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Eye Gaze Detection Using Low Resulution for a Desktop with a Web Camera

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Abstract- Eye tracking is an evolving concept in the field of computer science it has emerges to the extent of gaze-based mouse usage to the system that may be implemented in the upcoming era. This concept can also be applied for the security purpose. An algorithm was developed to characterize, compare, and analyze eye movement sequences that occur during visual tracking of multiple moving targets. The most notable gaze features in the face image are the iris centre and eye corner. The eyeball moves in the eye socket when looking at different positions on the screen. The developed algorithm characterizes a sequence by hierarchically clustering the targets that an individual interrogated through an unordered transition matrix created from the frequencies of eye fixation transitions among the targets. Then, the resulting sets Of clustered targets, which we define as multilevel visual groupings (VGs), can be compared with analyze performance. The algorithm was applied to an aircraft conflict detection task. The algorithm supported identifying different eye movement characteristics between experts and novices. Scans of the experts had multilevel VGs around the conflict pairs, whereas those of the novices included different aircraft. Our Existing method, though insensitive to light conditions, achieves only average accuracy results show promise for using the compact representation of eye movements for performance analysis.

Keywords: Public – Visual tracking, Clustered targets, Eye movement.

1. INTRODUCTION

Face is the index of mind and eyes are the window to the soul. Eye movements provide a rich and informative window into a person's thought and intentions. Thus the study of eye movement may determine what people are thinking based on where they are looking. Eye tracking is the measurement of eye movement/activity and gaze (point of regard) tracking is the analysis of eye tracking data with respect to the head/visual scene. Researches of this field often use the terms eye-tracking, gaze-tracking or eye-gaze tracking interchangeably. Eye tracking is mostly used in the applications like drowsiness detection [Picot et al. (2010)], diagnosis of various clinical conditions or even iris recognition [Xu et al. (2006)]. But gaze tracking methods can be used in all the ways that we use our eyes, to name a few, eye typing for physically disabled, Cognitive and behavioural therapy, visual search, marketing/advertising, neuroscience, Psychology and Human Computer Interaction (HCI). Usually the integration of eye and head position is used to compute the location of the gaze in the visual scene. Simple eye trackers report only the direction of the gaze relative to the head (with head-mounted system, electrodes, sceleral coils) or for a fixed position of the eyeball (systems which require a head fixation). Such eye tracking systems are referred as intrusive or invasive systems because some special contacting devices are attached to the skin or eye to catch the user's gaze. The systems which do not have any physical contact with the user and the eye tracker apparatus are referred as non-intrusive systems or remote systems. Several recent studies have shown that manipulating the gaze direction of face stimuli could influence their later recognition. Authors have reported that faces seen with a direct gaze (i.e., the gaze directed to the observer) are more likely to be recognised at a subsequent recognition task compared to faces seen with a laterally deviated gaze. In a surprise recognition task, the participants' performance was better for targets presented with a direct gaze during the initial classification task

II. LITERATURER SURVEY

A variety of eye-gaze (eye-movement) tracking techniques have been reported in the literature [l]. A brief list of them includes Electra-Oculography [2], Limbus, Pupil and Eyelid Tracking, Contact Lens Method, Cornea1 and Pupil Reflection Relationship, Purkinje Image Tracking, Artificial Neural Networks and Head Movement Measurement. Computer vision is intrinsically non-intrusive, and does not require any overly expensive equipment. Nonobtrusive sensing technology - such as video cameras and microphones - has received special attention in this regard. This paper draws a model for gaze tracking has been constructed using a web camera in a desktop environment. An MTAHC(Maximum Transaction based agglomerative hierarchical clustering algorithm) algorithm was developed to characterize, compare, and analyze eye movement sequences that occur during visual tracking of multiple moving targets. The concept of this paper is organized as follows: Section II describes related study. The details of the proposed gaze tracking method are presented in Section III, which includes Existing System, Problem Definition, Proposed System, Advantages. In Section IV, we study the architecture diagram. Section V explain proposed algorithm. Section VI is the conclusion.

III. RELATED WORK

Nowadays most eye-tracking systems work on video-based pupil detection and a reflection of an infrared LED. Video cameras became cheap over the last years and the price for a LED is negligible. Many computer devices come already with built-in cameras, such as mobile phones, laptops, and displays. Processor power still increases steadily and standard processors are powerful enough to process the video stream necessary to do eye tracking, at least on desktop and laptop computers. Head-tracking systems, which are necessary to give the users the freedom to move in front of their display, are also video-based. Such systems can be implemented unobtrusively with a second camera. If produced for the mass market, a future standard eye tracker should not cost much more than an optical mouse or a webcam today. Some people interact with the computer all day long, for their work and in their leisure time. As most interaction is done with keyboard and mouse, both using the hands, some people suffer from overstressing particular parts of their hands, typically causing a carpal tunnel syndrome. With a vision of ubiquitous computing, the amount of interaction with computers will increase and we are in need of interaction techniques which do not cause physical problems. The eyes are a good candidate because they move anyway when interacting with computers. Using the information lying in the eye movements could save some interaction, in particular hand-based interaction. Eye Gaze is defined as the line of sight of a person. It represents a person's focus of attention. Eye gaze tracking has been an active research topic for many decades because of its potential usages in various applications such as Human Computer Interaction, Eye Disease Diagnosis, Human Behavior Study, etc. Earlier eye gaze trackers were fairly intrusive in that they require physical contacts with the user, such as placing a reflective white dot directly onto the eye or attaching a number of electrodes around the eye. Except the intrusive properties, most of these technologies also require the viewer's head to be motionless during eye tracking. With the rapid technological advancements in both video cameras and microcomputers, eye gaze tracking technology based on the digital video analysis of eye movements has been widely explored. Since it does not require anything attached to the user, the video technology opens the most promising direction to build a non-intrusive eye gaze tracker. Based on the eye images captured by the video cameras, various techniques have been proposed to do the eye gaze estimation. Yet most of them suffer from two problems, the need of calibration per user session and the large restriction on head motion. Among them, the PCCR technique is the most commonly used approach to perform the video-based eye gaze tracking. The angle of the visual axis (or the location of the fixation point on the display surface) is calculated by tracking the relative position of the pupil center and a speck of light reflected from the cornea, technically known as "glint".

In existing system, infrared imaging and visible imaging approaches are commonly used. As infrared-imaging techniques utilize invisible infrared light sources to obtain the controlled light and a better contrast image. As a result, an infrared imaging-based method is capable of performing eye gaze tracking. Unfortunately, an infrared-imaging-based gaze tracking system can be quite expensive. In visible imaging methods there is no need of any specific infrared devices and infrared light sources. But ambient light is uncontrolled, so iris centre detection will become more difficult.

PROBLEM DEFIFINTION

- Infrared-imaging-based gaze tracking system is quite expensive
- An infrared-imaging system will not be reliable
- Not all users produce the bright-dark effect
- The reflection of infrared light sources on glasses is still an issue.
- Ambient light is uncontrolled
- Lower contrast images
- The iris center detection will become more difficult

IV. PROPOSED WORK

In proposed system, the implemented technique is an MTAHC algorithm which characterizes a sequence by hierarchically clustering the targets that an individual interrogates through an unordered transition matrix created from the frequencies of eye fixation transitions among the targets. The resulting sets of clustered targets, which is defined as multilevel visual groupings (VGs), can be compared with analyze performance. The algorithm supported identifying different eye movement characteristics between experts and novices. The results show promise for using the compact representation of eye movements for performance analysis.

V METHODOLOGY

•Eye region detection

To obtain the eye vector, the eye region should be located first. Here first, we utilize local sensitive histograms to cope with various lighting for this. Compared with normal intensity histograms, local sensitive histograms embed spatial information and decline exponentially with respect to the distance to the pixel location where the histogram is calculated. In the second stage, we adopt the active shape model (ASM) to extract facial features of the gray image, through which the illumination changes are eliminated. The details of facial feature extraction using ASM are, Feature selection and statistical shape model.

•Eye feature detection

In the eye region, the iris center and eye corner are the two notable features, by which we can estimate the gaze direction. Iris Center Detection: Once the eye region is extracted using the previous steps, the iris center will be detected in the eye region. We first estimate the radius of the iris. Then, a combination of intense energy and edge strength information is utilized to locate the iris center. Eye Corner Detection: Usually, the inner eye corner is viewed as a reference point for gaze estimation because it is insensitive to facial expression changes and eye status , and is more salient than the outer eye corner. Therefore, we should detect the inner eye corner to guarantee the gaze direction accuracy.

•Eye vector and calibration

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In this module we have to calculate the eye vector first. The eye vector is defined by the iris center p iris and eye corner p corner , i.e., g = p corner − p iris . To obtain the screen coordinates by a mapping function, it provides the gaze information. A calibration procedure is to present the user with a set of target points at which to look, while the corresponding eye vectors are recorded. Then, the relationship between the eye vector and the coordinates on the screen is determined by the mapping function. In our , the second-order polynomial function is utilized and the user is required to look at nine points; the eye vectors are computed and the corresponding screen positions are known. Then, the second-order polynomial can be used as mapping function, which calculates the gaze point on the screen. Accordingly, utilizing the mapping function, the user's gaze point can be calculated efficiently in each frame.

•Head pose detection.

This module handles the facial feature tracking and the head pose estimation approach in video sequences. The pose estimation approaches uses a stereo camera and 3-D data for head shape or limited head rotation. Usually, the human head can be modeled as an ellipsoid or a cylinder for simplicity, with the actual width and radii of the head for measures. Some use the cylindrical head model (CHM) to estimate head pose , which can perform in real time and track the state of the head roughly. The system utilize the 3-D head shape because the ellipsoid and cylinder do not highlight facial features. The SHM can better approximate the shape of different faces.

VI. RESULT AND DISCUSSIONS

The implementation can be gone through in a stage-wise method as follows.

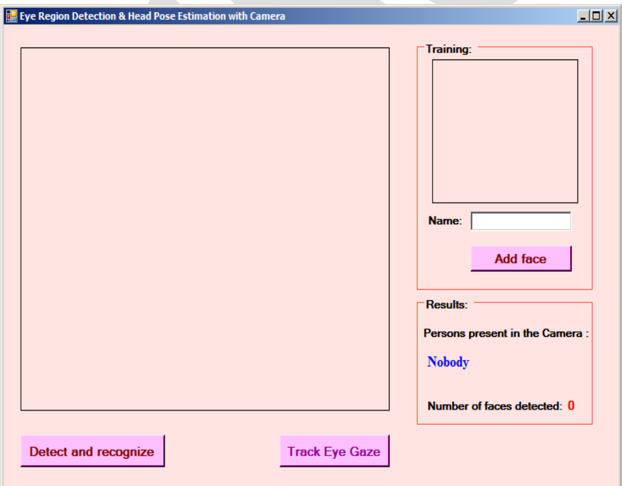

Fig. 1. Home Page Showing Activities

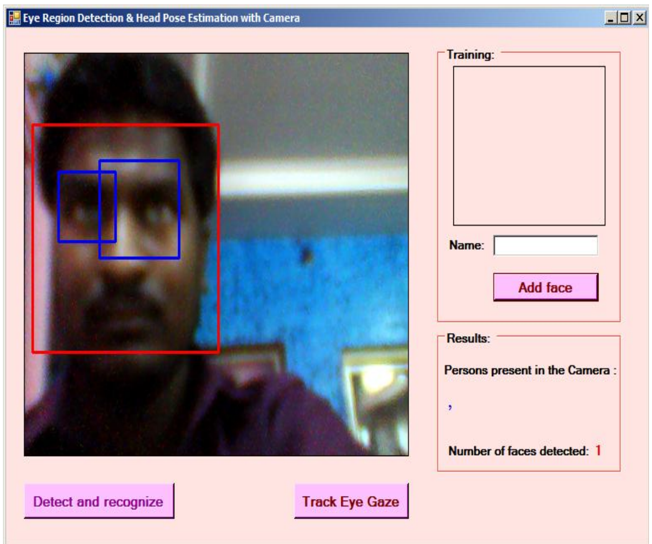

Fig. 2. Taking a Snapshot from Camera and Adding eye Points

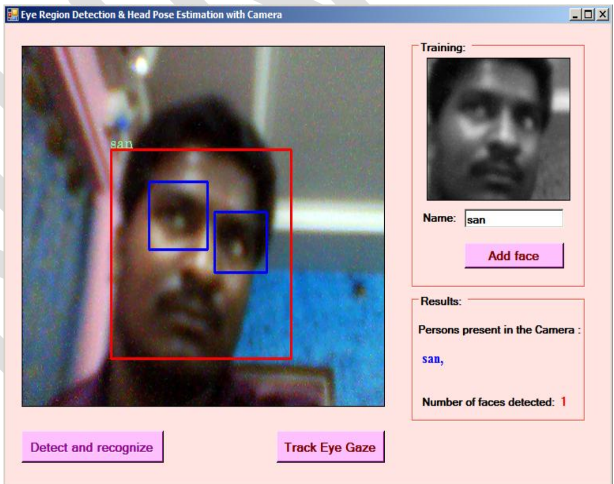

Fig 3: Identitfying Eyes and Removing Destoration

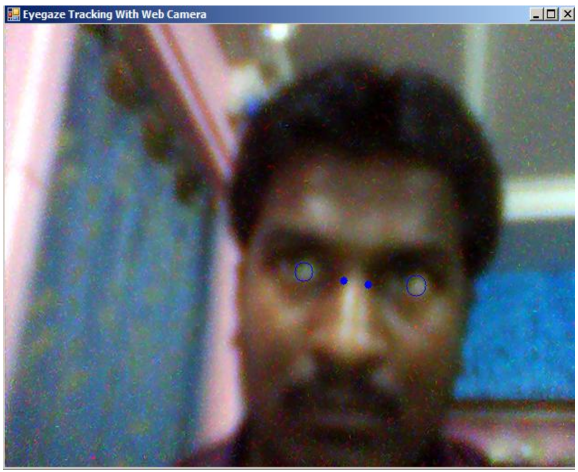

Fig. 4. Final Identified Eyes

V.CONCLUSION

A model for gaze tracking has been constructed using a web camera in a desktop environment. We proposed MTAHC algorithm is introduced to create multilevel visual groupings (VGs), defined as sets of targets that have higher number transitions between or among them compared with other targets. The algorithm supported identifying different eye movement characteristics between experts and novices. Scans of the experts had multilevel VGs around the conflict pairs, whereas those of the novices included different aircraft. The results show promise for using the compact representation of eye movements for performance analysis.

REFERENCE

[1] Laurencr. Young And David Sheee Na, Survey of Eye Movement Recording Methods, Behavior Research Methods and Instrumentation, Vol. 7, No. 5, pp. 397-429 and 1975.

[2] Arie E. Kaufman, Amit Bandopadhay, Bernard D. Shaviv, An Eye Tracking Computer User Interface , Research Frontier in Virtual Reality Workshop Proceedings, IEEE Computer Society Press, pp. 78-84. October 1993.

[3] M. Mason, B. Hood, andC.N. Macrae, "Look into my eyes: Gaze direction and person memory," Memory, vol. 12, no. 5, pp. 637–643, 2004.

[4] Z. Kang and S. J. Landry, "An eye movement analysis algorithm for a multielement target tracking task: Maximum transition-based agglomerative hierarchical clustering," IEEE Trans. Human Mach. Syst., vol. 45, no. 1, pp. 13–24, Feb. 2015.

[5] D. A. Robinson, "A method of measuring eye movement using a sclera search coil in a magnetic field," IEEE Trans. Bio-med. Electron., vol. 10, no. 4, pp. 137–145, Oct. 1963.

[6] A. E. Kaufman, A. Bandopadhay, and B. D. Shaviv, "An eye tracking computer user interface," in Proc. IEEE Symp. Res. Frontiers Virtual Reality, 1993, pp. 120–121.

[7] J. S. Babcock and J. B. Pelz, "Building a lightweight eyetracking headgear," in Proc. Symp. Eye Tracking Res. Appl., 2004, pp. 109–114.

[8] K. Takemura, K. Takahashi, J. Takamatsu, and T. Ogasawara, "Estimating 3-D point-ofregard in a real environment using a head-mounted eye-tracking system," IEEE Trans. Human Mach. Syst., vol. 44, no. 4, pp. 531–536, Aug. 2014.

[9] J. J.Cerrolaza, A.Villanueva, and R. Cabeza, "Taxonomic study of polynomial regressions applied to the calibration of video-oculographic systems,"in Proc. Symp. Eye Tracking Res. Appl., 2008, pp. 259–266.

[10] A. Haro, I. Essa, and M. Flickner, "A non-invasive computer vision system for reliable eye tracking," in Proc. Extended Abstracts Human Factors Comput. Syst., 2000, pp. 167–168.

[11] D. W. Hansen and A. E. Pece, "Eye tracking in the wild," Comput. Vis. Image Understanding, vol. 98, no. 1, pp. 155–181, 2005.

[12] E. D. Guestrin and E. Eizenman, "General theory of remote gaze estimation using the pupil center and corneal reflections," IEEE Trans. Biomed. Eng., vol. 53, no. 6, pp. 1124–1133, Jun. 2006.

[13] J. Zhu and J. Yang, "Subpixel eye gaze tracking," in Proc. 5th IEEE Int. Conf. Autom. Face Gesture Recog., 2002, pp. 124–129.

[14] R.Valenti, N. Sebe, and T. Gevers, "Combining head pose and eye location information for gaze estimation," IEEE Trans. Image Process., vol. 21, no. 2, pp. 802–815, Feb. 2012.

[15] D. Torricelli, S. Conforto, M. Schmid, and T. DAlessio, "A neural-based remote eye gaze tracker under natural head motion," Comput. Methods Programs Biomed.,