ORIGINAL RESEARCH PAPER

Computer Science

MOUSE BASED ACTIONS CONTROLLING WITH HUMAN EYE TRACKER MODEL

KEY WORDS: fixations, saccades, blinks, eye movement

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ABSTRACT

Eye movement recognition is still an area under research to achieve higher accuracy. As technology has advanced many device allows human to pass mouse based actions in form of eye movement. This paper presents a study of three main eye movement characteristics: blinks, fixations and saccades. This paper also presents different fixations features and saccades features.

1 Introduction:

In any eye tracking system generally following steps are performed i.e. preprocessing, capturing user's face image from webcam, detection of face, feature extraction, eye detection, post processing. This eye tracker model perform all mouse based actions through eye movement. Human eye tracker model allows you to control mouse based actions on a visual display just by moving your eyes. Various processing tasks required to detect focus point of human eye on visual display is described.

2 Scope of experimental work for Human eye tracking

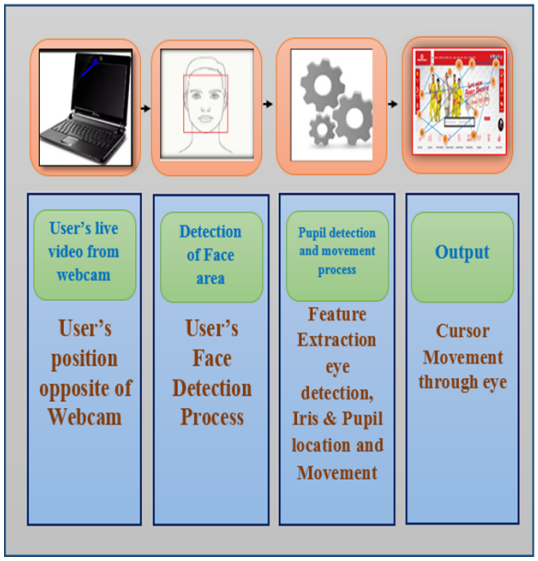
For experimental task of tracking human eye, researcher has used device with standard webcam. Further process of tracking human eye and iris part and records iris movement is presented with respect to determine focus point on visual display. Researcher has also recorded movements of eye and used as a control signal to interact with visual display.

3 Designing of human eye tracker model:

To design human eye tracker model, following steps are performed.

3.1 Capture the user's face image from webcam (image processing)
3.2 Detection of face part.
3.3 Feature extraction- Detection of various features of face
3.4 Detection of eyes and position of iris.
3.5 Identify iris movement in sclera.

Figure 1 shows human eye tracker model diagram.



3.1 Capture the user's face image from webcam:

To track your head, human eye tracker model uses image acquisition tools (standard built-in camera or webcam) attached with laptop. To perform some operations on image and extract useful information related to eye, image processing concept and algorithm is used. If you move your eye right, mouse pointer moves to right side and if you move your eye left, mouse pointer moves to left side. For accuracy, robustness and high resolution standard web camera that is attached with laptop is used. To analyze eye gaze based interfaces it is required to focus both sides of interaction-user's eye and the eye tracker tool.

3.2 Detection of face part

The proposed model requires a user's face image as an input. For acquired this image, this model requires a window with video screen that capture user's face image continuously. For the proposed work, user's face image is captured using standard web camera attached with laptop. Once the user's position is set opposite to video screen face part is detected first. Face area is localized using the face detector algorithm. Detection of user's face part is shown in Figure 4.3.

3.3 Feature extraction- Detection of various features of face

In feature extraction, each feature of face is separated and identified. Every feature of face like lips, nose, eyes, eyebrows, cheekbones, chin, and jawlines are identified and separated.

3.4 Detection of eyes and position of iris

On face image, researcher has mainly focused on eye part. On the face area, the eye area is calculated using facial proportions. Eyebrow region is also roughly computed using face detector algorithm. Sclera and its surrounding area is shape of eye. Using machine learning technique, a selected region around the eyes is converted into probability space that is sclera region. Color based method is used to detect the shape of eye. It identifies sclera region (brighter region) and non-sclera region (darker region).

3.5 Identify iris movement in sclera

Iris movement in sclera is the main decision making step in human eye tracking model. This stage uses the iris position that is extracted in the previous stage of eye and iris detection. In proposed model, detected iris position x and y coordinate is considered as last static position. The center part of iris is considered as pupil. Than continuously focus on pupil position and detect every x and y coordinate of position. Normal blink (closing and opening of eyes) is not considered but if user close eyes for certain amount of time, click action is performed. If user close only right eye for certain amount of time, right click action is performed.

4 Flow of the proposed model

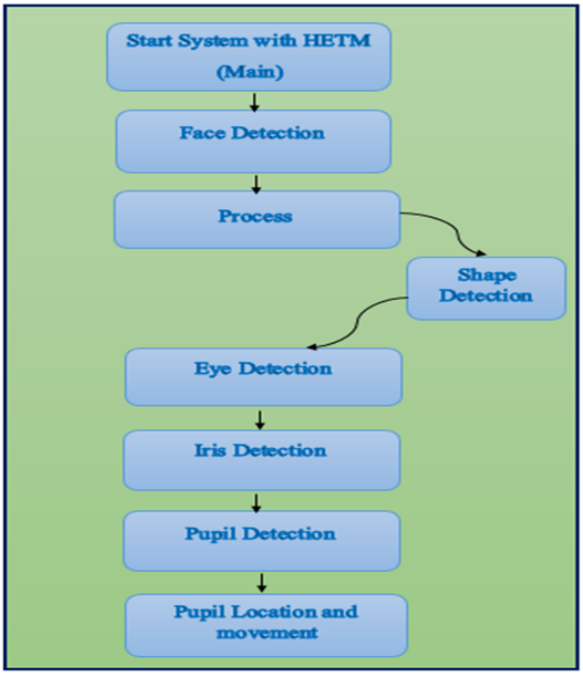


Figure 2. Flow of the proposed model

REFERENCES

[1] Diana Borza, Adrian Sergiu Darabant, Radu Danescu, "Real-Time Detection and Measurement of Eye Features from Color Images", Sensors, Mdpi 2016.
[2] Radu, Ferryman, Wild, "A robust sclera segmentation algorithm", Biometrics Theory, IEEE 7th International Conference on Applications 157 and Systems (BTAS), Arlington, VA, USA, 2015, pp. 1-6.
[3] [Online] https:// github.com/ opencv/ opencv/ blob/ master /data/haarcascades/