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Dip and Dump Communication Gesture System by Cityblock Method

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Abstract: ***This is a Social integration of the deaf and dump people. They people communication media only finger of hand movement, they are interact with each other of hand movement but normal people doesn't communicate with deaf and dump people because the normal people can't undusted language of sign. This cause the isolation of deaf people in the society. In this paper a method of image capturing and filter of that images conversion RGB to HSV and distance method is city block , use in Eigen value of particular image and convert in to text format and text word converted in voice format. So normal people can understand sign language and as well as communicate also. This invention helpful for deft and dump people and normal people***

Keywords: Deaf, Dump, Gesture, Hsv, Hand Gesture Recognition finger movement, cityblock

1. Introduction

Sign language is the language used by deaf people to express themselves. Every gesture has a specific meaning associated with it. Now a days due to advanced techniques and science there are lot of improvements in sign language that makes it easy for the deaf people to communicate with each other as well as in other fields to. Many research works related to sign languages have been done as in American sign language, British sign language ,Japanese sign language etc. but there is not much improvement in Indian sign language.

To communicate with with the deaf people without any translator is every difficult and more over not always possibly handy. This creates a huge gap between the normal people and the deaf people. To minimize is gap I have approached a system which is able to recognize the various alphabets of Indian sign language for human computer interaction giving a more accurate result at last possible time. As per my system the hand gestures will be converted into text and then into voice.

2. Literature Review

Many researchers have been done using different techniques by different scientists. some of the techniques where vision based ,soft computing like artificial neural network, fuzzy logic, genetic algorithm, and data glove based techniques and other like PCA, Conical Analysis, gesture system, animation system, vision based translation device, monocular image reorganization system, different type of skin color and motion cues. In this research I have divided my system into three sub divisions –

1) Hand segmentation
2) Future extension
3) Gesture reorganization

Hand Segmentation:

There are two methods in hand segmentation

1) Skin flittering
2) Hand cropping

1. According to scientist Nguyen Dang Binh, Toshiaki Ejima paper name is "A NEW APPROACH DEDICATED TO HAND GESTURE RECOGNITION" he has used thai sign language recognition which used the method 5DT Data glove 14 ultra data glove which was attached with 14 sensors, 10n sensors for fingures and rest 4 sensors between the fingures which measures fluxtuation and abductions respectively. But he got the 94% result set. Scientist Nguyen dang binh used a new Pseudo 2-D hidden markov model (P2DHMM) structure dedicated to the time series recognization. And this technique T-comP2DHMM structure was used to develop a complete vocabulary of 36 gestures including the ASL letter spelling alphabets and digits and got 96% result set[7].

2. Scientist J.Bhattacharya S. Majumdaar paper name "Shape. Texture and Local Movement Hand Gesture Features for Indian Sign Language Recognitionused " a hand region which is segmented and detected by YCbCr skin colormodel references. The shape, texture and figure features of each hand are extracted using principle Curvature Based Region(PCBR) detector, wavelet packet decomposition(WPD-2) and complexity defect algorithm for hand posture recognization process. To classift each hand posture multiclasses non linear support vector machines (SVM) is used for which a recognization rate of 91.3% is achieved. And dynamic gesture rate is 86.3% [1].

3. Scientist Daniel B. Dias, Renata C. B. Madeo, Thiago Rocha, Helton H. Biscaro and Sarajane M. Peres paper name "Hand Movement Recognition for Brazilian Sign Language: A Study Using Distance-Based Neural Networks" and team used a artificial neural network model based on distance including neural fuzzy models the experiment explore there shows the usefulness of this model to extract a helpful knowledge about the classes of movement and supporting project and got the 94.92% accuracy result[2].

4. Scienti st Cao Xin-yan, Liu Hong-fei, Zou Ying-yong,"Gesture Segmentation Based on Monocular Vision Using Color and Motion Cues " and team used a gesture segmentation from the video images sequence based on manicular vision is present by the skin color and motion case.gestures are separated from video image sequence reliably and complexity using the mathematical morphologic

method. The experimental result s show the technique is capable of segmenting the gestures quit effectively [3].

5. Scientist M.K. Bhuyan, Mithun Kumar Kar, Debanga Raj Neog paper name "Hand Pose Identification from Monocular Image for Sign Language Recognition" and his team used a novel approach for hand pose reorganization analyzing the textures and key geometrical features of the hand. A skeletons hand model is constructed to analyze the abduction/adduction movements of the fingers ans subsequently, texture analysis is performed to consider some inflexive finger.measures are computed between input gestures and remodeled gesture patterns from a database by considering intra class abduction/adduction angle variation and inter class inflexive variation.[4].

6.Scientist R.Elakkiya ,K.Selvamani and S. Kanimozhi research paper name a "frame work for recognizing sign language gestures from continuous vedio sequence using boosted learning algorithm". In this paper a fram work for segmenting and tracking skin objects from singing video is described. A boosting algorithm to learn a subset of weak classifiers for extended future to combine them into a strong classifier for each sign is then applied. A joint learning strategy to share sub unit across sign classes is adopted the result they got was 85% [5].

7. Korean scientist Hyung-Ji Lee and Jac-Ho Chung research paper name is "Hand gesture recognization using orientation histogram" in that paper the proposed algorithm recognize hand gesture based on visual information without using any special gesture glove. It follows 3 steps eagle based hand area search algorithm. A hand block is found segment efficiently from the monochrome input image .secondly, if the hand area is successfully extracted by the future vector representing the hand shake. And thirdly. they recognized hand gesture by feature vectors of hands shape and movements. The proposed algorithm cannot only segment the hand area but also extract the features vectors. From the gray scale motion images representing 5 sign language words .they got the average result. In my project proposed system have able to recognize to recognize two hand gestures with an improved accuracy rate of 98% [6].

3. Theoretical Background

Proposed system is the 4 phase- Hand cropping, Skin Filtering, Feature Extraction and Classification in Proposed system. Block diagram of proposed system in this system 24 alphabets stored in data base

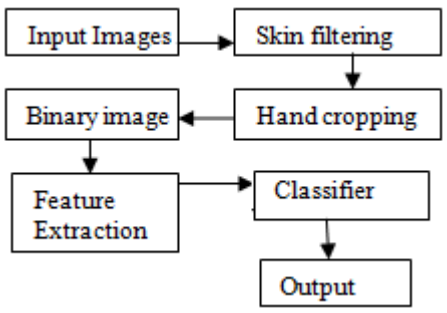
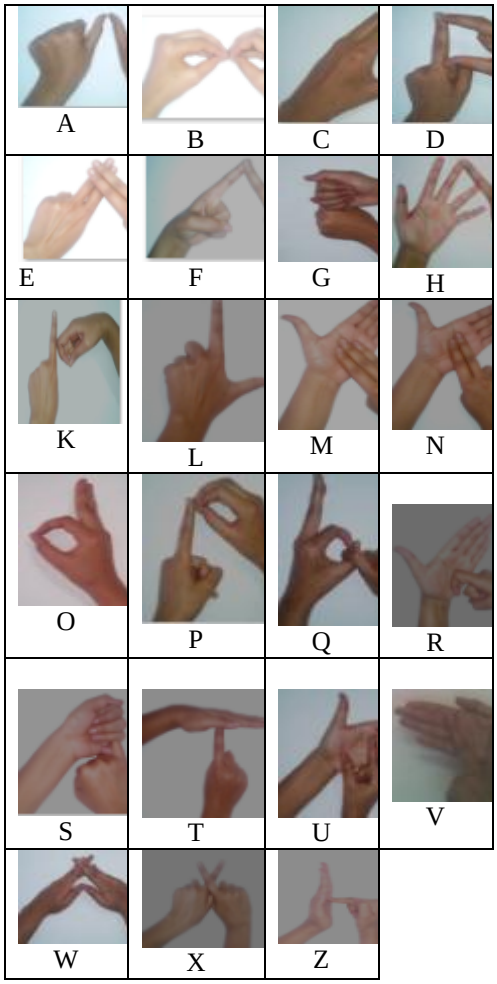


Figure 1: Block Diagram of proposed system

In that system we have stored images in a data base at each images we have captured 10 images of each alphabets so 216 images as each form, the fig show some images.



3.1 Skin Filtering

This process is typically used as a preprocessing step to find regions that potentially have human faces and limbs in images

The input image from the database which is in RGB form is converted to HSV form(color space). Then is image is filtering to form a bluer image. The excessive bluer image is smoothen out to form a binary image in grayscale. This binary image is the the biggest BLOB which produces the output.

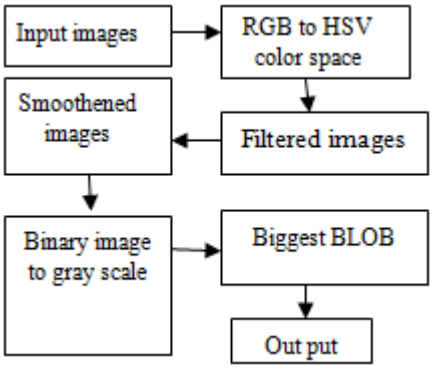


Figure 3: Skin filtering block diagram

In our proposed system, the RGB is converted to HSV color model by the following mathematical calculations

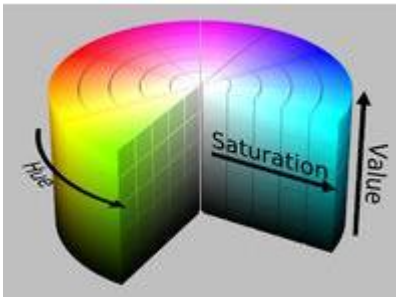


Figure 4: HSV Color mode

The RGB is converted to HSV colour model by the following mathematical equations

Fig 2. Images stored in data base

$$H = \begin{cases} 60\left(\frac{G-B}{\delta}\right) & if\ MAX = R \\ 60\left(\frac{B-R}{\delta}+2\right) & if\ MAX = G \\ 60\left(\frac{R-G}{\delta}+4\right) & if\ MAX = B \\ not\ defined & if\ MAX = 0 \end{cases}$$

$$s = \begin{cases} \frac{\delta}{MAX} & if\ MAX \neq 0 \\ 0 & if\ MAX = 0 \end{cases}$$

where $\delta = (MAX - MIN)$, $MAX = \max(R, G, B)$ and $MIN = \min(R, G, B)$.

When we take the input using gestures other objects like shadow, dress, wood etc also may have skin color. Thus to avoid these we take the BLOB WHICH Considers only the region including of biggest linked skin colored pixels. The output is as follow.

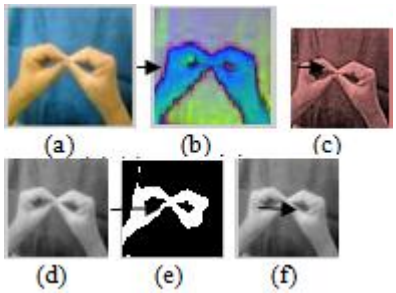


Figure 5: (a)RGB images, (b) HSV images, (c) Filtered images, (d)Smoothened images,(e)Binary images in gray scale (f)Biggest BLOB

3.2 Hand Cropping

In Oder to identify different gestures only hand portion till wrist is required. The is process is done to eliminate the unwanted hand portions. when the wrist is found the figures can be easily found as it lies on the opposite direction of the wrist. To do this we require steps which are as follow.

The skin flittered image is processed through all the directions such as left, right, top, bottom to identify the wrist. Then the minimum and maximum positions of the white pixels in the image are found out in all other directions. Thus we obtain Xmin, Ymin, Xmax, Ymax, one of which is the wrist position. Then the image is cropped along these coordinates as shown.

3.3 Feature Extraction

As soon as we get the desired image after cropping the feature extraction comes into considerartion .here, Eigen values found out from the cropped images. The mathematical steps to find these are as follow. Data compression ,data dimension reduction are the advantages without much loss of information , reducing the original variables into a lower number of orthogonal or non correlated synthesizes variables.

3.4 Classifier

In order to recognize different hand gestures classifier is used. In my paper, I have designed a new classification method i.e. Eigen value city block between Eigen vectors which involves 2 levels of classification.

City block

The city block distance metric measures the path between the pixels based on a 4-connected neighborhood. Pixels whose edges touch are 1 unit apart; pixels diagonally touching are 2 units apart.

Cityblock-in 2-D the cityblock distance between (x.,y.) and (x.,y.) is | x.- x. | + | y. – y.|

Cityblock metric

$$d_{st} = \sum_{j=1}^{n} \left| x_{sj} - x_{tj} \right|$$

Notice that the city block distance is a special case of the minkowski metric , where p=1 [12].
Pairwise distance between pairs of objects
Syntax
D =pdist(X)
D=pdist (X,distance)
Description
D = pdist(X) computes the Euclidean distance between pairs of objects in *m*-by-*n* data matrix X. Rows of X correspond to observations, and columns correspond to variables. D is a row vector of length $m(m–1)/2$, corresponding to pairs of observations in X. The distances are arranged in the order (2,1), (3,1), ..., (*m*,1), (3,2), ..., (*m*,2), ..., (*m*,*m*–1)). D is commonly used as a dissimilarity matrix in clustering or multidimensional scaling.

To save space and computation time, D is formatted as a vector. However, you can convert this vector into a square matrix using the squareform function so that element *i*, *j* in the matrix, where $i < j$, corresponds to the distance between objects *i* and *j* in the original data set.

D = pdist(X,*distance*) computes the distance between objects in the data matrix, X, using the method specified by *distance*, which can be any of the following character strings[12].

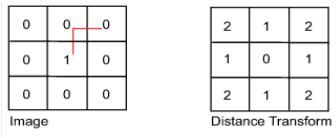


Figure 6: Cityblock distance

In this project we will click on dropdown list, we will seen the number of images.

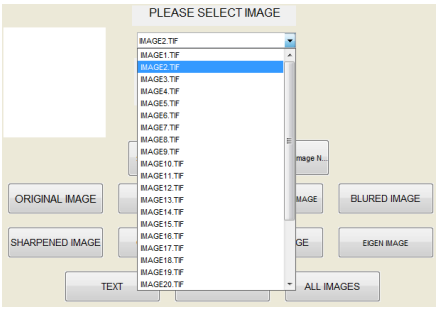


Figure 7: First step of image selection

After that we will select a image and see original form as hand movement

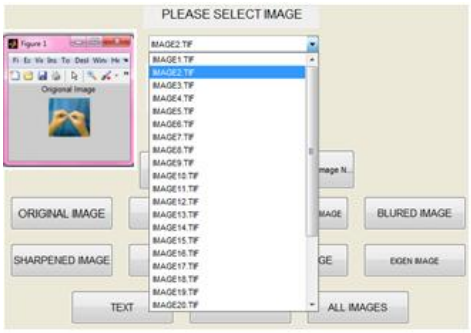
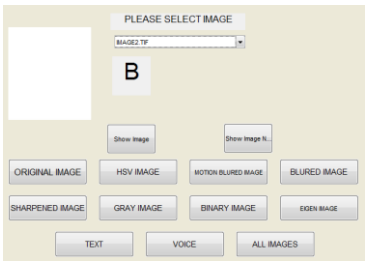


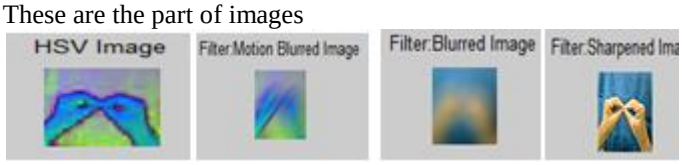
Figure 8: Second step show original img.

That is the first part of project. Second part is text the image will be converted in text form show as alphabetical form



If we click on voice button so voice will be generated that alphabetical name example B

These are the part of images



4. Result and Discussions

In this table we are showing the mean value of images that mean value denoted alphabetical form

Table 1: Result sate mean value

Valxmean Value	Alphabets
13.1589	A
11.0926	B
7.5293	C
8.5502	D
9.1343	E
9.0423	F
9.8608	G
7.4689	I
11.9691	K
8.8426	L
8.5082	M
5.5566	N
7.8785	O
8.0745	P
8.4730	Q
6.1020	R
9.1309	S
10.5033	T
12.6637	U
11.1109	V
10.1459	W
10.3914	X
0	Y
6.0008	Z

Table 2: Comparitive Study Between Our Work And Other Approaches

Name of the technique used	Success Rate	Difficulties Faced
PCA, Gabor Filter and SVM[14]	95.2%	Single hand gesture
Contour based[15]	91%	Number of use gloves as hand movement and also show single hand gesture recognition in hand movement
Hit-Miss operation HMM [13]	97%	The skin color is weak

Our work	Success rate	Advantage
Cityblock methods by distance Based	95%	Flow is smooth, complication is less, time secured
Dynamic presentation	40%	Multiple task performer

5. Conclusion and Future Work

The proposed system was implemented with MATLAB version 7.6 (R2008a) and supporting hardware was Intel® Pentium® CPU B950 @ 2.10GHz processor machine, Windows 7 Home basic (64 bit), 4GB RAM and an external 2 MP camera IT is capable of handling different static alphabets of Indian sign language by using city block method.it is denoted distance between eigen value. These are classification techniques. In this paper I am using a voice translation method which is more beneficial for communication media. In future we can make app using this technique so that while talking to the disabled people the app can can translate the gesture into voice. This proposed system was implemented with matlab.

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