



International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

Real Time Static and Dynamic Hand Gesture Recognition System with SURF Algorithm

Dimpal S.Korake,

PG Student, Dept. of Electronics and Telecommunication, N.B.N. Sinhgad College of Engineering,
Solapur University, India

ABSTRACT: Hand Gesture is invariably used in everyday life style. It is so natural way to communicate. Hand gesture recognition method is widely used in the application area of Controlling mouse and/or keyboard functionality, mechanical system, 3D World, Manipulate virtual objects, Navigate in a Virtual Environment, Human/Robot Manipulation and Instruction Communicate at a distance. This paper introduces a real time static and dynamic hand gesture recognition system. This system consists of three stages: image acquisition, feature extraction, and recognition. In the first stage input image of hand gestures are acquiesced by digital camera in approximate frame rate. In second stage a rotation, translation, scaling and orientation invariant feature extraction methods are introduce to extract the feature of the input image based on moment feature extraction method. Finally, this feature extraction are used to recognise the hand gesture. The performance of the system test on real data.

KEYWORDS:Pre-processing, skin segmentation, skin colormodel ,Hand gestures

I.INTRODUCTION

Gesture recognition has gained a lot of importance since few years. Various applications can be controlled using gestures. Face gestures like lip movements are used to recognize the language spoken, hand gestures are used in various applications like gaming, mouse control etc. In an application like robot control using hand gestures, the robot responds to hand gestures given by the human. This hand sign of humans is visually observed by a robot through a camera.

A hand gesture recognition system to be able to successfully replace a mouse or keyboard needs to be able to precisely detect each finger and hand orientation in real time and should be robust to various changes in hand measurements, rotation, colour and lighting. This is a very complex problem and requires advanced image processing and computer vision concepts. In this paper, a novel method is proposed to recognize hand gestures in real time with high accuracy and precision. Two types of hand gestures are used, static and dynamic. Static gestures make gestures by keeping the hand stable.

This system uses both static and dynamic gestures for mouse interfacing application. In this system the images are captured through the webcam. It is segmented to recognize the hand region. There are different static hand gestures defined these are representing one, two, three, four, five. There are different dynamic hand gestures defined these are representing waving hand, fist hand, vertical hand, and horizontal hand. We developed a simple and fast motion image based algorithm. A skin color detection algorithm is used for hand region detection. Gestures recognition deals with the goal of interpreting human gestures via mathematical algorithm In general, it is suitable to control home appliances or many other application using hand gestures

II.RELATED WORK

Many applications have been developed that are controlled through gestures that include gaming, sign language recognition, control through facial gestures, controlling mouse, VLC media player etc. In 2012

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirccce.com

Vol. 5, Issue 3, March 2017

[1] RuizeXu, Shengli Zhou and Wen J. Li developed a system that recognizes seven hand gestures like up, down, right, left, cross and circle. Three different modules were built that recognized hand gesture. Signals from MEMS 3-axes accelerometers were given as input.[2] Kuan-Ching Li, Hwei-Jen Lin, Sheng-Yu Peng, KanoksakWattanachote used hand moments to retrieve information from the internet which reduces time and also convenient to use. [3] Ginu Thomas presented an article on A Review of Various Hand Gesture Recognition Techniques where he compared . The results obtained by different techniques. The different methods used are edges method, pixel by pixel comparison and orientation histogram. [4] AnupamAgrawal and SiddharthSwarupRautaray used hand gestures to control the VLC media player. The K nearest neighbor algorithm was used to recognize the gesture. A VLC media player function that were controlled by hand gesture includes play, pause, Fullscreen, stop, increase volume, decrease volume. [5] Yikai Fang, Jian Cheng and Hanqing Lu, Kongqiao Wang recognized hand through trigger followed by tracking and segmentation and used this gesture for image browsing. Segmentation is done during detection and tracking using motion and color cues. [6] Yikai Fang, Jian Cheng, Hanqing Lu, Kongqiao Wang speed up hand gesture recognition. They used integral image approximation for Gaussian derivation in image convolution. [8] Lars Bretzner, Ivan Laptev, Tony Lindeberg presented algorithms for hand tracking and hand posture recognition. In this on each image multi-scale color feature detection is performed. [9].Zhi-hua Chen,1 Jung-Tae Kim,1 Jianning Liang,1 Jing Zhang,1,2 and Yu-Bo Yuan1,The hand region is detected from the background by the background subtraction method. Then, the palm and fingers are segmented. On the basis of the segmentation, the fingers in the hand image are discovered and recognized

III. DESIGN & IMPLEMENTATION

To design static and dynamic hand gestures recognition.Steps or the overview of proposed system is as shown in following figure.

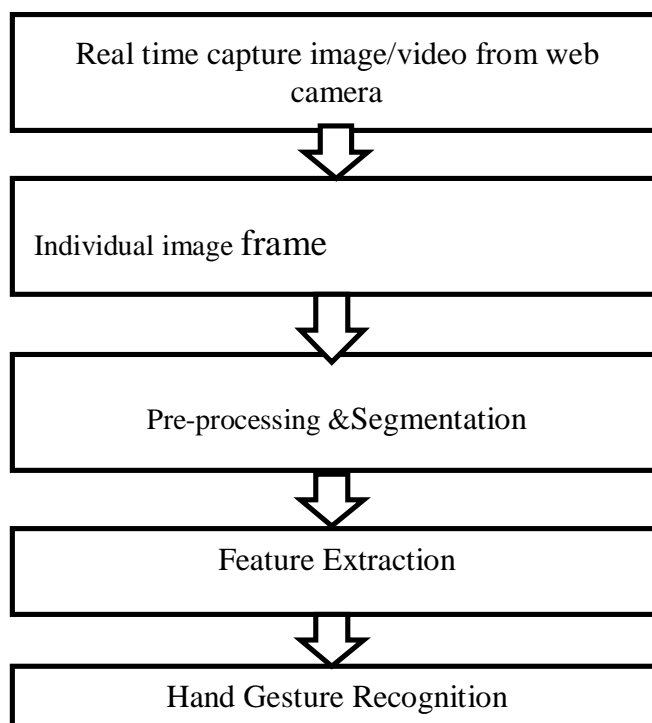


Fig.1:- Block diagram of proposed system



International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

The Basic block diagram of the system is as shown in fig.1 starting by capturing real time video using webcam, converting the video into image frames and processing them. The detection of hand image is accomplished by extraction of skin colors from image and determines the hand center point. Feature extracted using moment invariant for classification and hand gesture recognition. Matlab2014a is used during the course of project. The advantage of using Matlab is real-time data processing.classification and recognition

IV. STATIC HAND GESTURE

A static gesture is a particular hand configuration and pose, represented by a single image. Fig. 1 shows the flow chart of the proposed system in which skin color model is one of the key components. The system is divided into four major parts: preprocessing and segmentation, skin color detection, skin color model, hand gesture recognition. Each part is described in the following subsections

A. Capturing the real time video/Image:

The input RGB videos are captured by a webcam placed on a laptop. The system is demonstrated on a conventional Laptop computer running on Intel Pentium Dual Processor with 4GB of RAM. The video is acquired under normal lighting conditions to simulate real-time environment. Natural lightning conditions are present during the video acquisition process. A video acquisition process is subjected to many environmental conditions such as position of the camera, distance from the camera, illumination or lightening conditions available and presence of noise etc.

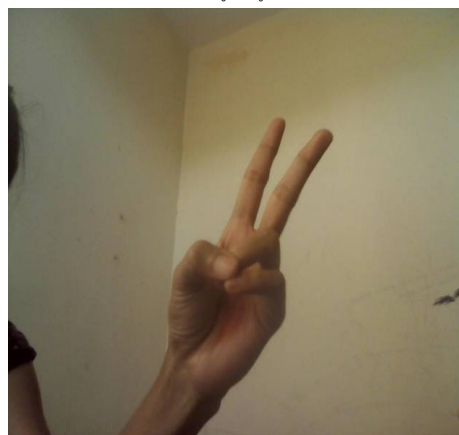


Fig 2:-Original image

B. Obtain Individual image frame:

In this phase, the Webcam captures video and converts it into frames of images. The images are obtained one after the other in a continuous manner out of which the current frame is considered for further processing.

C. Pre-processing:

After extracting the image frame from video .This individual frame 1024×1280 pixel is used for processing.This individual frame is used for RGB enhancement. In RGB enhancement we find the mean value of R,G,B plane. After that we combining this three plane mean value we got the result is compensated image.

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

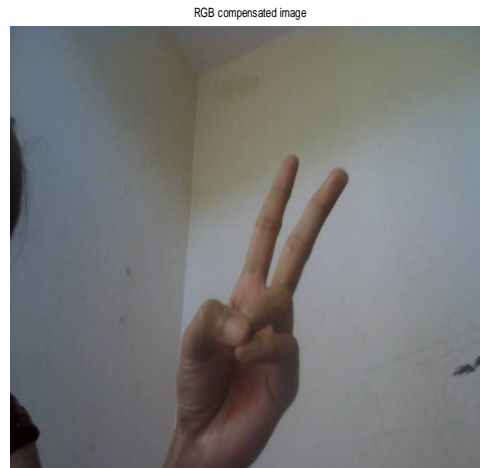


Fig 3:-RGB compensated image

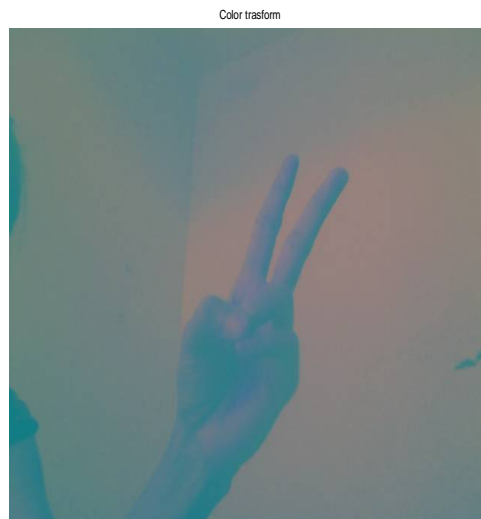


Fig4: Color transform

D. Skin color segmentation:

The 'skin' pixel color segmentation is used in this project which comprises converting RGB image into YCbCr image. Then threshold value of Cb and Cr is applied to remove non-skin colour elements. The advantage of this methodology is brightness can be removed during the transformation process of RGB into YCbCr format. So brightness does not matter after capturing images. So high compensation is achieved through this approach. Through 'imtool, command in matlab Y, Cb and Cr values of image can be seen at any particular coordinates. Y (luminosity) values is neglected. Chrominance component i.e. Cb and Cr values can be set by observing the values of Cb and Cr using 'imtool' command.

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

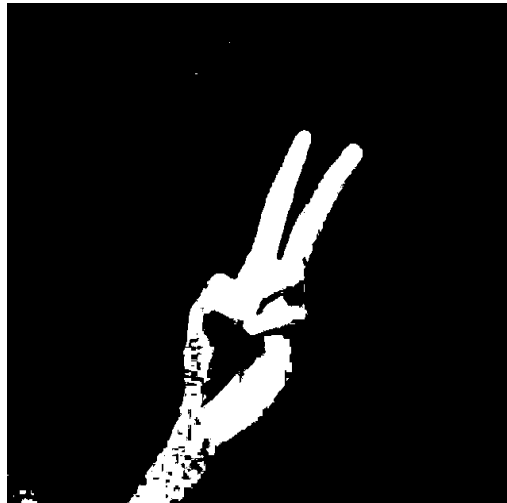


Fig5:Skin Segmentation

V. DYNAMIC HAND GESTURE RECOGNITION

A dynamic gesture is a moving gesture, represented by a sequence of various images. Dynamic hand gesture means we have gesture recognition using dynamic hand. Here I have defined four types of hand gestures like five, fist horizontal and vertical. In that we have no need to use skin color model for matching skin color tone but dynamically taken skin color tone. For dynamic hand gesture we have two stage.

A. Training Stage:

Training stage Generate a transformation subspace for each hand-shape. In that training stage we have to take sample images for different hand gestures. Here we have defined four types of hand gestures for gesture recognition. Gesture ID is used for detection of hand shape. Principal Component Analysis is used for define component.



Fig 6 :Traing image

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirccce.com

Vol. 5, Issue 3, March 2017

B. Testing Stage:

Testing stage project the test image into each of the subspaces to find the subspace with the nearest perpendicular distance. This subspace will be representative of one particular hand-shape. In testing stage we have to implement real time dynamic hand gesture recognition. In testing stage we have dynamic hand gesture detection and tracking. After that gesture classifier using training eigen space and also movement gradient classifier for detecting movement. Combination of gesture classifier and movement gradient classifier will give gesture movement pair and this gesture movement pair will give output.

C. Feature Extraction:

The dominant movement direction of matched SURF points in adjacent frames is used for dynamic hand gesture representation. The most appealing descriptor to represent salient points seems to be the SIFT descriptor which can get good performance in the case of scaling, rotation, view point changing, etc. Inspired by SIFT, the SURF descriptor outperforms SIFT in computational speed greatly and gains good robustness as well as SIFT. This brings us opportunity to adopt the SURF descriptor to describe salient feature points in object in order to satisfy the demand of both robustness and effectiveness.

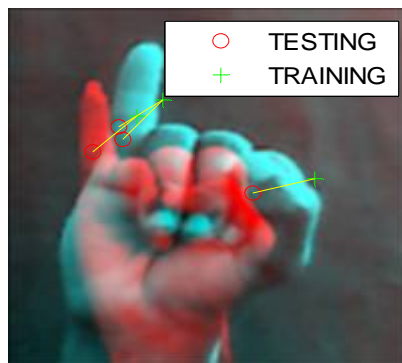


Fig 7: SURF Algorithm result

In dynamic hand gesture firstly we collect real data base and this real time database are used as testing database. Fig 6 shows the training image which is compared or matched with the database images by using 'matchfeature' command in matlab. And dynamic hand gesture are recognise Fig 7 show the maximum matching point red circle shows the test surf points and green circle shows training points

VI. CONCLUSION

In this paper, the work is completely done by using MATLAB 14a. Gesture recognition is an ideal example of multidisciplinary research. There are different tools for gesture recognition, based on the approaches. A real time static and dynamic hand gesture recognition algorithm which overcomes the challenges such as rotation, size and position variation of the images for detection of hand gesture images, is developed in this work. It can be made as an effective user interface with different applications like controlling VLC media player, mouse cursor controlling, home appliance etc.

REFERENCES

- [1] DnyanadaJadhav, L.M.R.J. Lobo, "Hand Gesture Recognition System To Control Slide Show Navigation", IJAIEM, Volume 3, Issue 1, January 2014.
- [2]] RuizeXu, Shengli Zhou, Wen J. Li, "MEMS Accelerometer Based Nonspecific-UserHand Gesture Recognition", IEEE, VOL. 12, NO. 5, MAY 2012.
- [3] Sheng-Yu Peng, KanoksakWattanachote, Hwei-Jen Lin, Kuan-Ching Li, "A Real time hand gesture recognition system for daily information retrieval from Internet", IEEE Fourth International Conference on Ubi-Media Computing, VOL. 12, 2011 .
- [4] Ginu Thomas, "A Review of Various Hand Gesture Recognition Techniques Volume: 03 Issue: 04 | Apr-2016.



ISSN(Online): 2320-9801
ISSN(Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

- [5] SiddharthSwarupRautaray and AnupamAgrawal, "A Vision based Hand Gesture Interface for Controlling VLC Media Player", International Journal of Computer Applications, Volume 10– No.7, November 2010.
- [6] Yikai Fang, Kongqiao Wang, Jian Cheng, Hanqing Lu, "A Real-Time Hand Gesture Recognition Method", IEEE, 2007.
- [7] Yikai Fang, Jian Cheng, Kongqiao Wang, Hanqing Lu, "Hand Gesture Recognition Using Fast Multi-scale Analysis", IEEE, 2007.
- [8] AsanterabiMalima, ErolOzgur, "A Fast Algorithm For Vision-Based Hand Gesture Recognition For Robot Control", IEEE, 2006.
- [9] Zhi-hua Chen,1 Jung-Tae Kim,1 Jianning Liang,1 Jing Zhang,1,2 and Yu-Bo Yuan1," Real-Time Hand Gesture Recognition Using Finger Segmentation", Volume 2014.