Several lightness induction effects with a computational multiresolution wavelet framework

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Lightness induction effects are provoked in the human visual system by the interactions between an observed central stimulus and its surround information. Depending on different properties of both, central and surround stimuli, several induction effects may appear, such as lightness assimilation or lightness contrast. In computer vision some efforts are devoted to reproduce induction effects on digital images, with the final goal of building perceived images as the basis for further processing, such as quality control or general image understanding. Multiresolution decomposition has been shown in many works as a general framework to reproduce perceptual induction processes in a unified formulation (Blakeslee and McCourt, 2005 *Vision Research* **45** 607 - 615) (Otazu and Vanrell, 2005 *Journal of Imaging Science and Technology* **49** 262 - 271); it has been essentially applied to reproduce assimilation and contrast effects. In this work we present a computational multiresolution wavelet framework which describes assimilation and contrast effects in a unified formulation. Moreover, it makes it possible to reproduce other common visual effects such as the White effect, Mach bands, Chevreul effect, Adelson - Logvinenko snake, the Schyns and Oliva faces, and the Hermann - Herring effect in a very unified and simple model. This wavelet framework is based on the definition of a surrounding induction function that recovers the induced image from the coefficients of the computed multiresolution decomposition.