

DETECTION OF DYNAMIC HAND GESTURE USING SUPPORT VECTOR MACHINE

Dr. Sheshang Degadwala,

Associate Professor, Sigma Institute of Engineering, Vadodara, India

Sheshang13@gmail.com

Dhairya Vyas

Managing Director, Shree Drashti Infotech LLP,

Nizampura, Vadodara, India

dhairyavyas@live.com

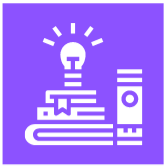
ABSTRACT

During past few years, human hand gesture for interaction with computing devices has continues to be thriving area of research. Hand gesture Recognition system received great attention in recent years because it provides human computer interaction and sign language. Hand gesture recognition is contain three stages: Pre-Processing, Features Extraction, classification. Most current approaches is based on the static hand gesture recognition Hand gesture recognition is often too sensitive to poor resolution ,environment of background, occultation among other prevalent problems and recognition dynamic hand gesture. So, proposed work investigates dynamic hand gesture recognition using Conditional Random Field. Result shows dynamic hand gesture recognition under complex background and achieve better recognition rate.

Keyword: Skin detection, HIS, YcbCr, Morphological, and Combine Approach.

INTRODUCTION

Hand gestures provide a natural and intuitive communication modality for human-computer interaction. Efficient human computer interfaces (HCI) have to be developed to allow computers to visually recognize in real time hand gestures. However, vision-based hand tracking and gesture recognition is a challenging problem due to the complexity of hand gestures, which are rich in diversities due to high degrees of freedom (DOF) involved by the human hand. In order to successfully fulfill their role, the hand gesture HCIs have to meet the



requirements in terms of real-time performance, recognition accuracy and robustness against transformations and cluttered background. Interaction between humans comes from different sensory modes like gesture, speech, facial and body expressions . The main advantage of using hand gestures is to interact with computer as a non-contact human computer input modality. The state of art of human computer interaction presents the facts that for controlling the computer processes gestures of various types of hand movements have been used .The present research effort defines an environment where a number of challenges have been considered for obtaining the hand gesture recognition techniques in the virtual environment. Being an interesting part of the Human computer interaction hand gesture recognition needs to be robust for real life applications, but complex structure of human hand presents a series of challenges for being tracked and interpreted. Other than the gesture complexities like variability and flexibility of structure of hand other challenges include the shape of gestures, real time application issues, presence of background noise and variations in illumination conditions. The specifications also involve accuracy of detection and recognition for real life applications The present research effort has a goal of developing an application using vision based hand gestures for manipulation of objects in virtual environment. Our application presents a more effective and user friendly methods of human computer interaction intelligently with the usage of hand gestures. Functions of mouse like controlling of movement of virtual object have been replaced by hand gestures. The complexity involved is with the detection and recognition phases of the simulated virtual application. The challenges encountered are noisy environment which creates a big impingement on the detection and recognition performance of human hand gestures. The application has been designed to be cost effective and uses low cost input tools like webcam for capturing hand as input. Manipulation of virtual objects has been done through modeling of some predefined command based hand gestures. There are several applications of hand gesture recognition systems such as sign language recognition, human-robot interaction, controller less video gaming, smart TV, video surveillance etc. With such widespread applications, it has become imperative for us to study and to make such systems as user friendly as possible. Hand segmentation is the pre-requisite in gesture recognition system

since if we get better segmented output of the region of interest i.e. hand, better recognition rates can be achieved.

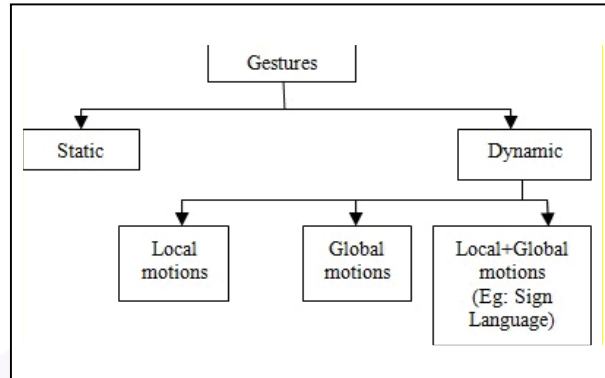


Fig. 1: Types of gestures

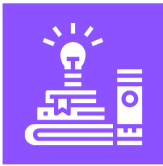
DIFFERENT METHODS OF SKIN SEGMENTATION

In image pre-processing stage firstly, the input gesture which is acquired capture by the webcam or camera. In pre-processing stage operation are concentrated to extract the hand gesture and prepare the hand gesture for feature extraction. In this stage skin segmentation, filtering and edge detection can happen.

Skin segmentation is the process of dividing an image into multiple parts. This is used to identify objects or other relevant information or data in digital images. There are many different ways to perform image segmentation, including: RGB, HSI, YCbCr, CIE-Lab [4], Depth data [8]. RGB: Hues or colors are determined as far as three primitive colors: red (R), green (G) and blue (B).

HSI: Colors are determined as far as hue (H) define colors, Saturation(S), and Intensity value (I) define brightness which are three characteristics that are seen about color . Other similar color spaces are HSV, HLS. It is signify image precisely with institutive qualities.

YCbCr: Colors are determined as far as in terms of luminance (the Y channel) and chrominance (Cb and Cr channels). Cb defines blue difference and Cr defines red difference. Depth Data: This is one type of color restriction techniques typically limits the environment by using color marker or using fix color background. Accessibility of depth information of image objects can



overcome hand movement trouble and noise difficulties easily define. It can be used for gesture recognition in 3D space. Filter is most used for remove noise in image. Different type of filtering technique is presented like: Spatial filter, Mean Filter, Median Filter, Morphological filter, Gaussian filter. Spatial Filter can be successfully used to eliminate several types of noise in digital images and it is commonly worked on small neighbourhoods ranging from (3x3) to (11x11). Mean filter is averaging filters and it has worked on nearby groups of pixel called neighbourhood and swap the centre pixel with the average of the pixel in this

neighbourhood. Median filter size of nearby neighbourhood is characterised and then work on it. The centre pixel is swapped by the median or the centre value present among its neighbour, unlike by average. Median filter is nonlinear filter.

Morphological filtering is created to get a smooth, closed, and complete contour of a gesture by using a sequence of dilation, opening, closing and erosion operations. Gaussian smoothing is operative for removing noise. It can provide weights give higher significance to pixels close to edge. It is linear low pass filters. Edge detection first edge point corresponding image find and then merged to form line and object outlines. Edges are carrying useful information about object boundaries. It can be used for image analysis, object identification and filtering.

PROPOSED METHODOLOGY

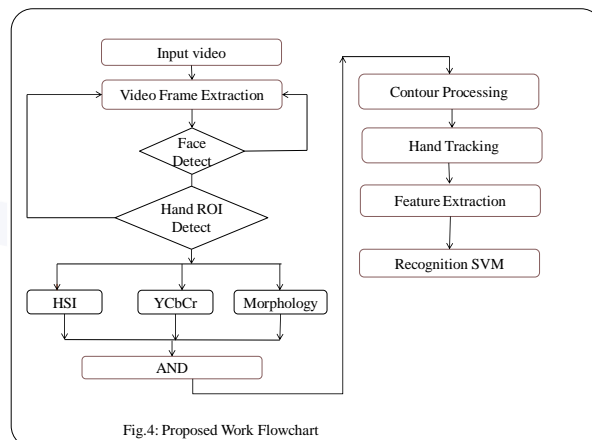
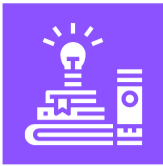


Fig.2: Proposed Work Flowchart



In proposed work first input the video. Video is capture by the web came or camera. Then converted that video into frame. The detect the face using Haar classifier. Then detect the hand using Region of Interest. Proposed will use the combination of HSI, YCbCr and morphology instead of only HSI and YCbCr color model use in skin color segmentation. Then apply contour processing on the output of skin segmentation. Then apply hand tracking using centroid and then apply feature extraction using Euclidian distance. And finally recognition or classification using SVM.

Combination of HSI, YCbCr and Morphology:

Aim of this step is proper skin color segmentation

In this step segmentation process is carried out by taking Cb, Cr and S and I value is cosider.

By using histogram method :

Cb and Cr for skin color is $(x,y) = (Cb \leq 118) \& (Cr \geq 130 \& Cb \leq 165)$

H and I for skin color is $(x,y) = (v1 \geq 0.5 \& v1 \leq 0.8) \& (h \geq 0.01 \& h \leq .13)$

Output pixel at point (x,y) is classified as skin color.

The segmentation eqution is:

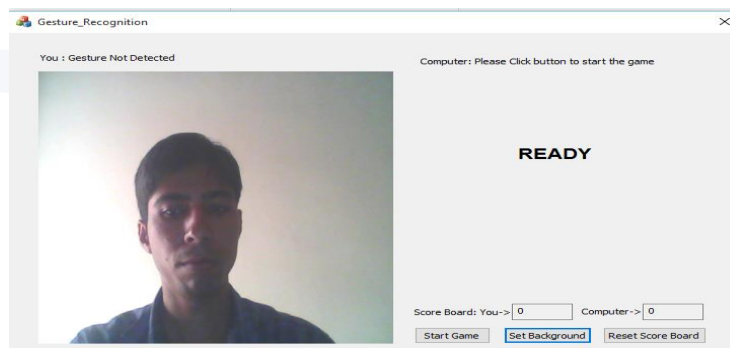
$$O(x,y) = 1 \quad \{\text{if } H, I, Cb, Cr \text{ value point falls inside their respective range}\}$$

$$0 \quad \{\text{otherwise}\}$$

RESULTS

Figure indicate the Main Graphic User Interactions (GUI) of our system. It is contain one figure window for show the live camera video, three button Start game, Set Background and Reset Score board. Also the message in the left site for indication of detection process is ready.

Running Code



As shown in the above Figure as first click the Set Background Button before going to gesture reorganization process.

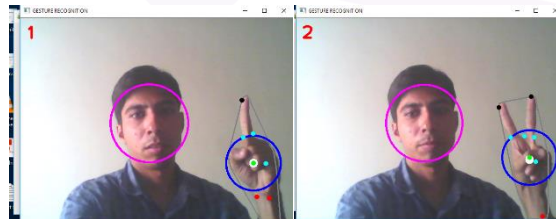


Face Detection

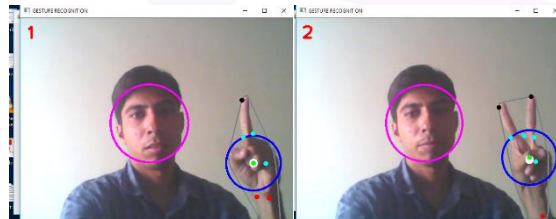


First Step in our detection Process is Face Detection as shown in above figure Pink circle shows the detection of face. For that Viola Johns Algorithm is use in that we have use haar-like features.

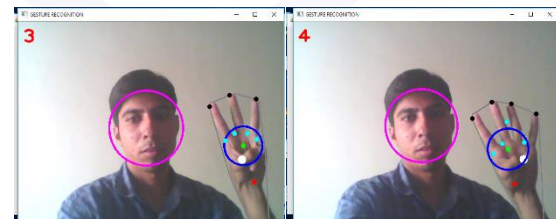
One Sign



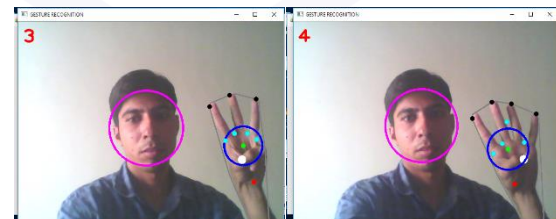
Two Sign



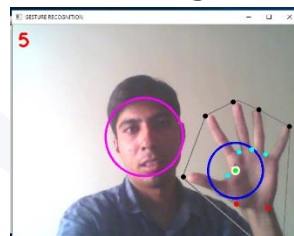
Three Sign



Four Sign



Five Sign



After the face detection process next step for skin segmentation of hand region using ycbcr + HIS + Morphological Method.



Using Contour Detection find the largest contour after and black dot shows number of gaps between sign after that the binary feature we have use the SVM classier for the reorganization of hand sign.

Above Result shows the Sign Detection and in left site shows the indication in red color as notification.

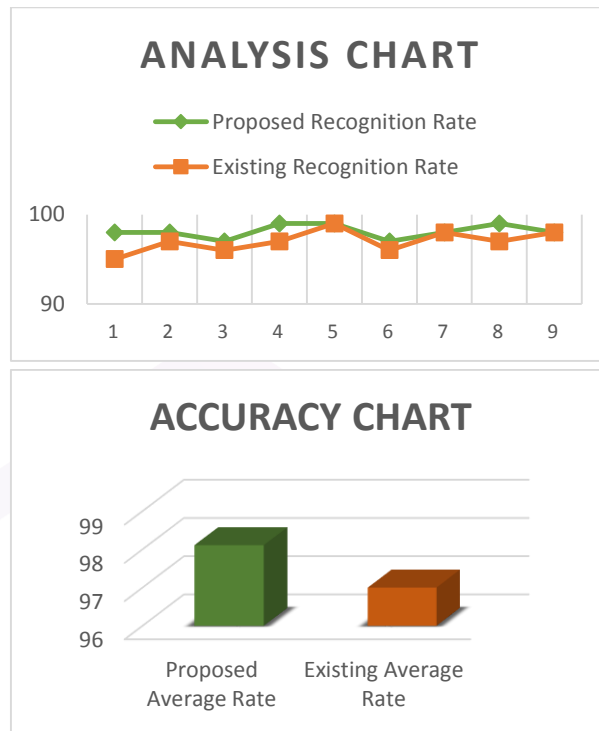
ANALYSIS

Existing System:

“Sign“	“Training Sample“	“Testing Sample“	“Existing Recognition Rate“
D	12	8	95
H	12	8	97
I	12	8	96
L	12	8	97
S	12	8	99
U	12	8	96
V	12	8	98
W	12	8	97
Y	12	8	98
Existing Average Rate			97

Proposed System:

	“Training Sample“	“Testing Sample“	“Proposed Recognition Rate“
	15	12	98
	15	12	98
	15	12	97
	15	12	99
	15	12	99
	15	12	97
	15	12	98
	15	12	99
	15	12	98
“Proposed Average Rate“			98.111111



FUTURE WORK

This hand gesture recognition system is very vast in day-today technical solutions. Its main applications are

1. For controlling the traffic signals as per the wish of traffic controller to reduce the problem of traffic jam at peakhours.
2. To control the mouse so that physically handicapped people can use it and also it mouse will not be inefficient to use while travelling.

CONCLUSION

Recently, Gesture recognition is very active area of research. The surrounding of the hand gesture itself dictates the degree of difficulty hand detection for dynamic hand gesture recognition.

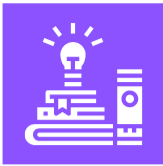
Existing work is based on static hand gesture recognition Using PCA. Existing system recognize based on sigle color model. So, in proposed work based on dynamic hand gesture recognition using SVM and Combine Color Model.

As From analysis propose work of dynamic hand gesture is achieve better and same as static hand gesture recognition



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