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Hand Gesture Recognition Using Support Vector Machine Learning Algorithm

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Abstract: Communication is the main channel to interact between individuals with each other. Since deaf and dumb people are unable to communicate with normal people, they must rely on some kind of visual communication. It's hard to understand what deaf and dumb people are trying to communicate with us. We have created a dataset from Double-Handed Indian Sign Language Characters image and preprocess data extract features from both the training and testing data set and used support vector machine learning algorithm for classification of data. In our experiment both training data set and test data gives good accuracy We will study this problem in depth and will apply this method for Marathi words recognition system for deaf and dumb community and normal community which will remove communication barrier between two community.

Index Terms **-Indian sign language, Feature Extraction, Classification, Support vector machine.**

I. INTRODUCTION

Communication is the main channel to interact between individuals with each other. Since deaf and dumb people are unable to communicate with normal people, they must rely on some kind of visual communication. It's hard to understand what deaf and dumb people are trying to communicate with us. Hand gesture recognition helps them to communicate with normal people. It is a non-verbal communication or motion of a body which contains information. It includes movement of the hands, face, or other parts of the body. It is distinct from sign language. Sign languages are the natural form of languages that have been used from when the first theories of sign languages appeared in history. It has started to be used even before the human being does not know the spoken languages. Since then, sign language has evolved and been adopted as an integral part of our day-to-day communication process. Now a days, sign languages are being used extensively in international sign use of deaf and dumb, in the world of sports, for religious practices and at workplaces. Gestures are one of the first forms of communication when a child learns to express its need for food, warmth and comfort. It enhances the emphasis of spoken language and helps in expressing thoughts and feelings effectively.

II. RELATED WORK

A Review on Indian Sign Language Recognition -Anuja V. Nair, Bindu. There are mainly two different approaches in sign language recognition - Glove based approach and vision-based approach. The first category requires signers to wear a sensor glove or a colored glove. The wearing of the glove simplifies the task of segmentation during processing. The drawback of this approach is that the signer must wear the sensor hardware along with the glove during the operation of the system. Vision based approach uses image processing algorithms to detect and track hand signs as well as facial expressions of the singer. This approach is easier for the singer since there is no need to wear any extra hardware. Histogram of Edge Frequency (HOEF) is the best feature extraction technique [3]. Automatic Indian Sign Language Recognition for Continuous Video Sequence- Joyeeta Singha, Karen Das This paper describes a novel approach towards a system to recognize

the different alphabets of Indian Sign Language in video sequence automatically. The proposed system comprises of four major modules: Data Acquisition, Preprocessing, Feature-Extraction and Classification. Pre-processing stage involves Skin Filtering and histogram matching after which Eigen vector-based Feature Extraction and Eigen value weighted Euclidean distance-based classification technique was used. 24 different alphabets were considered [4]. Dynamic Hand Gesture Recognition Using the Skeleton of the Hand- Bogdan Ionescu, Didier Coquin, Patrick Lambert, Vasile Buzuloiu. Hand gestures can be divided into two main categories: static gestures and dynamic gestures. In this paper, a novel dynamic hand gesture recognition technique is proposed. They proposed gesture recognition method using both static and dynamic gesture [5]. Brightness Factor Matching for Gesture Recognition System Using Scaled Normalization- Mokhtar M. Hasan, Pramoud K. Misra. They used scaled normalization to recognize gestures using brightness factor matching. With a black background, thresholding techniques are used for segmenting the input images. At the X and Y axis origins, the coordinates of any segmented image are shifted to match the centroid of the hand unit and the image's center mass is determined [6]. Indian Sign Language Recognition Using Eigen Value Weighted Euclidean Distance Based Classification Technique- Joyeeta Singha, Karen Das. In this paper researcher proposed a system using Eigen value weighted Euclidean distance as a classification technique for recognition of various Sign Languages of India. A new classification technique is used Eigen value weighted Euclidean distance between Eigen vectors which involved two levels of classification. Classification based on Euclidean Distance; Classification based on Eigen value weighted Euclidean distance. The system comprises of four parts: Skin Filtering, Hand Cropping, Feature Extraction and Classification [7]. Various datasets for sign language translation have been proposed in recent years (Yin et al., 2021). Specifically for American Sign Language (ASL), there have been some early works on creating datasets (Martinez et al., 2002; Dreuw et al., 2007), where the datasets were collected in the studio by asking native signers to sign content. Other datasets have been proposed for Chinese sign language (Zhou et al., 2021), Korean sign language (Ko et al., 2018), Swiss German Sign Language - Deutschschweizer Gebardensprache (DSGS) and Flemish Sign Language - Vlaamse Gebarentaal (VGT) (Camgöz et al., 2021). In this work, we specifically target Indian Sign Language and propose a dataset with ISL videos-English translation pairs. Most of the existing approaches for sign language translation (Camgoz et al., 2018; De Coster and Dambre, 2022; De Coster et al., 2021) depend on intermediate gloss labels for translations. As glosses are aligned to video segments, they provide fine one-to-one mapping that facilitates supervised learning in learning effective video representations. Previous work (Camgoz et al., 2018) has reported a drop of about 10.0 in BLEU-4 scores without gloss labels. However, considering the annotation cost of gloss-level annotations, it becomes imperative to consider gloss-free sing language translation approaches. Moreover, the gloss mapping in continuous sign language might remove the grammatical aspects from the sign language. Other recent works on Sign language translation include Voskou et al.

III .DATA SET

For dataset creation online images are taken. Which is a single image of Indian sign language which contains all alphabets from A-Z. All alphabets are cropped from those images and dataset is created.

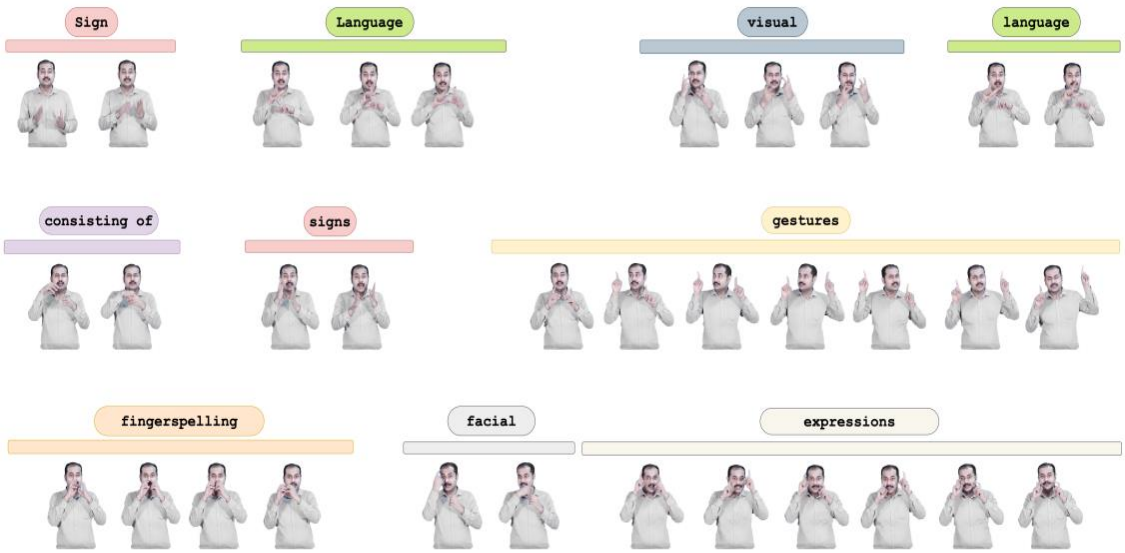

Fig.1 A sample from ISLTranslate: "Sign Language is a visual language consisting of signs, gestures, fingerspelling and facial expressions."

IV. METHODOLOGY

Step1- Data Preprocessing: All cropped images are first resized into one size. All resize images are in rgb images, and all operations are performed on gray scale images so, we first convert rgb image into gray scale. For ease of segmentation, we have converted all images into gray scale images.

Step2- Feature Extraction: We must first extract the features of the training images then find the same features of the test images. Features extracted from the training dataset are compared with the features of test images then classifier classify the test image. When we convert rgb to gray image then we find local binary features of image where contrast, homogeneity, correlation, energy these glcm features are extracted from the image. If we convert an image from rgb to hsv then, a total of 9 features are extracted. They are mean, standard deviation, skewness, min hist, max hist along with contrast, homogeneity, correlation and energy.

Step3- Hand gesture recognition using SVM: After feature extraction process the images are classified by using support vector machine algorithm. The proposed method gives much emphasis on preprocessing and feature extraction. Next important phase is the classification in which gestures are correctly classified into corresponding gesture classes based on the calculated features. Here we use Support Vector Machine classifier (SVM) for classification which finds the optimal separating hyperplane between classes based on supervised learning on the training data. Given a set of training examples each marked as belonging to one of the two categories an SVM training algorithm builds a model that predicts whether a new example falls into one category or another.

Steps to be followed to apply support vector machine algorithm: -

- Prepare dataset, dividing it into training and testing set.
- Prepare validation set out of training set
- Feature selection
- Find best parameters
- Test the model with the test set

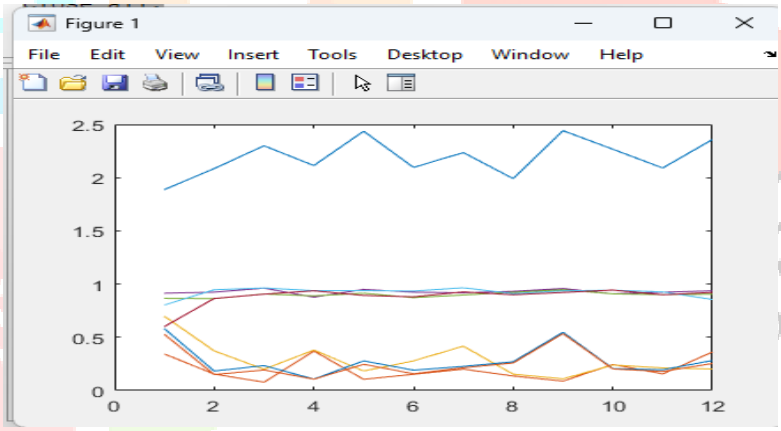

Fig.2 Plot of features extracted from the test dataset.

V. RESULTS

Output of the model after training.

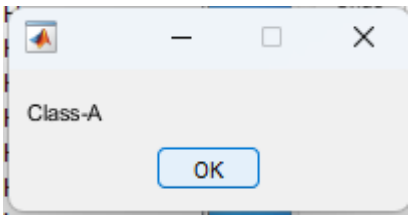

Fig.3 Output after selecting A.

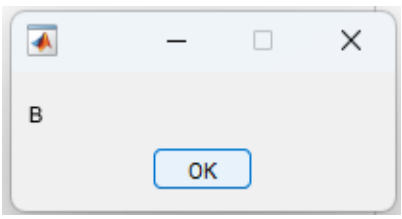

Fig.4 Output after selecting B.

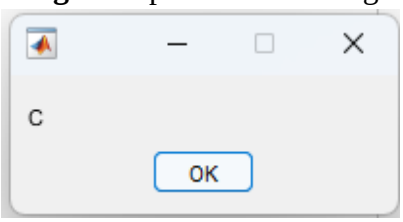

Fig.5 Output after selecting C.

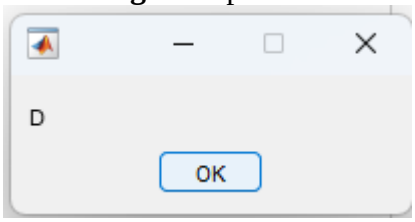

Fig.6 Output after selecting D.

VI. CONCLUSION

We have created a dataset from Double-Handed Indian Sign Language Characters image and preprocess data extract features from both the training and testing data set and used support vector machine learning algorithm for classification of data. In our experiment both training data set and test data gives good accuracy We will study this problem in depth and will apply this method for Marathi words recognition system for deaf and dumb community and normal community which will remove communication barrier between two community.

REFERENCES

[1] A. V. Nair and B.V., "A Review on Indian Sign Language Recognition", International Journal of Computer Applications, vol.73.

[2] J. Singha and K. Das, "Automatic Indian Sign Language Recognition for Continuous Video Sequence", ADBU-Journal of Engineering Technology, vol.2.

[3] B. Ionescu, D. Coquin, P. Lambert and V. Buzuloiu, "Dynamic Hand Gesture Recognition Using the Skeleton of the Hand", EURASIP Journal on Applied Signal Processing, vol.13.

[4] M. M. Hasan, P. K. Misra, "Brightness Factor Matching for Gesture Recognition System Using Scaled Normalization", International Journal of Computer Science Information Technology (IJCSIT), Vol. 3.

[5] J. Singha and K. Das, "Indian Sign Language Recognition Using Eigen Value Weighted Euclidean Distance Based Classification Technique", International Journal of Advanced Computer Science and Applications (IJACSA), vol. 4.

[6] K. Ahmed, E. Ahmed, A. Omar, Y. Arif, "DeepASLR: A CNN based human computer interface for American Sign Language recognition for hearing-impaired individuals", Computer Methods and Programs in Biomedicine Update, vol.2.

[7] Sawant Pramada1, Deshpande Saylee 2, Nale Pranita3, Nerkar Samiksha4 Mrs.Archana S. Vaidya, "Intelligent Sign Language Recognition Using Image Processing", OSR Journal of Engineering (IOSRJEN) e-ISSN: 2250-3021, ISSN: 2278-8719 Vol. 3, Issue 2, pp. 45- 51, 2013.