IMAGE-DIFFERENCE PREDICTION FROM
GRAYSCALE TO COLOR

Abstract:

Existing image-difference measures show excellent accuracy in predicting distortions, such as lossy compression, noise, and blur. Their performance on certain other distortions could be improved; one example of this is gamut mapping. This is partly because they either do not interpret chromatic information correctly or they ignore it entirely. We present an image difference framework that comprises image normalization, feature extraction, and feature combination. Based on this framework, we create image-difference measures by selecting specific implementations for each of the steps. Particular emphasis is placed on using color information to improve the assessment of gamut-mapped images. Our best image-difference measure shows significantly higher prediction accuracy on a gamut-mapping dataset than all other evaluated measures.

Existing method:

The interpretation of an image by the visual system depends on the viewing conditions, e.g., viewing distance, illuminant, and luminance level. Consequently, the images should be normalized to specific viewing conditions before any information is extracted. So-called image-appearance models have been developed for this purpose. Among the mechanisms that they model are chromatic adaptation, contrast sensitivity, and various appearance phenomena such as the Hunt effect and the Stevens effect. Fig. 2 illustrates the image normalization: a sub threshold distortion may turn into a suprathreshold distortion if the viewing conditions change.
Proposed method:

Changes of image semantics cannot be detected. If, for instance, a particular distortion affects a human face in a portrait, the subjective image quality is greatly reduced. A similar change to an object in the background may not even be noticed.

Merits:

1. Noise level very low.

Demerits:

1. Noise level very high.