# Sign Language Interpretation using Color Detection Technique

Prof. Poonam P. Kshirsagar<sup>1</sup>, Bhairavkar Sagar S.<sup>2</sup>, Kadam Swarup S.<sup>3</sup>, Bande Priyanka P.<sup>4</sup>

Bhosale Bhagyashree S<sup>5</sup>

Assistant Professor<sup>1</sup>, Final Year Students<sup>2,3,4,5</sup>, Department of Electronics & Telecommunication Engineering, RMCET, Ambav (Devrukh), Ratnagiri Maharashtra, India. Email:poonam.kshirsagar@gmail.com

Abstract- Sign Language Recognition using Multi-Color Detection Technique is a system designed to help the deaf and dumb people to communicate with all other normal people using their natural hand gestures. The system does not require the hand to be perfectly aligned to the camera. The basic objective of this system is to develop a computer based intelligent system which can act as a 'Translator' between the sign language & the spoken language dynamically & make the communication more effective & efficient. The system we are implementing is for Binary Sign Language and we are using color Detection Technique in Image Processing. by using Color Detection in MATLAB the proper Text output will be displayed on the screen.

Index Terms-HCI, Binary Sign Language, Image Processing, Color Detection, Pixel to Pixel matching.

### 1. INTRODUCTION

Dumb people are usually deprived of normal communication with other people in the society. It has been observed that they find it really difficult at times to interact with normal people with their gestures. A very few of those are recognized by most people. Since deaf people cannot talk like normal people so they have to depend on some sort of visual communication in most of the time. Sign Language is the primary means of communication in the deaf and dumb community. As like any other language it has also got grammar and vocabulary but uses visual modality for exchanging information. The problem arises because normal people are usually unaware of these grammars. As a result it has been seen that communication of a dumb person are only limited within his/her family or the deaf community. The importance of sign language is emphasized by the growing public approval and funds for international project. At this age of Technology the demand for a computer based system is highly demanding for the dumb community. The idea is to make computers to understand human language and develop a user friendly human computer interfaces (HCI). Gestures are the non-verbally exchanged information. A person can perform infinite gestures at a time. The project aims to determine human gestures by creating an HCI. In our project we are focusing on Image Processing and Color Detection for better output generation.

#### 2. LITERATURE SURVEY

Christopher Lee developed a glove-based gesture recognition system that was able to recognize only 14 of the letters from the hand alphabet, learn new gestures and able to update the model of each gesture in the system in online mode, with a rate of 10Hz [1].

The most successful commercially available glove is by far the VPL Data Glove [2]. It was developed by Zimmerman during the 1970s. It is based upon patented optical fiber sensors along the back of the fingers. Another research is by Hyeon-Kyu Lee and Jin H. Kim presented work on real time hand-gesture recognition using Hidden Markov Model. Kjeldsen and Kendersi devised a technique for doing skintone segmentation in HSV space. Etsuko Ueda and Yoshio Matsumoto presented a novel technique that is hand pose estimation that can be used for vision-based human interfaces.[4]

#### **3. OBJECTIVES**

- 1. To be familiar with image processing technique for Recognition of Sign Language.
- 2. To be familiar with MATLAB software.
- 3. To develop HCI system for making computer to understand facial expressions and hand gestures.
- 4. To be familiar with Color Detection Technique.
- 5. To develop Pixel to Pixel Matching.
- 6. To identify and convert signs into Text.

7. To create an interface between normal people and deaf, dumb people.

8. To make easy communication media for deaf and dumb people.

#### 4. FLOWCHART

Fig 1 shows the overall idea of proposed system. Image is captured through the webcam. The camera is mounted on top of system facing towards the wall with neutral background. Firstly, we need to find out the pixel value ranges for required colors. Each color have different (Red, Green, Blue) pixel count

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combination. So by finding proper range for each color we can set RGB values for required colors. Then we calculate pixel count for Red, Yellow, Blue, Green, Purple and Combination of these colors are set for text output. The system works in two different mode i.e. training mode and operational mode. Training mode is part of machine learning where we are training our system to accomplish the task for which it is implemented.



Fig. 1: Flow graph

#### **5. PRACTICAL APPROACH**

The basic algorithm is as shown in Flowchart but due to the lighting conditions, pixel values may vary. Because of which appropriate result may not be found. Thus, we have set pixel ranges from minimum to maximum value and also have set a threshold to overcome this problem[6]. Pixel values are taken or calculated at both day and night time and according to those values the range has set.

#### 6. METHODOLOGY

# 6.1. RGB COLOR DETECTION

Any color image is a combination of red, green, blue colors. An important decision when implementing a computer vision system when differentiating objects using color image is to decide what color space is to be used. For this project, the detection of marker pixels is required. The camera detects the color information. Maximum and minimum RGB pixel values of the colors which we are using were manually calculated at different places with different light intensities. These ranges were then used to detect color pixels in a subsequent frame. But Hue, when compared with saturation and luminosity, is surprisingly bad and thus HSL shows no significant advantage over RGB. Also conversion of the color data from RGB to HSL took considerable processor time so it was decided to use RGB.[3]

#### **6.2. ALPHABET RECOGNITION**

TABLE 1: Values assigned to each finger

	Pinky	Ring	Middle	Index	Thumb
Power of 2	$2^4$	$2^{3}$	$2^2$	2 <sup>1</sup>	$2^0$
Value	16	8	4	2	1

Above table 1 shows the values assigned to each finger.[5]

Binary Alphabet calculation: It is possible to display total (251) i.e.31 gestures using the fingers of a single hand, and (2101) i.e. 1023 gestures if both hands are used.



Fig. 2: Binary finger tapping tool

Above Figure 2 shows the significant values assigned to each finger.

Following table 2 shows the Gesture codes.

TABLE 2: Values assigned to each finger

Sr.No	Р	G	В	Y	R	gesture
1	0	0	0	0	1	А
2	0	0	0	1	0	В
3	0	0	0	1	1	C
4	0	0	1	0	0	D
5	0	0	1	0	1	Е
6	0	0	1	1	0	F
7	0	0	1	1	1	G
8	0	1	0	0	0	Н
9	0	1	0	0	1	Ι
10	0	1	0	1	0	J

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11	0	1	0	1	1	K
12	0	1	1	0	0	L
13	0	1	1	0	1	М
14	0	1	1	1	0	N
15	0	1	1	1	1	0
16	1	0	0	0	0	Р
17	1	0	0	0	1	Q
18	1	0	0	1	0	R
19	1	0	0	1	1	S
20	1	0	1	0	0	Т
21	1	0	1	0	1	U
22	1	0	1	1	0	V
23	1	0	1	1	1	W
24	1	1	0	0	0	Х
25	1	1	0	0	1	Y
26	1	1	0	1	0	Z
27	1	1	0	1	1	1
28	1	1	1	0	0	2
29	1	1	1	0	1	3
30	1	1	1	1	0	4
31	1	1	1	1	1	5

# 6.3. Detection

To display letter K -



Fig. 3: Original RGB image of gesture K

The Original RGB image for letter K is taken from the webcam.

a)The present colors red, yellow and green are detected successfully And the corresponding result is obtained in the form of text. Snapshot of the Output -

Co	ommand Window
	>> mtstr
	mtstr =
	ĸ
fx,	
fx;	

Fig. 4: Output on MATLAB Command Window.

#### 7. RESULT

Input Images with Letters Notification :



Fig.-5: R



Fig.-6: M



Fig.-7: C

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Fig.-8: E



Fig.-9: T

Snapshot of the result -

File	Edit	Debug	Desktop	Window	Help	3
s	Lgn =					
RÌ	(CET					
fx; >:	>					

Fig. 10: Output on MATLAB Command Window

# 8. CONCLUSION

Our project aims to bridge the gap by introducing an inexpensive webcam in the communication path so that the sign language can be automatically captured, recognized and converted into text for deaf and dumb people. We are working on conversion of text output into speech for the blind people.

# 9. FUTURE SCOPE

To carry out further research in order to develop enhanced version of the proposed system. System would be able to communicate in both directions I.e. it will have the capability to translate normal languages to hand gestures successfully. A challenge will be to recognize signs that involve motion. By enhancing more, it can be used as an App in a Smartphone.

# **10. REFERENCES**

- [1] Christopher Lee and Yangsheng Xu, Online, interactive learning of gestures for human robot interfaces Carnegie Mellon University, the Robotics Institute, Pittsburgh, Pennsylvania,USA, 1996
- [2] Richard Watson, Gesture recognition techniques, Technical report, Trinity College, Department of Computer Science, Dublin, July, Technical Report No. TCD-CS-93-11, 1993
- [3] Ray Lockton, Hand Gesture Recognition using computer Vision,4th year project report, Ballilol College, Department of Engineering Science, Oxford University,2000
- [4] Etsuko Ueda, Yoshio Matsumoto, Masakazu Imai, Tsukasa Ogasawara, Hand Pose Estimation for Vision Based Human Interface, IEEE Transactions on Industrial Electronics, Vol.50, No.4, pp.676-684, 2003.
- [5] Sawant Pramada, Deshpande Saylee , Nale Pranita, Nerkar Samiksha, Nerkar Samiksha, Mrs.Archana S. Vaidya, Intelligent Sign Language Recognition Using Image Processing, IOSR Journal of Engineering (IOSRJEN), Vol. 3, Issue 2),—V2—PP 45-51, Feb. 2013
- [6] Digital Image Processing (2nd Edition) Rafael C. Gonzalez (Author), Richard E. Woods.