A gaze-contingent, acuity-adjusted mouse cursor

Michael Dorr\(^1\), Christoph Rasche\(^2\), and Erhardt Barth\(^1\)

\(^1\)Institute for Neuro- and Bioinformatics, University of Lübeck
\(^2\)Abt. Psychologie, Justus-Liebig-Universität Giessen

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Gaze-based interfaces still haven’t reached the mainstream yet

Chicken-egg problem: small deployment numbers mean few applications mean small deployment

Tailoring individual applications to gaze control still is a very time-consuming task

“Killer application” still missing
Two approaches to incorporate gaze information

- Control the interface with gaze
- Adapt to user’s perception
Gaze-contingent displays

- Visual acuity high only in the centre of the visual field
- Resolution of peripheral display can be degraded
- Applications in reading research, VR rendering, movie compression, gaze guidance, ...
Gaze-contingent displays: demo

A gaze-contingent mouse cursor
We propose to start out with using gaze as an assistive measure only.

Make mouse cursor size a function of visual eccentricity to keep visibility constant.
Mouse cursor back then...

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A gaze-contingent mouse cursor
... and mouse cursor today
• User moves mouse somewhere
• User moves their eyes away, types, ...
• User needs mouse again, cannot find it
• Often-used solution: wiggle mouse to make it catch attention

(however: “Cursor Hider helps you to work more productively. It removes mouse pointer from a working place [...] Only $19.95!”)
Use eye tracking to infer visibility of cursor and ... 

- Show small cursor when user looks at it (do not cover screen)
- Show large cursor when in the periphery
- Qt toolkit basis of wide variety of open-source software (including the KDE desktop environment)
- Only one modification required (∼300 lines of code), can be used in many applications
- GNU General Public License, patch available upon request
- Web browsing one of today’s key applications
- Unfortunately, both konqueror and WebKit use their own pointer handling (... and do not document it!)
Size function

Dorr et al.  A gaze-contingent mouse cursor
Dorr et al. A gaze-contingent mouse cursor
10 minute evaluation

4 subjects were asked to perform “typical” web browsing activities (route planning, shopping, Wikipedia, ...)

Gaze recorded using SMI iView X RED remote tracker, 50 Hz

Linux/WebKit GUI on 19” screen, 1280x1024 pixels
Scale from -5 (very annoying) to +5 (very helpful)

1 subject: no rating (did not notice anything unusual)
2 subjects: +1
1 subject: +4

No clear result, but definitely not annoying

Objective performance evaluation needed
We have presented a gaze-contingent cursor that changes in size to maintain visibility even in the visual periphery.

Users liked it!
Objective performance evaluation (click throughput, number of “wiggles”)

Hopefully, more gaze-controlled applications based on Qt
... thank you for your attention!