

Real Time Vision Hand Gesture Recognition Based Media Control via LAN & Wireless Hardware Control

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ABSTRACT: *Gesture (Ges-ture) means a movement of part of body. Gesture Recognition is the technology that recognize the movement of body. It recognize hand, arms, head or any part of the body. So the goal of Gesture Recognition is to provide interface of human body with computer via mathematical algorithm.*

This paper gives a real time vision based method for recognizing human body motion using MATLAB. It also gives the working details of recognizing process using Edge detection and Skin detection algorithms. In this paper Gesture Recognition used to control the media application over LAN connectivity and wireless hardware interface technology employed allow us to control home appliances formed in a wireless network via Hand gesture movement only, this opens a new pleothera of avenues in real time vision based home automation system.

I. INTRODUCTION

Gesture Recognition recognize meaningful expression of motion by a human body, involving the hands, arms, face, head or body. Gesture Recognition is important in designing efficient human computer interface. Its provides a bitter bridge between machine and human than primitives tent user interface or event GUI(graphical user interface).

One of the attractive methods for providing natural human-computer interaction is the use of the hand as an input device rather than the cumbersome devices such as keyboards and mice, which need the user to be located in a specific location to use these devices. Since human hand is an articulated object, it is an open issue to discuss. The most important thing in hand gesture recognition system is the input features, and the selection of good features representation. This paper presents a review study on the hand postures and gesture recognition methods, which is considered to be a challenging problem in human computer interaction context and promising as well. Many applications and techniques were discussed here with the explanation of system recognition framework and its main phases. This section defines the literature review of real time media control application LAN control and hand gesture recognition with wireless network to control hardware. Appearance based technology is used for recognize a gesture. Appear based technology read appearance of image of hand and compare this image parameters with the extracted image feature from input video. Gesture recognition does not require the user to wear any special equipment or attach any devices to the body. The gestures of the body are read by a camera instead of sensors attached to a device.

We control media application or utility application through LAN. In recent years LAN connectivity of computer system is commonly used in all fields like Education, Business, Medical and Banking etc. Application sharing and open same application on many systems is common task. Gesture Recognition makes it easy to control media application (audio, video etc.) or utility application (notepad, word sheet or business purpose application) to share or open on different computers connected through LAN. A hand gesture is used on one system and its controls all LAN connected system. This paper gives and implements a idea of media application controlled over LAN network by a simple hand gesture recognition.

This paper also gives the idea of wireless hardware control. It controls hardware over wireless network. In any building or big companies to control the hardware like (fan, light, gates etc.) take more time and man work. We control hardware by gesture recognition manually or automatically through wireless connectivity. It is also used in home appliance to control like TV, Radio, Light, Fan, and Door through a gesture without use of switch. To understand gesture recognition two things are important.

I. Human Gesture Introduction - Human hand gestures provide the most important means for non-verbal interaction among people. They range from simple manipulative gestures that are used to point at and move objects around to more complex communicative ones that express our feelings and allow us to communicate with others. Hand gesture recognition based man-machine interface is being developed vigorously in recent years. Due to the effect of lighting and complex background, most visual hand gesture recognition systems work only under restricted environment. Many methods for hand gesture recognition using visual analysis have been proposed for hand gesture recognition. Sebastiean Marcel, Oliver Bernier, Jean Emmanuel Viallet and Danieal Collobert have proposed the same using Input-output Hidden Markov Models. Xia Liu and Kikuo Fujimura have proposed the hand gesture recognition using depth data. For hand detection, many approached uses color or motion information. Attila Licsar and Tamas Sziranyi have developed a hand gesture recognition system based on the shape analysis of the static gesture. Another method is proposed by E. Stergiopoulou and N. Papamarkos which says that detection of the hand region can be achieved through color segmentation. Byung-Woo Min, Ho-Sub Yoon, Jung Soh, Yun-Mo Yangc and Toskiaki Ejima have suggested the method of Hand Gesture Recognition using Hidden Markov models. Another very important method is suggested by Meide Zhao, Francis K.H. Quek and Xindong Wu. There is another efficient technique which uses Fast Multi-Scale Analysis for the recognition of hand gestures as suggested by Yikai Fang, Jian Cheng, Kongqiao Wang and Hanqing Lu, but this

method is computationally expensive. Chris Joslin et. al. have suggested the method for enabling dynamic gesture recognition for hand gestures. Rotation Invariant method is widely used for texture classification and recognition. Timi Ojala et. al. have suggested the method for texture classification using Local Binary Patterns.

II. GESTURE RECOGNITION

Gestures are expressive, meaningful body motions – i.e., physical movements of the fingers, hands, arms, head, face, or body with the intent to convey information or interact with the environment. There are several aspects of a gesture that may be relevant and therefore may need to be represented explicitly. Hummels and Stappers (1998) describe four aspects of a gesture which may be important to its meaning.

- Spatial information – where it occurs, locations a gesture refers to.
- Pathic information – the path that a gesture takes.
- Symbolic information – the sign that a gesture makes
- Affective information – the emotional quality of a gesture.

In order to infer these aspects of gesture, human position, configuration, and movement must be sensed. Gesture recognition is the process by which gestures made by the user are made known to the system. Gesture recognition is also important for developing alternative human-computer interaction modalities. It enables human to interface with machine in a more natural way. Gesture recognition is a technique which used to take computers 'see' and interpret intelligently is becoming increasingly popular. Dynamic gesture recognition isn't something entirely new.

III. SYSTEM MODEL

Input: The input of the gesture recognition is hand gesture image that taken by a webcam or camera. This is a motion of hand or body part that is captured and processed by edge detection algorithm. Before preprocessing first we initialize variable and parameters.

Preprocessing: Preprocessing is applied to images before we can extract features from hand images. It is a step by step process to recognize and matching appearance of the image that is previously stored.

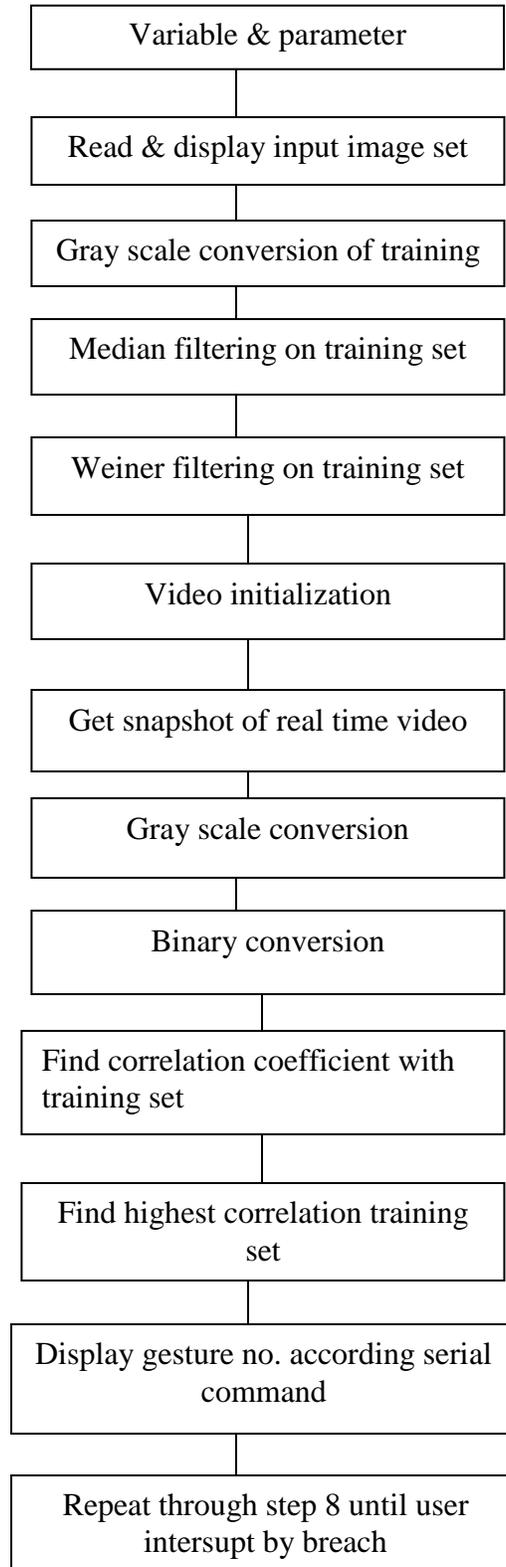
STEP 1: Captured image is a gray scale image converted into equal binary form or frames. Otsu algorithm is used to convert gray scale into binary form. In computer vision and image processing, Otsu's method is used to automatically perform histogram shape-based image thresholding or the reduction of a gray level image to a binary image. The algorithm assumes that the image to be threshold contains two classes of pixels or bi-modal histogram (e.g. foreground and background) then calculates the optimum threshold separating those two classes so that their combined spread (intra-class variance) is minimal.

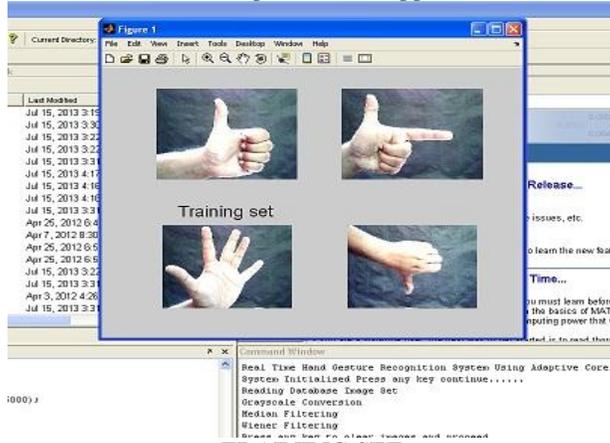
The result of this step is in the figure show below.

STEP 2: After applying the Otsu algorithm on the original gray scale image, we find that some noise occurs in binary image or frames. These errors create problems in detection of hand gesture. So we need remove these errors. Morphological filtering approach is done to remove these errors. In the morphological filtering, we apply a rule on the binary image. The value of any given pixel in the output image is obtained by applying set of rules on the neighbors in the input image.

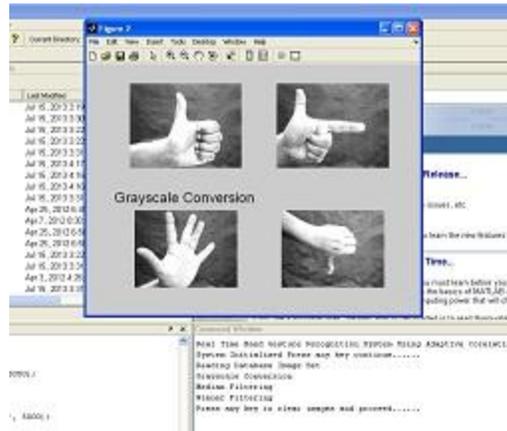
STEP 3: After finding the real binary image features extraction is perform. Features extraction is a process of find the edge of detected image. Canny edge detection algorithm is used for find the edge of detected image.

STEP4: The detected edge of image is used to match the appearance of hand gesture and give the result to the output hardware or media application.

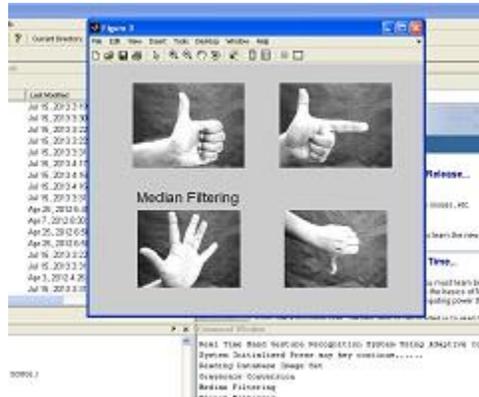
IV. FLOW CHART



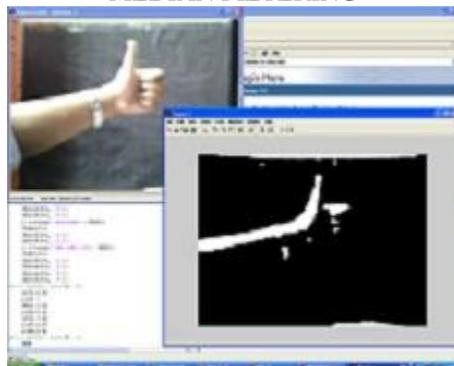
TRAINING SET



GRAY SCALE CONVERSION



MEDIAN FILTERING



BINARY IMAGE

V. FURTHER RESRARCH

Further detail research is focused on providing security machenism through gesture. We use body motion for authentication purpose or provide security to access the information or data with CCTV camera. It will be a multipurpose system. Recognize a pattern of body motion with CCTV camera and used to provide security to system not extra webcam is used.

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