

IMAGE PROPERTIES THAT DRAW FIXATION
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Purpose. Regardless of the task, efficient selection of fixation points must ultimately be based on image data, yet the image properties that attract gaze are largely unknown. It is thus difficult to, e.g., implement good fixation strategies in foveated artificial vision systems. We therefore sought to elucidate the image properties that attract gaze by combining accurate eye tracking with modern image analysis techniques. **Methods.** Subjects searched for targets embedded in $1/f$ noise. The noise in a region of interest (ROI) around each fixation was averaged over many trials yielding gaze attraction images analogous to the discrimination images of [1]. In another paradigm, subjects studied several hundred natural images, and ROIs around each fixation were accumulated. These ROIs were then subject to Principle Components Analysis (PCA) to reveal commonalities (other techniques including Independent Component Analysis are currently being explored). **Results.** Gaze attraction images indicate that subjects fixate likely targets (as opposed to randomly sampling the image), and they often search for a characteristic feature instead of the entire target. Results from the second paradigm indicate that statistics of ROIs in natural scenes are often different from those of randomly selected regions from the same images. **Conclusions.** The pixel-averaging technique of [1] can be successfully combined with accurate eye tracking to reveal image structure that attracts gaze. This technique can potentially reveal image structure that draws fixation in a wide variety of search tasks. Accurate eye-tracking can also be combined with image analysis techniques such as PCA to reveal statistics of natural images at the point of fixation. This promises to compliment recent work on natural image statistics and their relationship to the neurophysiological properties of the visual system.

[1] Beard and Ahumada (1998) SPIE Proc. Human Vis. and Elec. Im. III, v3299.