

## Poster Session

### Technical Aspects In The Recording Of Scanpath Eye Movements

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The two dimensional representation of the eye movement performed by a subject while exploring a scene is commonly called “scan-path.” By examining both the spatial and temporal evolution of the scanpath on the scene presented to the subject we are able to quantify, in a completely objective way, where the subject is looking and for how long his gaze remains on a specific area. The recording of scanpaths during the exploration of a computer display can represent a powerful tool in the context of usability testing.

In order to study the scanpath of a user interacting with a computer display we need a system able to record the vertical and horizontal components of eye movement with respect to the screen surface. Several systems are currently available on the market that are based on different eye movement recording techniques and each one is characterized by both advantages and drawbacks.

We have used and compared two such eye-tracking systems that exploit video camera based recording and track the center of the pupil and of the corneal reflections elicited by infrared light illumination. One system consists of a headset supporting two dichroic mirrors and two high-speed CCD cameras for binocular recording. Two sets of infrared light emitting diodes illuminate each eye for the generation of corneal reflections. The headset is heavy and must be fastened very tightly to avoid slipping since any displacement relative to the head can introduce an error in the reconstruction of gaze position on the display.

The other system is composed of a video camera mounted below the computer screen and exploits the Pupil-Center/Corneal-Reflection method to determine gaze direction. A small infrared light emitting diode illuminates the eye and generates a bright reflection on the cornea. The major advantage of the system is that it operates without any sort of contact with the subject thus allowing even very long acquisition sessions without causing discomfort to the subject. Moreover, since the measure of gaze position is performed with respect to the computer display, small movements of the head do not introduce errors.

In order to be able to examine a subject’s behavior while interacting with a computer system in a most natural way, we developed a software program that allows for the recording of both the gaze and mouse actions of a user while freely navigating the World Wide Web, any hypertext document, and possibly while using any graphical user interface.

Data analysis is performed offline by reproducing the vertical and horizontal components of eye movement on each page that the subject has explored during the recording. Zones of interest can be defined on each page in an interactive way. Then the software can compute the number of accesses to each zone, the fixation time for each access, i.e. the time spent by the subject looking inside the zone, and the sequence of exploration, i.e. which zone has been observed as the first, which one as the second and so on.

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