DOI:10.1068/0014

AVA 04 Abstract

0014

- **The efficient use of classification images for the psychophysical investigation of visual search**

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One application of the classification image (CI) technique is the study of visual search [for background see Eckstein and Ahumada, 2002 Journal of Vision 2(1)]. Observers may be requested to judge the presence or absence of a target embedded in noise. The properties of the noise associated with correct and incorrect responses can provide insight into the underlying strategies deployed, showing how the observer weights the importance of different stimulus features in deciding if the target is present or not. A general drawback of this popular technique in its original form is that it requires the accumulation of a large number of data (to the order of several thousands of trials per observer).

We propose an extension to the CI technique which allows us to reveal more rapidly features used by observers in visual search tasks. With eye tracking and a grid-like stimulus ensemble, the accumulation of results is accelerated in comparison with earlier methods by up to two orders of magnitude, whilst also providing compatibility with low-accuracy eye trackers. Our method is faster owing to three factors: first, when using a grid of discrete candidate tiles, one of which contains a centred target, the spatial jitter of features, observed when single large noise images are used, is avoided; second, in addition to obtaining hit and miss information, determined by whether the user selected the appropriate tile, a large number of useful data may be assembled from all the tiles fixated en route to the observer's selection, and from tiles never visited; thirdly, the use of 1/f noise increases the level of low spatial frequency structure in the tiles, leading to faster CI convergence. We test our method using three human observers, and two target types at 200 trials per target. The CIs obtained show the efficacy of the proposed method in exposing the search behaviour of human subjects, even with such a small number of trials.