The SHINE toolbox for controlling low-level image properties

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Abstract

Visual perception can be influenced by top-down processes related to the observer’s goals and expectations, as well as by bottom-up processes related to low-level stimulus attributes, such as luminance, contrast, and spatial frequency. When using different physical stimuli across psychological conditions, one faces the problem of disentangling the contributions of low- and high-level factors. Here we make available the SHINE (Spectrum, Histogram, and Intensity Normalization and Equalization) toolbox for Matlab, which we have found useful for controlling a number of image properties separately or jointly (Willenbockel et al., in press; Williams, Willenbockel, & Gauthier, 2009). The toolbox features functions for specifying the (rotational average of the) Fourier amplitude spectra, normalizing and scaling mean luminance and contrast, as well as for exact histogram specification optimized for perceptual visual quality. SHINE can thus be employed for parametrically modifying a number of image properties or for equating them across stimuli to minimize potential low-level confounds in studies on higher-level processes.

The toolbox can be downloaded here: www.mapageweb.umontreal.ca/gosselif/shine.

Methods

Overview of SHINE toolbox functions

- **specMatch & sfMatch**: Source images and their amplitude spectra. a) Source images and their mean luminance and contrast (std). Right: Output images equated in mean luminance and contrast.

The iterative approach: joint matching of histograms and spectra

References

- Wang, Z. (2003). Matlab implementation of the structural similarity index. Available at: www.ece.uwaterloo.ca/~z70wang/research/ssim/

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