IJRSET 2015 SPL Volume 2, Issue 10 Pages: 38-43
ISSN 2394-739X
International Journal for Research in Science Engineering and Technology

HUMAN-COMPUTER INTERACTION BASED ON FACE AND HAND GESTURE RECOGNITION

[1] Mr. R. SRIDHAR, [2] Mr. R. RAJKUMAR M.C.A, [3] Mr. S. MANI SELVAM
[1, 2, 3] III M. Sc. Software Systems,
[1, 2, 3] Department of BCA and SS,
[1, 2, 3] Sri Krishna Arts and Science College,
[1, 2, 3] Coimbatore.

ABSTRACT: -

By the extant period, hand symbols recognition structure might be used as a extra projected and practical approach for humanoid computer contact. Reflex hand gesture appreciation system provides us a new method for shared with the near atmosphere. In this paper, a face and hand signal recognition structure which is able to control computer media entertainer is offered. Hand gesture and humanoid face are the main part to interrelate with the cool system. We used …..the look recognition scheme for observer proof and the hand signal respect in device of PC media player, for instance, volume down/up, next tune and etc. In the planned technique, first, the arrow gesture and face location is removed from the core image by combination of skin and cascade gauge and then is sent to recognition stage. In recognition period, first, the threshold condition is inspected then the extracted face and gesture will be known. In the outcome stage, the planned technique is applied on the video dataset and the high precision proportion developed. Other the suggested hand signal recognition method is applied on static American Sign Language (ASL) database and the correctness rate achieved nearby 99.40%. also the planned method could be used in gesture based computer games and virtual reality.

Keywords: - human processer interaction; hand signal recognition; hand tracking; computer music controlling.

1. INTRODUCTION

In the existing world, the communication with the intelligent devices has progressive to such a magnitude that as humans it has become essential and we cannot live without its capability. The new machinery has become so embedded into our steady breathes that we use it to plant, work, interconnect and even interest our self [1]. It has been extensively supposed that the calculating, communiqué and presentation machineries advancement added, but the recent classifications may developed a holdup in the effective operation of the existing material flow. For competently with of these organizations, most computer applications need more and more communication. For that motive, human-computer interaction (HCI) has been a dynamic field of study in the last decades. Initially systems that are used for graphically HCI system are mouse and keyboards. Even if the innovation of the mouse and keyboard is a great development, there are still circumstances in which these devices are incompatible for HCI. This is primarily the instance for the announcement with 3D objects. The two points of freedom of the mouse could not suitably emulate the 3 dimensions of space. The use of hand gestures offers a smart and natural optional to these burdensome interface tools for

human computer message. With use of needles signal gratitude system can help people to interactive with computers in a more intuitive mode. Hand gesture recognition owns wide applications in sign language recognition [2], [3], computer games [4], virtual reality [5] and HCI systems [6]. There were numerous gesture recognition methods established for tracking and recognizing numerous hand signals. Each single of them takes their gain and disadvantage. Wired technology is the eldest one, in which in order to join or boundary with the computer system, users need to tie up themselves with the help of wire. User cannot freely move in the room in wired skill as they coupled with the supercomputer system via wire and limited with the measurement of wire. The best sample aimed at the wired expertise is the instrumented gloves -also called data gloves or microchip technology gloves. These microelectronics gloves obligate some radars, and thanks to these sensors they provide information related to location of the hand, position orientation of member etc. Productivity grades of these data belts are well but for the wide range common application using propose they are expensive through to being an electronic device [3]. After the Data gloves, the optical indications is give the impression. The visual markers spot the location of hand or tips of members by projecting Infra-Red light and return this well-lit on curtain. These establishments also suggestion the earnest result but need a very complex configuration. nowadays some new methods have been proposed for hand gesture recognition, such as Image based systems which needs processing of image structures like texture, color etc. the approaches on optical markers are very luxurious and have very difficult outline [3]. Too the practice based on image giving out is weedy against under diverse illumination situation, color texture modifying, which leads to variations in perceived results. For educating the image dealing out based technique for hand gestures recognition scheme we planned current paper method. In this paper, we use only a video camera and a PC to progress a hand gesture based HCI system. Our methodology for HCI is contain of four steps, I. aspect and needle detection built on fusion of skin detection and cascade detector; II. extracting needle new position based on element filter algorithm; III. measuring threshold condition based on hand new position and applying face & hand recognition stage; IV. Controlling smart device by extracted information from third stage. The rest of the paper is equipped as tails. In segment dual projected systems is presented and in section three and four the practical result and conclusion are detailed respectively

Face & Hand Detection

In instruction to cutting the face and needle from the images, a skin pixel finder, connected component (CC) generation and Viola jones detector has been implemented

Skin region detection

Skin region extracting is one of the greatest and primary step in face detection purpose [7]. In this respect, many approaches have been suggested to detect skin which showed high discovery quantity. In this rag we used our peel discovery way that we named before in [8]. Fig. 2(b) shows the result of this indicator on the access image.

Building Linked Component by accurate morphology

Mathematical morphology is one of the partitions of appearance giving out that contends about erection and hollow of entity in images [9]. After applying the covering detector, all possible skin zones are extracted and represented as white pixels. It's imaginable that the small raucous regions will be existing, but we undertake that the region related to the hand and faces are the principal. Therefore we first rescind the noise by "disk" erosion. Those small noisy areas, wrongly revealed as hand skin, stand classically skin-color

like objects in certain light situation. The erosion procedure could successfully erase those small noisy areas. Nevertheless the real extents related to the hand and face may also shrink with considering the erosion procedure calculated for rattle. Consequently we everyday the increase to gift the major discovered area, help to improve the anticipated hand and face finding. Briefly the indicator besides face are handy areas; the holes are filled in this chapter. Next this progression, the dual big extents extracted as face and hand candidate and rest of the expanse reduced. Fig. 2(c) pictures the result.

Viola and Jones Detector for Face Recognition

The Viola and Jones approached for object detection that introduced in 2001 has become one of the most common immediate bases. This system is chiefly a cataract of binary linear classifiers which are consequently applied to the sliding window input. For more detail see the [10]. In current paper we qualified the Viola-Jones framework with a lot of human faces, such as: natural, slanting, side assessment, deepen and indistinct with bearing in mind any distance and lighting complaint. After training the classifier, at the in a row time the appearance area is nominated between two object that extracted by the preceding step. In Fig. 2(d) the blue rectangular nominated as face by applying this detector.

Figure 1. (a) Entrance image (b) Detected skin region (c) result of mathematicalmorphology (d) detected face and hand region

Tracking & measuring dawn condition

In this stage, the new place of finger is removed by unit filter algorithm. For this respect, we used the extracted hand image (from principal frame), as input for element mesh algorithm. By applying this process we reached hand original situation in each setting. Also we extracted face new position in every mount by Viola jones gauge. After haul out face and finger new situation we used (1) for measuring distance between these object.

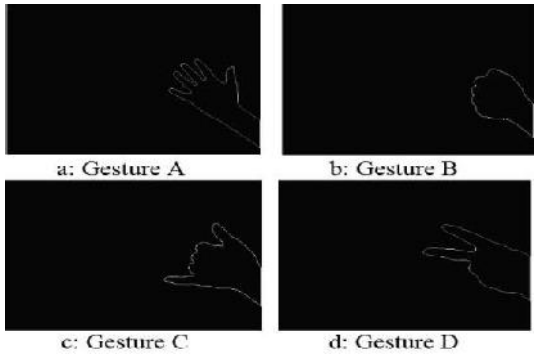

Figure 2. (a) Gesture A, (b) Gesture B, (c) Gesture C (d) Gesture D

Face feature set

Here are several approaches for face respect field, such by way of [11], [12]. In this part we used Primary Constituent Analysis (PCA) system for feature extraction. The PCA was existing by Karl Pearson and Harold Hotelling to convert a set of viably linked variables into a summary set of uncorrelated variables [13]. The notion is that a high-dimensional database is recurrently nominated by linked variables and for this reasons only a few significant dimensions account for maximum of the information. The PCA approaches find the directions with the highest alteration in the data, called chief workings.

Classification bay Mixture of Experts

In order to joining classifiers, there are binary main policies: selection and fusion. In classifier selection, every member is assigned to learn a part the feature space, whereas in classifier fusion, it is supposed

that on the whole article space, each cooperative fellow is trained. The mix of specialists (ME) is single of the most popular methods of classifier collection, which initial proposed by Jacobs et al. [14]. Practiced blend actually is a classic strategy that has been broadly used in several problem explaining tasks [15-17]. A group of single with diverse and complementary skills tackles a task jointly such that a performance higher than any single individual can type is accomplished via integrating the gifts of personalities [18]. Construction of the ME is serene of N local experts plus also, for essential the outputs skillful weights conditioned arranged the participation, there is a gating web. In our wished-for method, there is a hidden layer for each practiced - a multi-layer perceptron (MLP) neural network-, which computes an output as a occupation of the input impetuses path , and also, there are output layers, a sigmoid stimulation role, and a set of secreted weights. We presume that in a unlike area of Constitutive layers.

Guiding cool method

Later mining evidence (face owner and hand sign) from last point, we used this information for controlling computer music player by Matlab functions. Also this stage could be used as application in: smart device governing, smart TV, robots, computer disposed and etc.

Mixture of Experts Configuration

As proposed earlier, our neural network scheme contains several MLP neural networks that perform the experts' role and they are mixed through the mixture of professionals' organization. The drill set comprises the joints point's features and Fourier descriptors features of the 50% images of train set and the other 50% images are used for the testing. Afterward the input numbers are in the 17 dimensional space the topology of the strategic linkage would have 17 nodes in the input layer and also since the number of gestures is 5, before the extent of the nodes secondhand in the production layer duty be 5 (all node represents one finger signal). Therefore, our proposed neural networks topologies are differ only in the quantity of the hidden film bumps. A lot of configurations of the network by altering the complexity of the experts or the quantity of experts are tested in implementing the neural system and likewise unlike ideals are used factors conformation. In full the untried effect the gating learning rate was equal to 0.4 and the amount of its hidden nodes continued 40 nodes, the practiced culture notch was 0.9, and the network trained by 300 times. We tasted our system on unlike number of hidden swellings of experts and the results

As it is clear from the counter 2, the accuracy rate for the schemes having 10 nodes in their hidden layer is consistently low. With expanding the quantity of veiled nodes from 10 to 15 the accuracy rate improves tellingly, and in the two-authorities system with 20 secreted nodes the accurateness rate of 94.75% proof that the quantity of authorities was deficient that can't divide the input space correctly. In the four-expert party through the similar number of hidden nodes matching to the structure with three-experts nearby are copious free bounds that makes the network too complex to get a well result than 3-experts. Thus we used the network with three-experts and 20 numbers of veiled swellings as our classifier for it distributes the input space in the greatest way and establish a balance of the amount of experts and hidden nodes.

Performance Evaluation of the Proposed Method

The experimental outcomes proofed that the proposed system has a robust recognition level in detecting and recognition human computer interaction technique. Table 1 characterizes the experimental grades. Na, NCR and AR individually raise to numeral of gesture in videos, number of correct recognition and the accuracy rate.

Hand Gesture	NA	NCR	
G1 (Stop music)	50	50	100 %
G2 (Play music)	50	49	98%
G3 (Next music)	50	50	100 %
G4 (Volume up)	50	49	98%
G5 (Volume down)	50	50	100 %

Table 1. The recognition rate for various gestures in video sequence

CONCLUSION

We offered a human-computer interaction (HCI) scheme using a PC and a video camera established on face and hand gesticulation recognition. A face recognition stage was secondhand for viewer verification and the hand gesture recognition stage for monitoring computer media performer. In our proposed system, first, we mined the hand and face location from the main image by combination of skin discovery and Viola Jones detector. After extracting face and hand we used particle filter algorithm and threshold condition for applying recognition stage. Finally in the recognition stage the feature set for face and hand gesture extracted respectively and recognized by the blend of connoisseurs. In the result stage, our projected system is tested on the video dataset and we achieved proximally 99.20% accuracy rate. Auxiliary we applied the mentioned algorithm on static American Sign Language (ASL) database and we obtained 99.40% correctness ratio.

REFERENCES

[1] M. Pantic, A. Nijholt, A. Pentland and T. S. Huanag, "Human-centred intelligent human–computer Interaction (HCI2): how far are we from attaining it", International Journal of Autonomous and Adaptive Communications Systems, ACM, Volume 1 Issue 2, 2008, pp. 168–187.

[2] S. Siddharth and A. Rautaray, "Vision based hand gesture recognition for human computer interaction: a survey," Springer Journal Artificial Intelligence Review, 2012, pp. 1–54.

[3] R. Azad, B. Azad and I. T. Kazerooni, "ReaReal-Time and Robust Method for Hand Gesture Recognition System Based on Cross-Correlation Coefficient", Advances in Computer Science: an International Journal, Vol. 2, Issue 5, No.6 , 2013, pp. 121-125.

[4] J. P. Wachs, M. K. olsch, H. Stern, and Y. Edan, " Vision based hand-gesture applications", Communications of the ACM, 2011, pp. 54-60.

[5] O. A. v. Nierop, A. v. d. Helm, K. J. Overbeeke, and T. J. Djajadiningrat, "A natural human hand model", Springer journal The Visual Computer, Volume 24, Issue 1 , 2008, pp 31-44.

[6] Y. Tu, C. Kao and H. Lin, "Human Computer Interaction Using Face and Gesture Recognition", IEEE conference on Signal and Information Processing Association Annual Summit (APSIPA), 2013, pp. 1-5.

[7] R. Azad and F. Davami, "A robust and adaptable method for face detection based on color probabilistic estimation technique", International Journal of Research in Computer Science, 3(6), 2013, pp. 1-7.

[8] R. Azad and H. R. Shayegh, "Novel and tunable method for skin detection based on hybrid color space and color statistical features", International Journal of Computer & Information Technologies, 1(3), 2013, pp. 211-219.

[9] R. Azad and H. R. Shayegh, "New method for optimization of license plate recognition system with use of edge detection and connected component", 3rd IEEE International Conference on Computer and Knowledge Engineering, 2013, pp. 1-5.

[10] Y. Freund and R. Schapire, "A

decision-theoretic generalization of online learning and an application to boosting," Journal of Computer and System Sciences, vol. 55, no. 1, 1997, pp. 119–139.
[11] R. Azad,"Real-Time Illumination Invariant Face Detection Using Biologically Inspired Feature Set and BP Neural Network", IJIEEB, vol.6, no.3, pp.9-15, 2014. DOI: 10.5815/ijieeb.2014.03.02.
[12] R. Azad, E. Ahmadzadeh, B. Azad,"Real-Time Human Face Detection in Noisy Images Based on Skin Color Fusion Model and Eye Detection", International Conference on Intelligent Computing, Communication & Devices (ICCD-2014), Springer, pp. 1- 12, 2014.
[13] R. Azad, B. Azad and I. T. Kazerooni, "Optimized Method for Real-Time Face Recognition System Based on PCA and Multiclass Support Vector Machine," Advances in Computer Science: an International Journal, Vol. 2, Issue 5, No.6 , 2013, pp. 126-132.
[14] R. A. Jacobs, M. I. Jordan, S. E. Nowlan, G. E. Hinton, "Adaptive mixture of experts ", Neural Comput., vol. 3, pp. 79–87, 1991.
[15] M.F. Amasyali, O.K. Ersoy, "Classifier Ensembles with the Extended Space Forest", IEEE Transactions on Knowledge and Data Engineering, vol. 26, issue. 3, pp. 549-562, 2014.
[16] J.M. Hahne, F. Biebmann, N. Jiang, H. Rehbaum, D. arina, F.C. Meinecke, K. R. Muller, L. C. Parra, "Linear and Nonlinear Regression Techniques for Simultaneous and Proportional Myoelectric Control ", IEEE Transactions on Neural Systems and Rehabilitation Engineering, vol. 22, issue. 2, pp. 269-279, 2014.
[17] R. Azad,"Traffic Sign Recognition with High Accuracy Using Mixture of Experts", IJMECS, vol.6, no.6, pp.21-29, 2014.DOI: 10.5815/ijmecs.2014.06.03.
[18] Reza Azad, Hamid Reza Shayegh, Babak Azad, Shahram Jamali,"A New Approach Towards Web Security Cracking based on CAPTCHA Recognition Using Mixture of Experts", IJCNIS, vol.6