

## Scanpath Comparison Methods: Compared

Nicola Christine Anderson<sup>1</sup>, Fraser Anderson<sup>2</sup>, Walter F. Bischof<sup>2</sup> &  
Alan Kingstone<sup>3</sup>

<sup>1</sup>Vrije Universiteit Amsterdam, The Netherlands

<sup>2</sup>University of Alberta

<sup>3</sup>University of British Columbia

Eye movement behaviour is a rich source of information that contains not only a location, amplitude and duration, but also has a specific sequence, or scanpath, that unfolds over time. The temporal richness of eye movement data is typically investigated by comparing scanpaths across scenes and individuals. In the present work, we outline, review and compare several recent methods for scanpath analysis, and introduce a new method, cross-recurrence analysis [based on Anderson, Bischof, Laidlaw, Risko, & Kingstone (in press). Recurrence quantification analysis of eye movements, Behavior Research Methods]. Each of the methods for scanpath analysis was evaluated using scanpaths derived from an image encoding and recognition task [based on Foulsham & Underwood (2008). What can saliency models predict about eye movements? Spatial and sequential aspects of fixations during encoding and recognition. Journal of Vision, 8 (2):6, 2008, pp. 1-17]. Comparing scanpaths within and between participants, we evaluate the strengths and weaknesses, the power to detect an effect, and the specific scanpath measures (e.g. temporal structure and similarity of scanpaths) quantified by each method. We show that different methods of scanpath analysis capture different aspects of eye movement behaviour and present some recommendations on how to select an optimal method.

*Contact information:* n.c.c.anderson@vu.nl