Eye tracking in the real world: a graph-theoretical analysis and comparison to virtual realty

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Abstract

Is virtual reality (VR) necessary to conduct complex immersive eye-tracking studies or can similar data be recorded and analyzed in the real world?

We adapted a spatial navigation paradigm from VR to the real city Limassol. Specifically, we combined a free exploration of 130 min with two pointing tasks while recording eye-tracking, head-tracking and GPS data. We labeled the eye-tracking data with a new classification pipeline and found a similar gaze distribution over object categories in both the real world and VR. Furthermore, we hand-labeled fixations on buildings to apply a graph-theoretical analysis. When comparing our results with VR we found some differences (e.g. graph density, diameter), but also many similarities in viewing behavior (e.g. hierarchy index, gaze-graph-defined landmarks).

Overall, our work showcases the feasibility of complex eye-tracking experiments in the real world and highlights the similarity of viewing behavior in both the real world and virtual reality.

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