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

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 2, February 2016

A Survey on Hand Gesture Tracking and Recognition System

Shrikala M. Deshmukh,Ashwini S. Gawade

Asst. Professor, Department of Information Technology, BVUCOE, Pune, Maharashtra, India

M.Tech. Student, Department of Information Technology, BVUCOE, Pune, Maharashtra, India

ABSTRACT: In proposed system, the hand gesture recognition system based interface consists of three modules as detection, tracking and recognition module. In this paper, real time gestures of users are used as input to interact with Pacman game application. Firstly, system detects for presence of hand and then track for key points. In recognition module, real time gesture of user is recognizing by system and respected action gets performed. This system will use Indian Sign Language (ISL) for gesture recognition. Recognition module will use template matching technique to match between real time gesture and static ISL gesture used for particular action.

KEYWORDS: Human and computer interaction (HCI), Indian Sign Language (ISL), hand recognition, template matching, real time gesture.

I. INTRODUCTION

The main aim to design Human-Computer Interaction (HCI) system is to create natural interaction between human and computer system in many ways [1][6][7]. For implementation of hand gesture recognition system, different methods are used. It describes a single hand gesture recognition system for making meaningful sentences using scale invariant feature transform method [7]. Normally, face recognition, eye retina scan is used to handle computer system or its applications.

HCI systems normally categorized in [15]:

a) Sensor based system
b) Visual based system
c) Audio based system

Sensor based system technologies allow us to interact with the help of sensor devices like pen, mouse, joysticks, pressure sensor, smell sensor [15]. E.g. Touch screen mobile is a best example of this system. To operate this type of mobile, we have to press on screen of mobile.

Second, visual based system contains gestures recognition, eye movements, facial expressions, body movements. This system used for direct interaction of human and computer with the help of action which acts as commands.

Then last one, audio based systems totally based on voice like speech recognition, musical interaction, etc. E.g. Windows Narrator is one of the example of this system. In this system, voice acts like commands for system.

Hand gesture is the powerful resource for communications within humans to express their thoughts without speech. It provides a separate balancing modality to speech for expressing one's ideas [13].

The growth in Human-Computer Interaction field has experienced different branching in its history. Instead of designing regular interfaces, the different research branches have had different focus on the concepts of multimodality rather than uni-modality, intelligent adaptive interfaces rather than command/action based ones, and finally active rather than passive interfaces. Gesture recognition is now becoming most important in many applications.

Two main characteristics we need to be considered while designing of the HCI system as mentioned in [2]: a) functionality and b) usability. Functionality of system is referred to the set of functions or services which system equips to the users [2], usability of system is referred to the level/scope that system can not only operate but also perform with specific user purposes efficiently [2]. The system that can attains suitable balance between these concepts is considered as powerful performance of system [2].

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

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 2, February 2016

In some application, HCI system require large storage capacity of database to store images. Complex algorithms are used to compare real time images with existing images and according to it action will get performed. Our proposed system overcome these issues, as it does not require any database to store images.

II. LITERATURE SURVEY

A) Hand Gesture Recognition: A Literature Review – 2012

In this paper, they did literature review on hand gesture system with its aim as well as they explained advantages and disadvantages of system. They also presented key issues with its challenges. Review methods of recent postures and gestures recognition system presented as well [1].

B) Hand-gesture recognition using computer-vision techniques – 2013

In this paper, they presented method to detect hand gestures based on computer-vision techniques, an implementation works in real time six gestures captured through an ordinary webcam. Method combines skin-color filtering, edge detection, convex-hull computation, and a rule-based reasoning with the depths of the convexity defects [2].

C) Hand Gesture Recognition System to Control Slide Show Navigation -2014

In this paper, hand gestures are used to control the power point presentation. This system doesn't require any database to store images of gestures.

D) Hand gesture recognition system – 2015

In this paper, they introduce gestures for controlling MS Power point and VLC media player. This application uses OpenCV in MS Visual Studio 2010.

E) Interaction with Virtual Game through Hand Gesture Recognition – 2011

In this paper, they implemented system with C++ with the use of OpenCV inbuilt libraries. Gestures like punch, grab, move forward, and are used to control virtual game.

III. PROPOSED SYSTEM

The block diagram is shown in fig.1. In this proposed system, ISL (Indian Sign Language) will get use for hand gestures. Firstly, hand will get detected and then gesture image will get capture. After that we will apply image filtering algorithm to detect the gesture of user, later matching function will use to match exact gesture [7].

Fig. 1. Block Diagram

The individual block function are as follows:

a. Input: The input gesture is captured by camera. The higher the mega-pixel, the better the picture the higher the resolution it can capture.
b. Tracking of Hand: The input gesture is given to the image filter which removes the noise present and background distortion and it will track the hand.
c. Feature Extraction: It extract the key-points of the gesture.
d. Matching: It matches current gesture and existing assigned gesture.
e. Output: According to the gesture, action will get performed.

In proposed system, I'm going to handle a system with hand gestures using Indian Sign Language (ISL). Gaussian algorithm recognizes input hand gestures by using non-geometric features [10]. It gets segmented

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

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 2, February 2016

using two different methods [10], first, skin colour based segmentation by applying HSV colour model. HSV colour model describes colours in terms of their shade and their brightness's separates colour from intensity.
This is very useful in many applications as well as often used simply because the code for converting between RGB and HSV is widely available and can also be easily implemented. Second, clustering based threshold techniques [10]. This system will not require any database to store any images. This system helps deaf and dump people to handle application efficiently.

Appearance based model

In this model, template image database use to derive the parameters from current captured image or video stream. It mostly depends on 2D model of gesture.

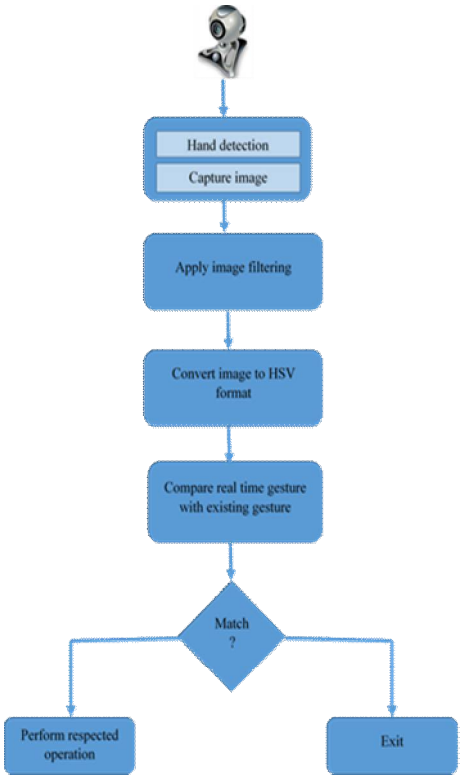

Fig. 2. Flow Diagram

Outline of gesture contains set of points called as template which is used to approximate the object gesture outline. This model use for simple gesture classification but commonly used for hand tracking and gesture recognition applications.

In gesture recognition, this model uses sequences of images as a template. Parameters of object gesture are either in themselves or we need to extract features from it. This model is very simple as compared to other remaining two models. In proposed system, we are going to handle Pacman game with hand gestures. With the help of these gestures we are going to handle the movements of Pacman; up, down, left and right. In this game, four monsters; blinky, inky, pinky and clyde;try to kill Pacman and we have to save him as well as feed pac-dots to him. If monster(s) touches him, his life will get loss.

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

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 2, February 2016

Gesture	Meaning
	Up
	Down
	Right
	Left

Table 1. Hand gestures example

Fig. 3. Gesture using appearance based model

Paper	Primary method of recognition	Background to Gesture Images	Additional Markers Required (Like Wrist Band)
A Low-Cost Hand Gesture Human-Computer Interaction System- 2012	Viola's face detection method	shape-based background subtraction algorithm	-
Hand-gesture recognition using computer-vision techniques – 2013	Hardware, non-color filter	Automatic detection of skin in image	Interactive shop window, wrist-worn camera
Comparative study of skin color based segmentation techniques, 1994	Finite State Machine/ Model Machine	Static	Markers on Glove
Hand Gesture Recognition System to Control Slide Show Navigation- 2014	Edge-based methods and region-based methods.	Segmentation, thresholding.	-
Hand gesture recognition system – 2013	Image Processing	Static	-
This project	*Detection algorithm*	*Appearance based model*	-

Table 2. Comparison of various gesture recognition system

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

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 4, Issue 2, February 2016

REFERENCES

1. "HANDGESTURERECOGNITION: A LITERATURE REVIEW", Rafiqul Zaman, Khanand Noor, Adnan Ibraheem, 2012, Department of Computer Science, A.M.U. Aligarh, India.
2. "Hand-gesture recognition using computer-vision techniques", 2013, David J. Rios-Soria, Satu E. Schaeffer, Sara E. Garza-Villarreal, Universidad Autónoma de Nuevo León (UANL) San Nicolás de los Garza, NL, Mexico.
3. "Hand Gesture Recognition System to Control Slide Show Navigation", 2014, Dnyanada Jadhav, Prof. L.M.R.J. Lobo, Walchand Institute of Technology, Solapur.
4. "Hand gesture recognition system", 2015, Prof. Praveen D. Hasalkar1, Rohit S. Chougule, Vrushabh B. Madake, Vishal S. Magdum, Department of Computer Science and Engineering, Walchand Institute of Technology, W.I.T, Solapur, Maharashtra, India
5. "Interaction with Virtual Game through Hand Gesture Recognition", 2011, Siddharth S. Rautaray and Anupam Agrawal, Indian Institute of Information Technology, Allahabad.
6. "A Low-Cost Hand Gesture Human-Computer Interaction System",2012, Leyuan Liu, Nong Sang, Saiyong Yan, Inst., PR & AI, Huazhong University of Science and Technology, Wuhan, China.
7. "Hand Tracking and Gesture Recognition", 2015, Anagha Dhote, S.C. Badwaik, Sinhgad College of Engineering Pune, India
8. "An Introduction to the Kalman Filter", 2001, Greg Welch, Gary Bishop.
9. "A Survey of Computer Vision-Based Human", 2001, Thomas B. Moeslund Erik Granum.
10. "Gesture Recognition and Control", 2013, Prof Kamal K, AmitaPareek, Dr S Tiwari.
11. Vision-based Hand Gesture Recognition for Human-Computer Interaction. In: The Universal Access Handbook. LEA, 2009, X. Zabulis, H. Baltzakis and A. Argyros
12. "A fast algorithm for vision-based hand gesture recognition for robot control", 2006, Asanterabi Malima, Erol Özgür, and Müjdat Çetin.
13. "Gesture Recognition: A Survey",2007, S. Mitra, and T. Acharya.
14. "A Review of Vision Based Hand Gestures Recognition",2009, G.R.S. Murthy, R. S. Jadon.
15. "Human-Computer Interaction: Overview on State of the Art", 2008, Fakhreddine Karray, Milad Alemzadeh, Jamil Abou Saleh and Mo Nours Arab.