

Hand Gesture for Deaf and Dumb People using ML

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Abstract: Millions of people around the world suffer from hearing disabilities. This large number demonstrates the importance of developing a sign language recognition system converting sign language to text for sign language to become clearer to understand without a translator. CNN Algorithm is proposed based on Sign Language. 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.

Keywords: Convolutional Neural Network, Sign Language, Machine Learning, Alphabet predictions.

I. INTRODUCTION

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it to learn for themselves. The Gestural Channel can be composed into the Human-Computer Interaction by propelling unique assessment in the sign affirmation field. The human sign affirmation thought goes under the general arrangement of model affirmation. The structure in this framework involves two cycles as Representation and Decision Processes. The depiction collaboration changes over the unrefined numerical data into a construction acclimated to the decision cycle which can furthermore arrange the data. The getting framework and the understanding framework are two extra cycles that go under the Gesture Recognition System. These processes convert the physical gestures into numerical data and give a meaning of the symbol series respectively. Any random hand gesture consists of four elements as hand configuration, movement, orientation, and location. These gestures are further classified as static gestures and dynamic gestures.

Over 5 percent of the world population, which means 360 million people, including 32 million children and 328 million adults, has a hearing disability according to World Health Organization (WHO) statistics. Hearing-impaired people generally use sign languages for communicating with other people. But most hearing people do not know sign language. When considering a large number of people who suffer from hearing disabilities, it is revealed how important providing them the opportunity to communicate with hearing people who do not know sign language a need to develop such a sign language recognition system arises day by day. The important key points of such a sign language system are reducing cost and obtaining more accurate rates efficiently. Developing a sign language system based on machine learning for automatically recognition sign language and converting sign language to text helps hearing people communicate and understand hearing-impaired people. The proposed system uses the images in the local system or the frame captured from the webcam camera as input. The processed input image is given to the classifiers which use Convolution Neural Network Algorithm. It classifies the image and converts it into the model. Finally, the predicted result is produced.

II. LITERATURE SURVEY

In [1] the proposed system a novel autonomous learning framework was presented to integrate the benefits of both depth vision and EMG signals. A combination of depth information and EMG with HSOM and MNN was adopted to achieve better accuracy for the designed VR application. A hand gesture recognition demonstration was implemented to verify the effectiveness of the proposed framework.

In [2] the proposed system has the Best Results other than using the sensor for hand gesture recognition. Error Correction Output Code Support Vector Machines (ECOC-SVM) and K -Nearest Neighbor (KNN) classifiers. Sensors were used to capture finger capacitance values. Achieved a classification rate of 97%.

The proposed [3] system provides two-way communication which helps to interact between the impaired people to normal people without any difficulties. Used CNN algorithm techniques for hand gesture recognition. NLP was used to feed the data. Best Results other than using the sensor for hand gesture recognition.

In [4] the proposed system K nearest neighbors from the training data. The distance is calculated using n Euclidean Distance. Support Vector Machine” (SVM) a supervised machine learning algorithm was used for both classification and regression challenges. Obtained Accuracy 90%

In [5] the proposed system 6000 images Database used of English alphabets. 4800 used for training and 1200 for testing. Dataset consisted of 26 signs. SVM techniques were used for classification and Obtained an Accuracy of around 88%

III. PROBLEM STATEMENT

There are many applications where hand gestures can be used for interaction with systems like video games, controlling UAVs, medical equipment, etc. System present and developed for hand gestures recognition can be used by handicapped people to interact with the systems. Classical interactions tools like keyboard, mouse, touchscreen, etc. May limit the way we use the system. All these systems require physical contact, to interact with the system. Gestures can interpret the same functionality without physically interacting with the interfacing devices. The problem lies in understanding these gestures, as for different people, the same gesture may look different for performing the same task. This problem may be overthrown by the use of deep learning approaches.

3.1 Proposed System

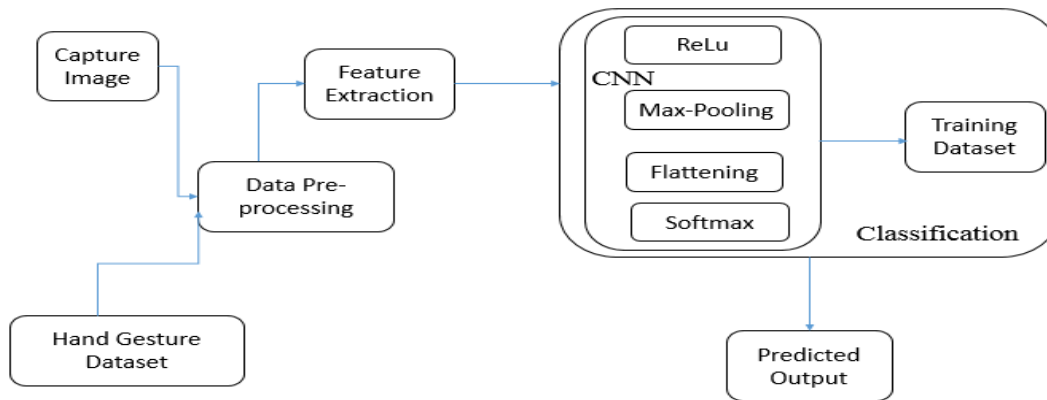
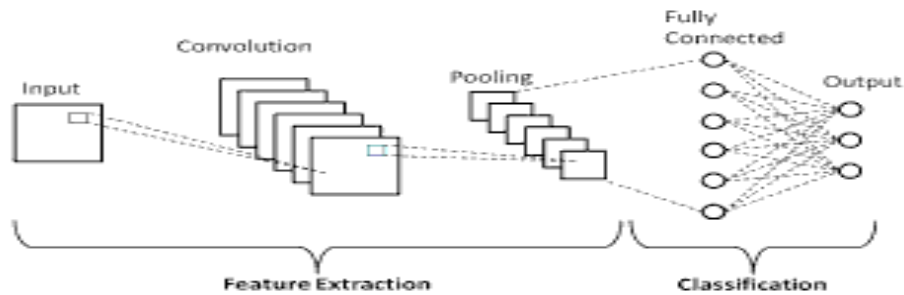


Figure: System Architecture

The proposed system is built in python using techniques of CNN, The system will be able to predict the gesture such as which alphabet or number the person is trying to say. Following is the methodology used in the proposed system

- The image data were collected from Kaggle.
- The collected dataset is divided into 2 parts. i.e :- 80% for training and 20% for testing
- Various Techniques like preprocessing, feature extraction are applied
- CNN was used for classification
- The web application is been developed using PHP and bootstrap for the frontend and Python for the backend.
- The user captured image is passed and captured images features are extracted.
- Extracted Features will be matched with the trained model, depending on nearby match the predicted output is been obtained

3.2 Algorithm Used CNN



A. Why CNN?

- CNN's are used for image classification and recognition because of their high accuracy.
- The CNN follows a hierarchical model which works on building a network, like a funnel, and finally gives out a fully-connected layer where all the neurons are connected and the output is processed.
- Hence we are using a Convolutional Neural Network for the proposed system

IV. CONCLUSION

In the proposed framework this technology Hand Gestures can be recognized with the CNN algorithm will provide us the best result. Hand Gesture Recognition will provide two-way communication which helps to interact between the impaired people to normal people without any difficulties by recognizing the alphabets or number the person wants to say. Hence the implementation system can translate Sign Language and predict characters and numbers.

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