

Conducting eye tracking studies online

Madhumitha Murali, Arzu Çöltekin*

^a Institute of Interactive Technologies, University of Applied Sciences and Arts Northwestern Switzerland
madhumitha.murali@fhnw.ch, arzu.coltekin@fhnw.ch

* Corresponding author

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Abstract:

Optical-camera based approaches (e.g., webcams, smart phone) for recording eye movements have historically suffered from accuracy issues, especially with darker eyes, as it is not straightforward to distinguish pupil from the rest of the iris based on optical images in real time. However, recent developments in machine learning seems to offer a breakthrough in this area. A recent publication by Valliappan et al., (2020) compared a smartphone-based eye tracking approach (without any additional hardware) that they devised to state-of-the-art commercial eye trackers and reported comparable or better accuracies in a study with 100 participants in oculomotor tasks (i.e., visual search, prosaccade, smooth pursuit), natural image viewing and reading comprehension difficulty. Similarly, using a webcam-based eye tracking (Webgazer.js by Papoutsaki et al., 2016), Semmelmann & Weigelt (2018) report that they were able to obtain comparable results from an online vs. a lab experiment in tasks that involved fixation, pursuit and free viewing, and suggest that webcam-based eye tracking is overall suitable for all three tasks and holds promise in cognitive science research. Furthermore, in recent years many freeware and commercial solutions are popping up that offer reasonably accurate eye tracking, such as webgazer.js (<https://webgazer.cs.brown.edu/>) with an average claimed error rate ~100 pixels, RealEye (<https://www.realeye.io/>) at 90 to 156 px (average 113 px), and GazeRecorder (<https://gazerecorder.com/>) with ~79 px, among many others (we identified at least 18 of them). Taken together, all these developments suggest that we might be at a turning point in terms of how prohibitive eye tracking studies been until recently, which may have implications in many fields including cartography and visualization. Arguably, in the last decade or two, eye tracking became an established method in cartography and (geo) visualization (e.g., Ooms, et al., 2013; Brychtova et al., 2014; Çöltekin et al., 2014; Çöltekin et al., 2016). Therefore, we plan to discuss these developments with the workshop participants, learn from their experiences, and share our experiences from the first attempt to conduct an online eye tracking study in a vision/perception experiment.

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