

~Material editing that makes object surfaces look wet~

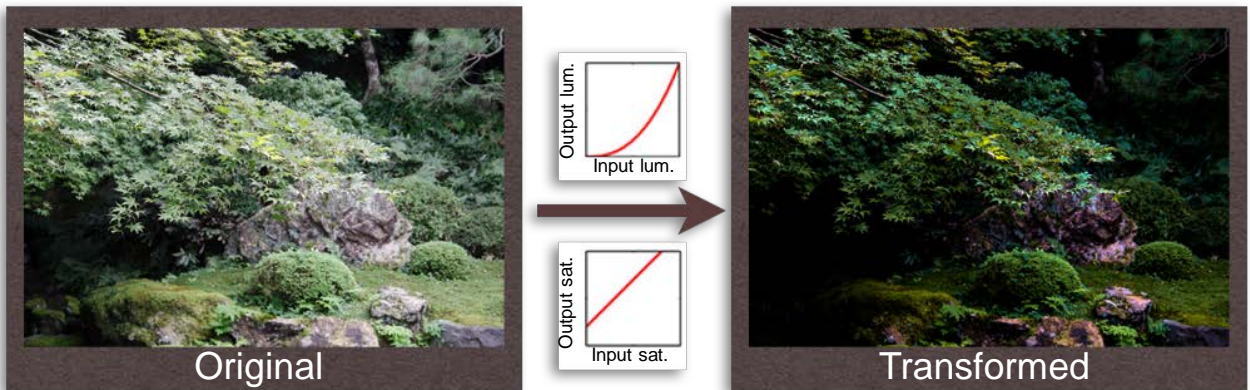
Abstract

Human visual system can easily recognize a variety of surface states such as wetness of a bath floor, slipperiness of a road, or dustiness of an ornament. The perception of “Shitsukan” including the surface states is a critical missing piece in the sciences on biological and machine sensory processing, and recently gathers a great deal of interest. We have revealed the visual mechanisms underlying the wetness perception of a scene by integrating methodologies of human psychophysics, computer vision, computer graphics, and information theory. Furthermore, by applying the scientific finding to the image processing technology, we have developed a novel material transformation, the “wet filter”, that makes a dry object look wet. In the future, science-based material technologies like the present “wet filter” will give us a way to easily edit an object’s appearance, and let robots quickly recognize “Shitsukan” of an object just as human do.

Wet filter: material editing that makes object surfaces look wet

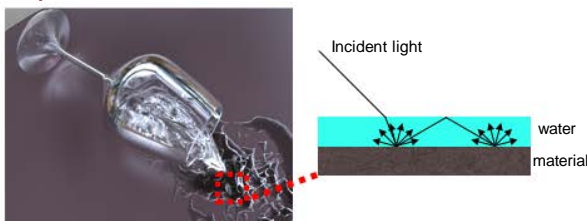
Operation 1. Change the luminance histogram of an image positively skewed

Operation 2. Enhance the color saturation of the image



Why the “wet filter” works well for human vision?

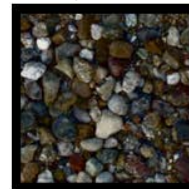
Optical factor



- When a surface is wet, the incoming light scatters repeatedly within the surface liquid layer. In addition, wetting a surface tends to increase the specular reflection. As a result, a wet-surface image has a positively skewed luminance histogram and a high chromatic saturation.

Perceptual factor

Transformation of an image with a high color entropy



Transformation of an image with a low color entropy



- The wet-filter is more effective for images with a higher color entropy (i.e., containing more colors).
- Although wet image features are not unique to wet surfaces, when they simultaneously appear in many different surfaces, human brain can infer they were resulted from global wetting.

【Reference】

[1] M. Sawayama, S. Nishida, “Visual perception of surface wetness,” *In Proc. 15th Annual Meeting of Vision Sciences Society, Journal of vision*, Vol. 15(12), p 937, 2015.

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