

Survey of Hand Gesture Recognition System based on Methods and Uses

Tulsi Joshi¹, Rupinder Kaur²

¹M.Tech (Scholar), ²Assistance Professor

Department of Computer Science Engineering, Doaba Institute of Engineering Kharar

Abstract - In the area of image processing it is actual remarkable to recognize the human gesture for general life applications. Gesture recognition is a rising field of research amongst various human computer interactions; hand gesture recognition is very general for interacting amongst human & machines. It is non verbal way of communication and this research area is full of innovative approaches. The proposed hand gesture recognition system consists of three modules: vision based information acquisition, feature abstraction, & hand gesture recognition

Keywords - Hand Gesture Recognition, image Processing, research area and feature extraction.

I. INTRODUCTION

Hand gesture recognition is efficient way of communication. This communication media uses hand motion or movement. Hand gesture recognition having two main applications such as in Robot control, for disabled people communication. In robot control user has numbers to function a robot, such as number 'one' means 'move forward', 'Five' means 'stop'. Two, three and four means 'move left', 'move right', 'move backward'. These are the methods to control a robot [1]. Other one application is to provide better communication for deaf and dumb people. Sign language is used in this communication method.

Hand gesture recognition system consists of Human-Computer Interface (HCI). This is the method of communication between a man and machine. Computer is an electronic device that uses input and output devices such as keyboard and mouse. Many people use computers in daily life either at their work or for personal use. Now-a-days many devices are used to make computer system more intelligent and advance. By using these devices humans are able to make complex communication with intelligent computer systems. Many input and output devices are designed over a period of time for communication between human and computer [2].

II. TECHNIQUES OF HGR SYSTEM

The two techniques are: Glove-Based technique, Vision-Based technique.

A. Glove-Based Technique

Glove-based hand gesture recognition is an interface in which user has to wear a device. It is necessary to wear weight of cables that is connected to the computer. In glove based technique user has to wear glove or attached skin sensors that sense angles, rotation and movement of hand. These skin attached sensors are useful to give command to the computer.

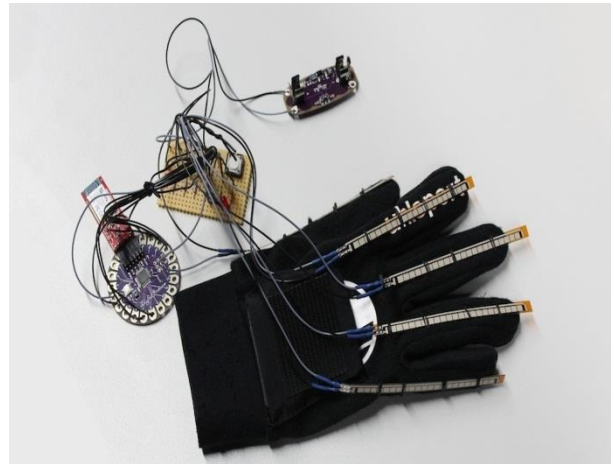


Fig 1: Glove based hand gesture recognition.

B. Vision-Based Technique

Vision-Based technique is another way to recognize hand gestures. Vision based technique is used for recognition of gestures and for location of gestures. This technique requires a camera for input from the user. Camera captures hand gestures and use gestures as input instead of keyboard. This technique has some limitations.



Fig 2: Vision based hand gesture recognition.

Hand gesture recognition having main applications in Biometrics, telemedicine and human machine interface. Feature extraction is a process used in hand recognition that involves individual classes of gestures. According to these individual classes, classifiers can classify the gesture. Different techniques are used in vision based approach for hand recognition[3]. These approaches provides human-computer interface which is quite challenging.

This process works with different conditions such as an adaptive skin colour model. It has two parts:

- a.) Skin color model.
- b.) Lighting compensation method.

Different lighting conditions in hand segmentation use white +yCbCr skin color model with all possible conditions. Proposed system had high accuracy and less complexity. To attain high accuracy and less complexity Gabor filters are used for classification in the system. Gabor filters take hand image as input for features extraction. Gabor filters are used for classification but due to high dimensionality PCA (Principle component analysis) is used for the dimensions decrease. In hand recognition gestures are castoff as input or used for the verbal-communication. Gestures are of two types: Static and Dynamic hand gestures.

III. LITERATURE SURVEY

Sangeetha et.al [4] new android application which will detect the Indian sign language via handset camera & exchanges into corresponding text or voice output. This application decreases the major communication gap amongst the compromised and normal people. This application uses certain image processing methods to compare the input with the at present stored signs. This application requires only android phone and does not need any special markers or magical gloves on the hand of the user. **Nasser H et.al 2011[5]** includes detecting & tracking bare hand in disorderly background using casing detection and hand postures contours comparison algorithm after face deduction, & recognizing hand gestures with Principle Components Analysis (PCA). In the training stage, a set of hand postures pictures with different scales, revolution and lighting conditions are trained. Then, the most eigenvectors of training pictures are determined, & the training masses are calculated by projecting each training image onto the utmost eigenvectors. In the analysis stage, for every structure captured from a webcam, the hand gesture is detected using our system, then the small picture that contains the identified hand gesture is projected onto the most eigen vectors of training pictures to form its test masses. Finally, the smallest Euclidean distance is determined between the test weights & the training masses of all training image to identify the hand gesture. **Ankit Chaudhary et.al**

2011[6]work done in the part of hand gesture appreciation where attention is on the intelligent approaches including soft computing based techniques like artificial neural network, fuzzy logic, genetic systems etc. The methods in the preprocessing of image for separation & hand image construction also occupied into study. Most researchers used fingertips for hand detection in presence based modeling. Finally the contrast of results given by different researchers is also presented. **Melanie Mitchell et.al[7]** the appeal of using ideas from evolution to solve computational problems, give the elements of simple GAs, review some application areas of GAs, & give a complete example of how a GA was used on one particularly interesting problematic automatically noticing good plans for playing the Prisoner's Dilemma. The paper concludes with a short introduction to the theory of GAs. **Joyeeta Singha et.al [8]** KL Transform to recognize different hand gestures. The system consists of five steps: skin filtering, palm collecting, edge finding, feature extraction, & classification. Firstly the hand is detected using skin filtering and palm cropping was completed to extract out only the palm area of the hand. The extracted image was then processed using the Canny Edge Detection method to extract the plan images of palm. After palm extraction, the features of hand were extracted with K-L Transform method & finally the input gesture was recognized using proper classifier.

IV. WHY HAND GESTURE TECHNIQUE USED?

Hand gestures provide a natural and intuitive communication modality for human-computer interface. Effectual human computer interfaces (HCI) have to be developed to allow computers to visually recognize in actual time hand gestures. Though, vision-based hand tracing and gesture recognition is a challenging problem due to the complication of hand gestures, which are rich in varieties due to high degrees of freedom (DOF) involved by the human hand. In command to successfully fulfill their part, the hand gesture HCIs have to meet the requirements in terms of real-time presentation, recognition accuracy & robustness alongside transformations and cluttered background. To meet these requirements, several gesture recognition methods used the help of colored markers or data gloves to make the task easier [9]. However, using of markers and gloves sacrifices the user's convenience. In this paper, we focus on bare hand gesture recognition deprived of help of any markers & gloves.

V. CONCLUSION

In recent years a lot of research has been conducted in gesture recognition. The aim of this project was to develop a gesture recognition system. This system is useful for communicating with a deaf and dumb person. Gesture Recognition System is used to segment the region of interest from background, remove image noise, and normalize the area

of interest and other operations that will help to reduce the representation of the image.

[9]. A. El-Sawah, N. Georganas, E. Petriu. A prototype for 3-D hand tracking and gesture estimation. *IEEE Transactions on Instrumentation and Measurement*, 57(8):1627–1636, 2008.

VI. REFERENCES

- [1]. Mitra, Sushmita, and Tinku Acharya. "Gesture recognition: A survey." *IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews)* 37.3 (2007): 311-324.
- [2]. Chaudhary, Ankit, et al. "Intelligent approaches to interact with machines using hand gesture recognition in natural way: a survey." *arXiv preprint arXiv:1303.2292* (2013).
- [3]. http://www.123rf.com/photo_8898103_hand-gestures.html
- [4]. Rajam, P. Subha, and G. Balakrishnan. "Real time Indian sign language recognition system to aid deaf-dumb people." *Communication Technology (ICCT), 2011 IEEE 13th International Conference on*. IEEE, 2011.
- [5]. Dardas, Nasser H., and Emil M. Petriu. "Hand gesture detection and recognition using principal component analysis." *2011 IEEE International Conference on Computational Intelligence for Measurement Systems and Applications (CIMSA) Proceedings*. IEEE, 2011.
- [6]. Chaudhary, Ankit, et al. "Intelligent approaches to interact with machines using hand gesture recognition in natural way: a survey." *arXiv preprint arXiv:1303.2292* (2013).
- [7]. Mitchell, Melanie. "Genetic algorithms: An overview." *Complexity* 1.1 (1995): 31-39.
- [8]. Singha, Joyeeta, and Karen Das. "Hand gesture recognition based on Karhunen-Loeve transform." *arXiv preprint arXiv:1306.2599* (2013).