn sign language in order to communicate with deaf people. Deaf people get isolated as a result of this. However, if a mobile application can be programmed to convert sign language into written format, the gap between regular people and the deaf community can be narrowed.

- **Proposed Experiment Work**

Our goal is to create a system that can translate sign language into English speech. Using few libraries we have trained an LSTM model to predict signs. This was accomplished by combining image processing techniques with a machine learning methodology. The proposed system would be a real time system wherein live sign gestures would be processed using image processing. Then classifiers would be used to differentiate various signs and the translated output would be displaying text. Machine Learning algorithms will be used to train on the data set. The purpose of the

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system is toimprove the existing system in this area in terms of response time and accuracy with theuse of efficient algorithms, high quality data sets and better sensors.

MODULE

- **Video to frames conversion:**

Using OpenCv the input is taken as an video this video will be then broken down into 30 frames and these 30 images or frames will be then used for plotting and predicting the sign.

Key points Creation:

After getting input from the user, these images are then passed to a function which plots keypoints and their connection using media pipe holistic model and these key points are drawn on thescreen for the user to seeusing matplotlib library. Points indicates joints of body and lines indicates connection between joints.

Creating Datasets:

We will be having a live feed from the web-cam and every frame that detects a gesture is created and keypoint values will be saved in terms of numpy array. These numpy array values are saved for different signs. Eachsign will have 30 different types of numpy arrays.

Training a LSTM on the captured dataset:

We now train a LSTM on the newly produced dataset. To begin, we load the data using keras, We will be developing the datasets ourselves for this project because we need datasets in terms of media pipe holistic keypoint values which is not available as per our requirements on the internet. Every frame that detects a posture will be converted into numpy array and saved in a directory that comprises folders with the name ofsigns, each containing 30 files acquired during dataset creation.

We will then train and test the model using the flow from directory function to import the train and test set data, with the names of the number folders serving as the class names for the images loaded.

Predicting the Gesture:

After successfully training the model with the given dataset. We now directly convert the live frames from the camera into numpy arrays and pass them to the model as input, Now the model will predict based on the keypoint values. The sentence having maximum accuracy with minimum loss will be shown to the user in terms of textbox.

3. RESULTS AND DISCUSSION

The training accuracy achieved when training the image dataset without any augmentation was very high (around 90 percent), but the real-time performance was not up topar. Most of the time, it predicted incorrectly because hand-gestures were not precisely centred and vertically aligned in real time. To compensate for this shortcoming, we trained our model by supplementing our dataset. Although the training accuracy was reducedto 89 percent, there al-time predictions were mostly correct. Offline testing of approximately 9000 augmented images revealed 82 percent accuracy.

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4. CONCLUSION

We conclude that the communication barrier between deaf and dumb people and normal people can be overcome with the help of AI and ML technology.

In this work, we used various tools to run an automatic sign language gesture recognition system in real-time. Although our proposed work expected to recognize sign language and convert it to text, there is still plenty of room for future work.

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