

Sign Language Detection Using Image Processing

Vinnayak Sharma¹, Khushbu Gupta² and Dr. Krishna Singh³

Undergraduate, Department of Electronics and Communication^{1,2}

Associate Professor, Department of Electronics and Communication³

GB Pant Government Engineering College, New Delhi, India

Abstract: Sign language is an effective means of communication for the deaf and dumb. But those who cannot understand this language find it almost impossible to get a grip of what the other person is trying to communicate. The proposed research helps non-sign-language speakers in identifying gestures used in Sign Language. The methodology described in this paper is implemented using MATLAB. In this method, firstly, the signs are captured with the help of a webcam. The images captured are then processed further and the features are extracted from the captured images using different structural features. Comparison of the features is done using SVM Classifier can use this document as both an instruction set and as a template into which you can type your own text.

Keywords: Sign language recognition, Image processing, SVM Classifier

I. INTRODUCTION

Sign Language is used by those hard of hearing and the speech impaired persons to communicate either with each other or the normal persons. Our Research focuses on making life easy for such differently abled individuals by allowing them to communicate in a much more effective and hassle-free way. Hand Gestures are the actions that convey meaningful messages. It is a convenient and comfortable way of communication. These specially impaired individuals use these hand gestures to convey their messages to the other person. In this research, we are recognizing hand gestures made by a person using the webcam and converting this gesture into respective text. The proposed method is based on Digital Image Processing using Skin Detection, Image Segmentation, Image Filtering, and cross-correlation method. This system expects to achieve recognizing gestures by special people and converting into speech

II. METHODOLOGY

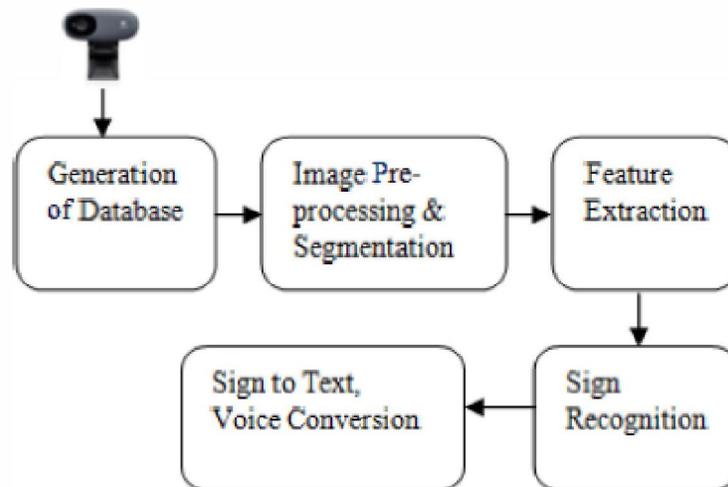


Figure 1: Block Diagram of Proposed Research

2.1 Data Acquisition

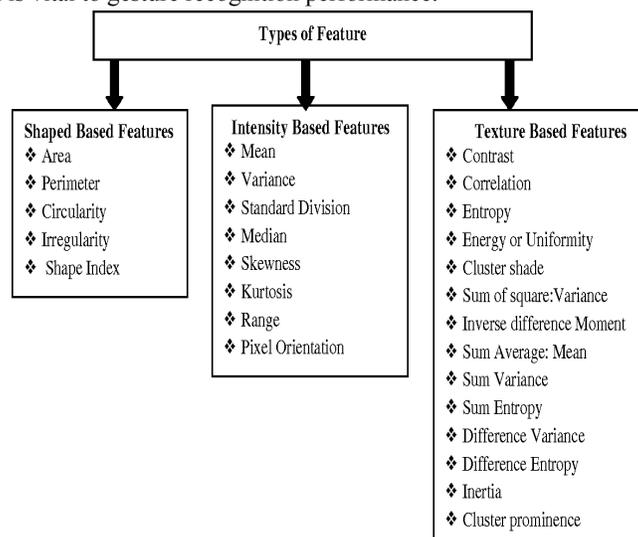
Input image through web cam is captured and it can be used to store as dataset for training or as input image to recognize the character. The image is captured and stored in a format specified by the device. Input image is converted to standard format, which helps for accurate classification.

2.2 Image Processing and Segmentation

- Pre-processing is required on every image to enhance the functionality of image processing. Captured images are in the RGB format.
- The pixel values and the dimensionality of the captured images is very high.
- As images are matrices and mathematical operations are performed on images are the mathematical operations on matrices.
- So we convert the RGB image into gray image using “rgb2gray” function and thus converting the Gray image into Binary image.
- Image segmentation is used on the Binary image to detect the hand area.
- For getting the hand gesture details, we used skin detection algorithm, which detects and segment skin part from whole image.
- Skin colour segmentation is used to segment the hand portion from the images.
- Pre-processing consists of image acquisition, image segmentation and morphological filtering methods. Then the Segmentation of hands is carried out to separate object and the background.
- The segmented hand image is represented using certain features. These features are further used for gesture recognition filtering techniques are used to remove noises from images so that we can get a smooth contour.
- The pre-processing operation is performed on the existing database.

2.3 Feature Extraction

- Feature extraction is the most significant step in the recognition stage.
- It is a method of reducing data dimensionality by encoding related information in a compressed representation and removing less discriminative data.
- Here, features are extracted from the hand region cropped from the signer to recognize gestures, corresponding character. Feature vector table is created.
- Feature extraction is vital to gesture recognition performance.



2.4 Sign Recognition

For Classification we can use machine learning classifier.

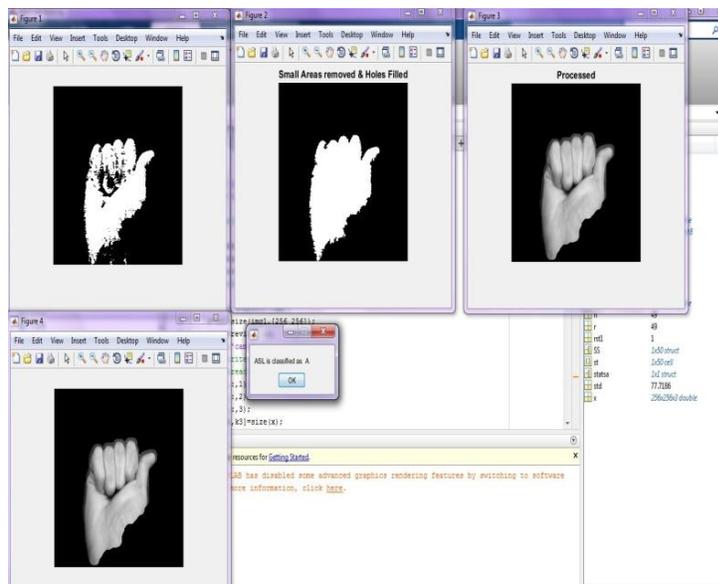
We can use supervised machine learning classifier.

There are 2 steps for classification

1. Training Session
 2. Testing Session
- We used SVM (Support vector machine) which is supervised ML classifier. In machine learning, there are learning algorithms that analyze data used for classification and regression analysis.
 - SVM (support vector machine) classifier is used for classification of image features into normal or abnormal image. SVM is supervised machine learning classifier which needs training and testing sessions. Linear SVM classifier is used in this application with different feature extraction techniques and compared to know the significance of proposed work over existing techniques.

2.5 Post Processing

Final obtained output is either displayed by message box or speech for given ASL. We used speech processing toolboxes to show the final outcome.



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