

YARBUS in the age of Webcam Eye-Tracking

BACKGROUND

The recent years have seen a surge in webcam-based eye-tracking. Although not as accurate as screen-based eye-trackers, their lowered costs and scalability via online distribution have opened them up to potential uses in research and teaching.

The present study explores the feasibility of carrying out large scale, replicable research projects and, as in the seminal work by Yarbus, asks if the iMotions Webcam eye-tracking (WebET) can be used to distinguish where people look based on the question asked.

ANALYSIS

Individual scanpaths and aggregated heatmaps, shown below for each of the four questions, were used for exploratory analysis. Areas of Interest (AOI) analysis was conducted on one image to look at gaze cueing on the question 'How long has the visitor been away'.

METHODS

To verify how relevant the iMotions WebET and the Hidden Markov Model (HMM) classification systems can be applied to psychological research and teaching, a part of the Yarbus (1967) study was replicated with N=10 participants.

In an online study, participants were shown 'The Unexpected Visitor' in four conditions in a repeated measures design, each one asking a different question (images below). Individual scanpaths, heatmaps and areas of interest were calculated in iMotions.



What are the ages of the people in the picture?



What clothes are the people in the picture wearing?



How long has the visitor been away?

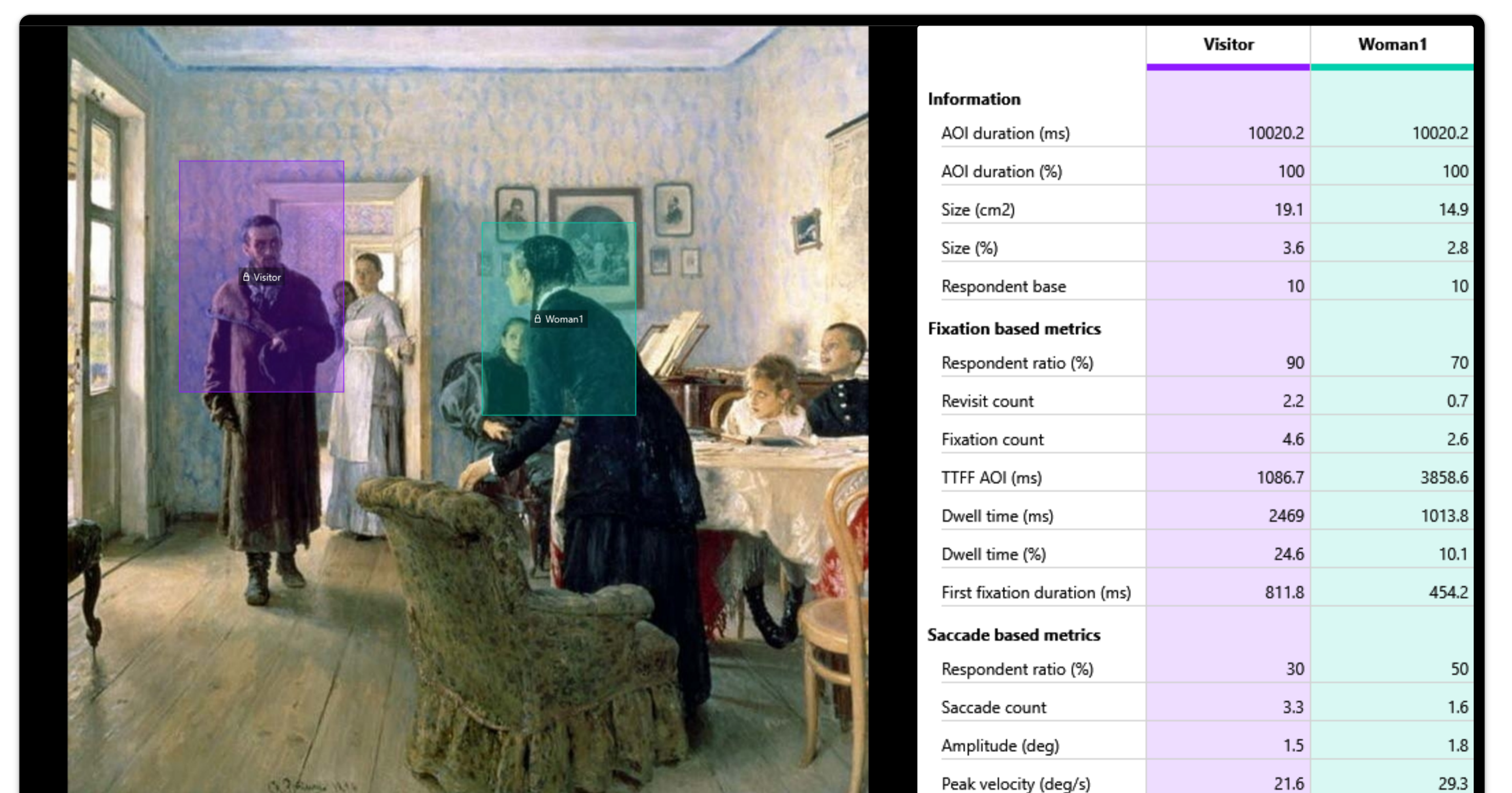


What are the material circumstances of the people?

RESULTS

Results show that even with a small sample size, the iMotions WebET combined with the HMM fixation classification can accurately distinguish between scanpaths of different conditions and the HMM was robust to individual level noise allowing for fixation classification per dataset. Larger, well-placed AOIs can give eye-tracking insights helpful in understanding top-down cognitive processing of participants in the present study. This has implications for applied research and the potential to use this as a teaching tool for eye-tracking.

Details of the algorithm, caveats, and best practices have been discussed in the iMotions whitepaper. How to use WebET for applied research and teaching has been discussed in the blog post.



Gaze cueing analysis: AOI metrics of the visitor and the woman he is looking at



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