Survey on Touch less Computer Control System Using Hand Gesture Recognition

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***Abstract*--**To achieve virtual interaction HCI is provides us with interface. The traditional input devices such as mouse and keyboard are being gradually replaced by virtual human computer interaction techniques. It also increases the interaction types which can be carried out with the computer. Now days for providing interfacing between computer and human using hand gesture, Hand gesture recognition system are widely being suggested. We design a computer vision based an improved HCI i.e. a mouse, which can control and command the cursor of a computer or a computerized system using a camera and hand. In the paper we propose is a mouse cursor movement and click events based on skin detection technique. A simple camera is used to track the hand movements made by the user. In order to move the cursor on the computer screen the user simply moves the hand on a surface within the viewing area of the camera. The video produced by the camera is examined individually on each frame using computer vision techniques based on the skin detection. The event that are generated are proper processed are used to move the cursor according to hand movements on the computer. The computer vision based mouse does not require any predefined datasets for recognizing the meaning of the hand gestures made by the user in front of the camera. The system is a real time system which is developed in a very cost effective way.

Keywords: *:* Gesture recognition, hand gesture recognition, human computer interface

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I. INTRODUCTION

Hand gesture recognition is the most active region of of computer vision .Its not difficult to interact with a system without using any hardware devices. Some of the user don't have a perfect knowledge about the computer at that time human computer interaction is able to give the idea about the system easily through which anyone can use the machine perfectly. Gestures are a form of nonverbal communication in which parts of body actions are used to communicate important information. Gesture contain movements of hand ,face and different parts of body. The camera recognizes objects around you instantly, with the micro-projector overlaying the information on any surface, including the object itself or your hand. Then, you can access or manipulate the information using your fingers .Recognition of hand postures is the basic problem solved by virtual mouse system.In paper hand recognition system having three basic module require for constructing things are as,skin detection,feature extraction and recognition.For recognition the beneficial match area is required to control of the system. Now take this to every aspect of everyday life. Someone can be in a taxi going to the airport, and just by taking out there boarding pass, Sixth Sense will grab real time information about flight and display it over the ticket. So that You won't need to do any action. Just hold it in front of your and it will work. The key is that Sixth Sense recognizes the objects around us and displaying information automatically and letting you can access it in any way , in the simplest way possible.

II. LITERATURE SURVEY

In one of the research paper author Zhifeng Li with his team [1] exhibits a novel approach popularly known as feature discriminant analysis which decrease the great discrepancy and enhances optical-infrared face recognition performance. This approach, firstly proposes a new learning-based face descriptor to extract the common features from heterogeneous face images (infrared face images and optical face images). Finally an effectual method for matching is applied to the resultant features to obtain the concluding result.

In order to improve the heterogeneous face recognition performance another author [2] proposed a novel coupled discriminant analysis method. The two major Drawbacks of this method are basically; all samples from dissimilar modalities are used to characterize the coupled projections, so that adequate discriminative information could be extracted. Secondly, the locality information in kernel space is included into the coupled discriminant analysis as a constraint to improve the generalization ability. Locality

constraint in kernel space (LCKS)-based coupled discriminant analysis methods, namely LCKS-coupled discriminant analysis (LCKS-CDA) and LCKS-coupled spectral regression(LCKS-CSR), are presented.

Some other author, Brendan F. Klare and Anil K. Jain [3]proposed a method for heterogeneous face recognition, called Prototype Random Subspaces. Probe and gallery images are at first filtered with three unique image filters, and two different local feature descriptors are employed for extracted. A training kit acts as a set of prototypes in which each prototype subject has an image in both the gallery and probe modalities. The nonlinear kernel similarity between an image and the prototypes is measured in the corresponding modality. A random subspace framework is employed in conjunction with LDA subspace analysis to further improve the recognition accuracy. The proposed method leads to excellent matching accuracies across four different HFR scenarios.

In [4] the author described a cross spectral matching method that encodes magnitude and phase of multispectral face images filtered with a bank of Gabor filters. An operator known as SWLD was applied to encode the magnitude of the Gabor filter responses, which is claimed here as a new application of SWLD operator. The stated operator was implemented in the Gabor domain jointly with a uniform 12-bit LBP operator to encode magnitude of the Gabor responses and was further complemented with a uniform GLBP descriptor to encode the phase response. Encoded multispectral images are mapped into a histogram representation and cross matched by applying a symmetric I-divergence distance

In [5] This paper proposed a method to enhance the performance of face detection and recognition systems. This method basically consists of two main parts: firstly, author detect faces and then recognize the detected faces. In detection step used the skin color segmentation with Gaussian skin color model combined with AdaBoost algorithm, which is fast and also more precise eas compared to the rest known methods.

In [6] A novel infrared face recognition method based on LBP was proposed. The chief idea is that face representation mission and recognition mission have different criterions. Based on the criterion of separabilitydiscriminant, pattern selection (PS) algorithm is proposed to get the LBP patterns which are most suitable for infrared face recognition. Author experiments illustrate that the PS is effective in extraction the discrimination information and the performance of the proposed infrared face recognition method outperforms the traditional
LBP+uniform and PCA+LDA methods.

III. Scope of Problem

Computer vision is the science and technology of machines that see. As a scientific discipline, computer vision is concerned with the theory behind artificial systems that extract information from images. The image data can take many forms, such as video sequences or views from multiple cameras

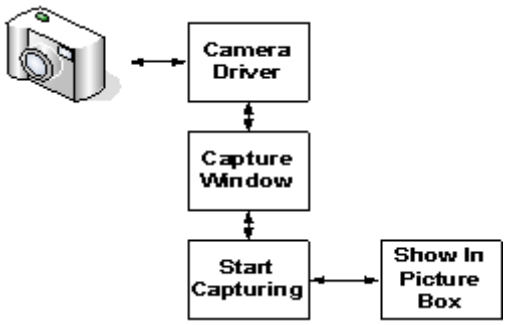
Scope of the problem definition may lies in different sector or area of application. Some of the most appropriate areas in embedded computer visions are as follows,

- Controlling processes (e.g., an industrial robot or an autonomous vehicle).
- Detecting events (e.g., for visual surveillance or people counting).
- Organizing information (e.g., for indexing databases of images and image sequences).
- Modelling objects or environments (e.g., industrial inspection, medical image analysis or topographical modeling).
- Interaction (e.g., as the input to a device for computer-human interaction).

IV. Proposed Approach:

Main aim of proposed system is to build the software system depend on real time video processing. Here camera will pointed to the user activity and by processing camera view system will identify the action and process further. This project is mainly divided in to three main following modules.

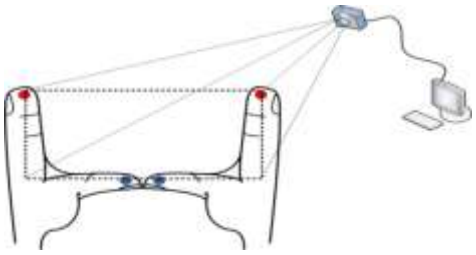
1] Processing of Camera and image capturing:



To access any of the cameras we need camera driver to be installed coz it handle the camera working.Secondly contact window are needed to give camera window to user to application after getting the capture window we can load the view in picture box or in any image showing object. Image is made up of pixels and each pixel is made up of bits this bit pattern is depending on the file or image format. Different colours for each bit of pixel value are assigned. For example in bitmap file format it uses Red for one bit, blue for one bit and green for one bit Once system capture

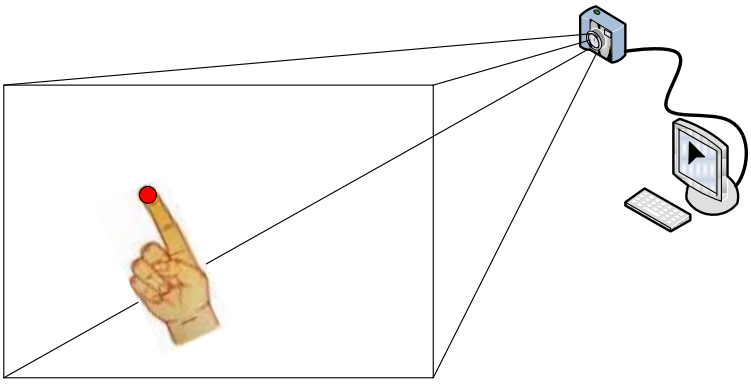
frame it will process frame for pixel identification and further processing

2] Hand Gesture Based Auto Image Grabbing:



Another module in project is to auto image grabbing using hand gesture. Here user will apply specified color strip on two finger and using frame extraction and color identification logic system will try to find the four co-ordinate to get the square area. Once the desired square area gets identified system will crop the camera captured image in to square area and save it as a bitmap image. Now user don't need to hold camera in his hand and click the take snap button user can simply take snap using had gesture. User can enlarge or reduce image size just by placing hand gesture far or near to camera view.

3] Hand position tracking and mouse control



Getting user input virtually is the main aim for this module where user will move his finger in front of camera capture area. This motion will capture and detected by the camera and processed by the system frame by frame. After processing system will try to get the finger co-ordinates and once co-ordinates get calculated it will operate the cursor position.

V. METHDOLOGY:

Research methodology to be employee: The organization of a computer vision system is highly application dependent. Some systems are stand-alone applications which solve a specific measurement or detection problem, while others constitute a sub-system of a larger design which, for example, also contains sub-systems for control of mechanical actuators, planning, information databases, man-machine interfaces, etc. The specific implementation of a computer vision system also depends on if its functionality is pre-specified or if some part of it can be learned or modified during operation. There are, however, typical functions which are found in many computer vision systems.

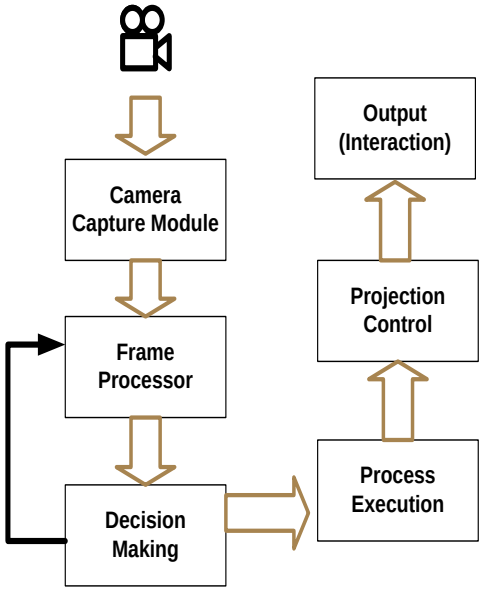


Figure 1. Processing Flow

- **Image acquisition**: A digital image is produced by one or several image sensors, which, besides various types of light-sensitive cameras, include range sensors, tomography devices, radar, ultra-sonic cameras, etc. Depending on the type of sensor, the resulting image data is an ordinary 2D image, a 3D volume, or an image sequence. The pixel values typically correspond to light intensity in one or several spectral bands (gray images or colour images), but can also be related to various physical measures, such as depth, absorption or reflectance of sonic or electromagnetic waves, or nuclear magnetic resonance.
- **Pre-processing**: Before a computer vision method can be applied to image data in order to extract some specific piece of information, it is usually necessary to process the data in order to assure that it satisfies certain assumptions implied by the method. Examples are
  - Re-sampling in order to assure that the image coordinate system is correct.

- Noise reduction in order to assure that sensor noise does not introduce false information.
- Contrast enhancement to assure that relevant information can be detected.
- Scale-space representation to enhance image structures at locally appropriate scales.

- **Feature extraction**: Image features at various levels of complexity are extracted from the image data. Typical examples of such features are
  - Lines, edges and ridges.
  - Localized interest points such as corners, blobs or points.

- **Detection/segmentation**: At some point in the processing a decision is made about which image points or regions of the image are relevant for further processing. Examples are
  - Selection of a specific set of interest points
  - Segmentation of one or multiple image regions which contain a specific object of interest.
- **High-level processing**: At this step the input is typically a small set of data, for example a set of points or an image region which is assumed to contain a specific object. The remaining processing deals with, for example:
  - Verification that the data satisfy model-based and application specific assumptions.
  - Estimation of application specific parameters, such as object pose or object size.

VI. Future Scope And Application:

The proposed system controls the mouse cursor and implements its function using a real time camera. The goal of this project is to create a system that will recognize the hand gestures and control the computer/laptop according to those gestures. This system is based on computer vision algorithms and can do all mouse tasks such as left and right clicking, double clicking and starting the applications using the gestures like notepad, paint, word etc. A new HCI vision-based interface is designed, which is sufficiently robust to replace a computer mouse and extend the interaction capabilities. This system realizes the function of the mouse gestures very well and controls the mouse cursor movement and click events of the mouse using hand gestures effectively. A virtual human computer interaction device is developed in a cost effective manner. This system will beneficial for anyone and better support for future enhancement and development. The application of the system are games on computer, navigation of robot, computer vision,defens robot,tv control system, and music player system.

VII. Conclusion:

In this paper a brief discussion on various techniques on human computer interaction device that were recently developed was studied. Also there merits and demerits were examined. And keeping the demerits in concern a novel system was proposed.

REFERENCES

[1] Abhik Banerjee, Abhirup Ghosh, KoustuvmoniBharadwaj, HemantaSaik (2014)—Mouse Control using a Web Camera based on Colour Detection‖ International Journal of Computer Trends and Technology (IJCTT) – volume 9 number 1, ISSN: 2231-2803, March 2014.

[2] Zhifeng Li, Dihong Gong, Yu Qiao and DachengTao,"Common Feature Discriminant Analysis for Matching Infrared Face Images to Optical Face Images" IEEE Transactions On Image Processing, Vol. 23, No. 6, June 2014

[3] Zhen Lei,Shengcai Liao, Anil K. Jain,and Stan Z. Li, "Coupled Discriminant Analysis for Heterogeneous Face Recognition" IEEE Transactions On Information Forensics And Security, Vol. 7, No. 6, December 2012.

[4] Brendan F. Klare and Anil K. Jain, "Heterogeneous Face Recognition Using Kernel Prototype Similarities" IEEE Transactions On Pattern Analysis And Machine Intelligence, Vol. 35, No. 6, June 2013.

[5] Francesco Nicolò and Natalia A. Schmid "Long Range Cross-Spectral Face Recognition :Matching SWIR Against Visible Light Images" IEEE Transactions On Information Forensics And Security, Vol. 7, No. 6, December 2012.

[6] AlirezaTofighi, S. AmirhassanMonadjemi ,"Face Detection and Recognition using Skin Color and AdaBoost Algorithm Combined with Gabor Features and SVM Classifier" International Conference on Multimedia and Signal Processing, 2011.

[7] Zhi-Hua Xie, JieZeng ,Guo-Dong Liu, Zhi-Jun Fang, "A Novel Infrared Face Recognition Based On Local Binary Pattern", International Conference on Wavelet Analysis and Pattern Recognition, Guilin, 10-13 July, 2011.

[8] Xiaogang Wang and Xiaoou Tang, "Face Photo-Sketch Synthesis and Recognition" IEEE Transactions On Pattern Analysis And Machine Intelligence, Vol. 31, No. 11, November 2009.

[9] Xiaoo Tang and Xiaogang Wang "Face Sketch Recognition" IEEE Transactions On Circuits And

ISSN: 2321-8169
209 – 213

Systems For Video Technology, Vol. 14, No. 1, January 2004.

[10] "Face Recognition", National science and technology council, 2006.

[11] XuanZou, Josef Kittler and Kieron Messer, "Illumination Invariant Face Recognition: A Survey" IEEE, 2008.

[12] Ran him, Wei-Shi Zheng, Bao-Gang Hu, and Xiang-Wei Kong, "Two-Stage Nonnegative Sparse Representation for Large-Scale Face Recognition" IEEETransactions on Neural Networks and Learning Systems, Vol. 24, No. 1, January 2013.

[13] Na Liu, JianhuangLai ,HuiningQiu, "Robust Face Recognition by Sparse Local Features from a Single Image under Occlusion" Sixth International Conference on Image and Graphics,2011.