Perceptual tone-mapping operator based on multiresolution contrast decomposition

Tone-mapping operators (TMO) are used to display high dynamic range (HDR) images in low dynamic range (LDR) displays. Many computational and biologically inspired approaches have been used in the literature, being many of them based on multiresolution decompositions. In this work, a simple two stage model for TMO is presented. The first stage is a novel multiresolution contrast decomposition, which is inspired in a pyramidal contrast decomposition (Peli, 1990 *Journal of the Optical Society of America***7**(10), 2032-2040). This novel multiresolution decomposition represents the Michelson contrast of the image at different spatial scales. This multiresolution contrast representation, applied on the intensity channel of an opponent colour decomposition, is processed by a non-linear saturating model of V1 neurons (Albrecht et al, 2002 *Journal of Neurophysiology***88**(2) 888-913). This saturation model depends on the visual frequency, and it has been modified in order to include information from the extended Contrast Sensitivity Function (e-CSF) (Otazu et al, 2010 *Journal of Vision***10**(12) 5). A set of HDR images in Radiance RGBE format (from CIS HDR Photographic Survey and Greg Ward database) have been used to test the model, obtaining a set of LDR images. The resulting LDR images do not show the usual halo or color modification artifacts.