

A Real time ANN based Eye tracking system for Driver's Gesture Recognition using CMANTEC algorithm

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ABSTRACT– The paper presents a novel idea for retinal position tracking system of human eye. This paper comes up with a new approach to help physically disabled people to share their knowledge using eye movement. Number of conventional techniques are available such as Head and Eye Movement Tracking Systems etc. exist for retinal tracking by making use of image processing where sensor is the primary source. Boosting technology is used in existing design to sense eye signals CMANTEC is widely used as a core function for various applications in ANN. The main challenge with ANN is performing wire-speed node classification because of increasing demands in throughput. Also the performance of today's neural classification solutions depends on the characteristics of rule sets. In this work, we propose a novel decision integrated neural based architecture to perform high-speed Retinal posture extraction.

1. INTRODUCTION

One of the major causes of accident is sleep deprivation. A National Highway Traffic

Safety Administration (NHTSA) study (in the U.S) gives us a clear picture that 37% of drivers surveyed have accepted to falling asleep at the wheel. In the same survey about 35 percent drivers who nodded of while driving says it happened during the time period of 6:00 a.m. and 5:00 p.m. Right in the middle of broad daylight. As per The U.S. National Highway Traffic Safety Administration (NHTSA) driver's weariness is seems to be the cause for majority of accidents approx 100,000 every year. The next troubling fact is that Fall-asleep crashes are likely to be serious. The morbidity and mortality associated with drowsy-driving crashes are high; the reason behind it might be the drivers driving rashly (Horne, Reyner, 1995b) along with delayed reaction time. Before falling asleep we can observe a dramatic increase in the occurrence of eye closure. If the initial signs of sleepiness of the driver could be found and alerted at an earlier stage, we will be able to prevent what seemed to be inevitable car accident. Simulating sleepiness detection system

using image processing methods is the main objective of this project. An AVI video file simulates a camera which pointed to the driver's face. Using a Matlab program, the AVI movie file is extracted into frames (In the AVI format used in this project, the movie contains 30.0003 frames per second). The system searches for the eyes (circles) in each frame using edge detection and applying artificial neural network. For about 8 consecutive frames if the eyes are not found, the system draws the conclusion that the driver is sleepy and produces a 'beep' sound to alert the driver. A short video film (in AVI format) including a camera kept in front of driver's face will demonstrate real-time video tracking system; it films the driver while driving.

2. LITERATURE WORKS

In 2000, Real-Time Surveillance of People and Their Activities proposed by I. Haritaoglu, D. Harwood and L.S. Davis defines Real time visual surveillance system called W4 that Simultaneously track people and their body parts but it is sensitive to shadows and lightning changes and have Single camera . During 2005 Detecting Pedestrians Using Patterns of Motion and Appearance by P. Viola, M. J. Jones and D. Snow described the Detection style algorithm which scans a detector over two

consecutive frames of video sequence. Proposed methods This method is Sensitive to lightning condition and the detector is constructive only on faces and frontal image.H.Fujiyoshi and A. J. Lipton proposed human motion analysis by image in 1998, which stated that moving targets are detected and boundaries are extracted Star skeleton is produced but they require great deal of image based information in order to work effectively. In 2011, An Real-time Hand Tracking on Depth Images proposed by C.-P. Chen, Y.-T. Chen, P.-H. Lee, Y.-P. Tsai, and S. Lei Hand tracking algorithm for that uses only for depth images and also hand click detection method to initialize the hand tracking automatically. A growing technique is applied to segment the hand regions on depth images .The main difficulty comes to model general skin color model and Hard to differentiate from faces or arms based on skin color. In 2009, Multi channel EOG Signal Recognition for an Embedded Eye Movement Tracking Device by MatejKirbis, IztokKramberger proposed a RISC processor to track EOG potential. For eye movement reference signal is used to recognize eye gesture using cross correlation between reference signal and current

position. The main drawback comes here, because tracking becomes possible only if correlation of EOG signal is determined and Reference signal getting updated for every time on observing new EOG movement. In 2009 EOG Signal Detection for Home Appliances Activation by H. Harun, W. Mansor where a Multimode training approach is proposed. The EOG signals were recorded during the time when the subjects were sitting and standing at different positions. Various distances between the subject and the television and gaze angles were considered to obtain optimum EOG signals. Its drawbacks are that a large number of gesture models are required for training phase and the accuracy of it is quite less (92%), Gestures failure is possible at differential EOG occurrence. In 2005, Development of an EOG (Electro-Oculography) Based Human-Computer Interface by Qiuping Ding, Kaiyu Tong, and Guang Li where EOG and LOS (Line of sight) is used and combined together for mouse control interface. For the purpose to achieve higher gain for common mode rejection OP amp is used. But Hardware based design which is expensive compared to previous techniques. Also LOS is used, it is applicable for interface control system and

couldn't detect drowsy mode. In 2004 Detection of Eye Movements for Controlling Television proposed by Hassan N.M.M, Mansor .W with a model of remote television with four buttons was used and the suitable distance between the eye and the remote control was determined. The EOG signals were recorded when her eyes are moved left, right, up and down from the selected button on the remote control for turning television on and off. The eye movements were detected using threshold technique Hardware based approach requires electrodes leads expensive design. Different angles of EOG should be recorded. This approach can be applied only for four mode control applications.

In 2005, Histograms of Oriented Gradient for Human Detection is proposed by .Dalal, B.Triggs explained about SVM based human detection. This approach provides us near perfect separation on the original MIT pedestrians. In 2011, A Real Time Hand Pose Estimation Using Depth Sensors by C.Keskin, F.Kirac, Y.Emrekara, L.Akarun advocates Depth sensors which can work in absolute darkness, hand detection and segmentation process are considerably simplified. Skeleton parameters are

extracted for sign language. Classification is done by RDF. But here RGB camera is used so the Complexity of features is large and location of occluded joints are not clear

In 2012, Real Time Hand Pair Gesture Recognition Using Stereo Webcam by

3. EXISTING WORK

Eye movements can provide important information for human-computer interactive applications. Due to the progress of computer technology, the detecting accuracy and speed of pattern recognition are promoted. With the help of human-computer interaction applications real-time human-eye detection and tracking systems is proposed .This technique can obtain eye movements and can be adopted as interactive control commands on driver assistance systems. On OMAP4430 for embedded application this system is proposed, and experimental results show that the proposed architecture is capable of effective and real-time eye position detection and event identification for human-computer interactive applications on driver assistance systems. Requiring infinitely accurate models and infinitely

C.patlollaS.Mahotra, N.Kehtarnavoz Using stereo webcam the hand gesture is recognized. Gaussian mixture model is used to separate skin from non skinpixels.noises are removed by median filter. Hand pair is recognized by DTW algorithm.co ordinates of hand pair are used as gesture signatures.

accurate measurements for training phase are the major drawbacks.Latency at training mode and execution mode are increased by feedback neuron model.The main disadvantage of feedback control is caused by time lag in a system. The feedback control in C-MANTEC will have to adjust the process inputs in order to correct this deviation for new set of rules. This results in the possibility of substantial deviation throughout the entire process.

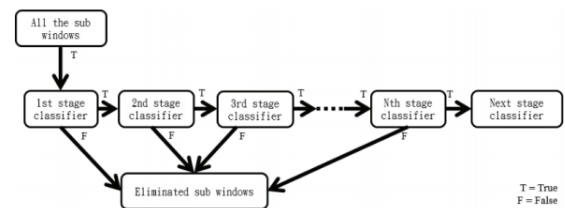
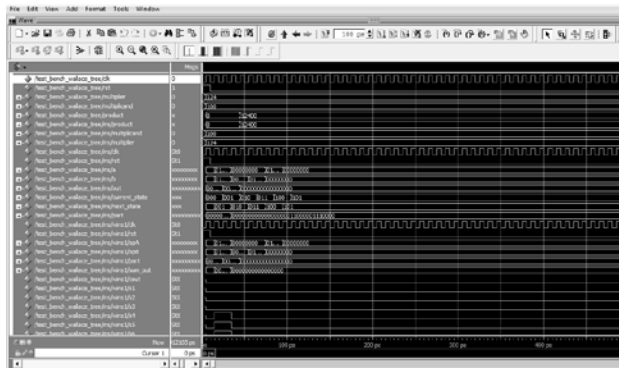


Fig. 1 The cascaded classifier

4. RESULTS AND DISCUSSION:

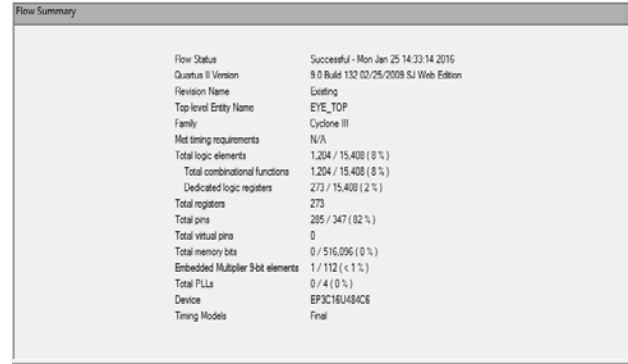
ModelSim is a verification and simulation tool for VHDL, Verilog, SystemVerilog, and mixed language designs. The Altera Quartus II design software provides a complete, multiplatform design environment that easily adapts to your specific design needs. It is a comprehensive environment for system-on-a-programmable-chip (SOC) design.



Simulation Result

5. CONCLUSION

The results from these survey shows that it requires many databases to track the eye movements. several algorithms are used to detect the eye movements. In the existing system we use Boosting classification technique to track the eye movements it uses more than ten framesets so the area will be more .In the proposed technique we use CMANTEC algorithm. Based on the threshold region eye position is detected. by using this algorithm size of the database get reduced. Thus it reduces the input images only one reference image is enough for



Synthesis report



Power consumption

tracking the eye movements. This is fed into ANN to obtain weighted value for the frame.

6. REFERENCES

- [1] M. Turk, Computer vision in the interface, Communications of the ACM 47 (1) (2004) 61–67.
- [2] T.B. Moeslund, A. Hilton and V. Krüger, “A survey of advances in vision-based human motion capture and analysis”, *Computer Vision and Image Understanding*, vol. 104, 90–126, 2006.
- [3] I. Haritaoglu, D. Harwood and L.S. Davis, "W4: Real-Time Surveillance of People and Their Activities", *IEEE Trans. on Pattern Analysis & Machine Intell.*, vol. 22, no. 8, pp. 809-830, 2000.



- [4] N. Dalal, B. Triggs, “Histograms of Oriented Gradients for Human Detection”, in *Proceedings of the 2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR'05)*, Vol. 1, pp. 886-893, 2005.
- [5] H. Fujiyoshi and A. J. Lipton, “Real-time human motion analysis by imageskeletonization” in *Proc. of the 4th IEEE Workshop on Applications of Computer Vision (WACV'98)*, October 19 - 21, 1998.
- [6] P. Viola, M. J. Jones and D. Snow, “Detecting Pedestrians Using Patterns of Motion and Appearance”, *International Journal of Computer Vision*, Vol. 63(2), pp. 153-161, 2005.
- [7] C.-P. Chen, Y.-T.Chen, P.-H.Lee, Y.-P. Tsai, and S. Lei “Real-time Hand Tracking on Depth Images”, in *Proc. Int'l Conf. Visual Comm. Image Process.(VCIP)*, 2011.
- [8] C. Keskin, F. K_rac., Y. Emre Kara and L. Akarun, “Real Time Hand Pose Estimation using Depth Sensors”, in *Proc. Int'l Conf. Computer Vision Workshops (ICCV Workshops)*, 2011.
- [9] C. Patlolla, ”Real-Time Hand-Pair Gesture Recognition Using a Stereo