Extracting material descriptors from images

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Context and Research Goal

A common task in Computer Vision and Computer Graphics is to evaluate if two images contain the same information. A standard approach for such comparison tasks consists in computing a compact *descriptor* of the image content. For instance, a histogram can be seen as a descriptor of the color distribution of an image [1]. The goal of this internship is to implement a descriptor of the *materials* in an image, such as glass, metal, fabric or plastic.

Approach

We will build on the approach of Sharan et al. [2] who performs material classification by measuring color stripes along and across image edges, as illustrated in Figure 1. These color stripes capture the local patterns of light reflection and refraction over the object. In their implementation, Sharan et al. compare color stripes using histograms of gradient. However, this approach doesn't account for the fact that two stripes of the same material often have different distributions of color because reflections and refractions are distorted by the local geometry of the object. The goal of this internship is to explore an alternative approach where we will compare color stripes using Dynamic Time Warping [3], which should make the method more robust to distortions of the color stripes.
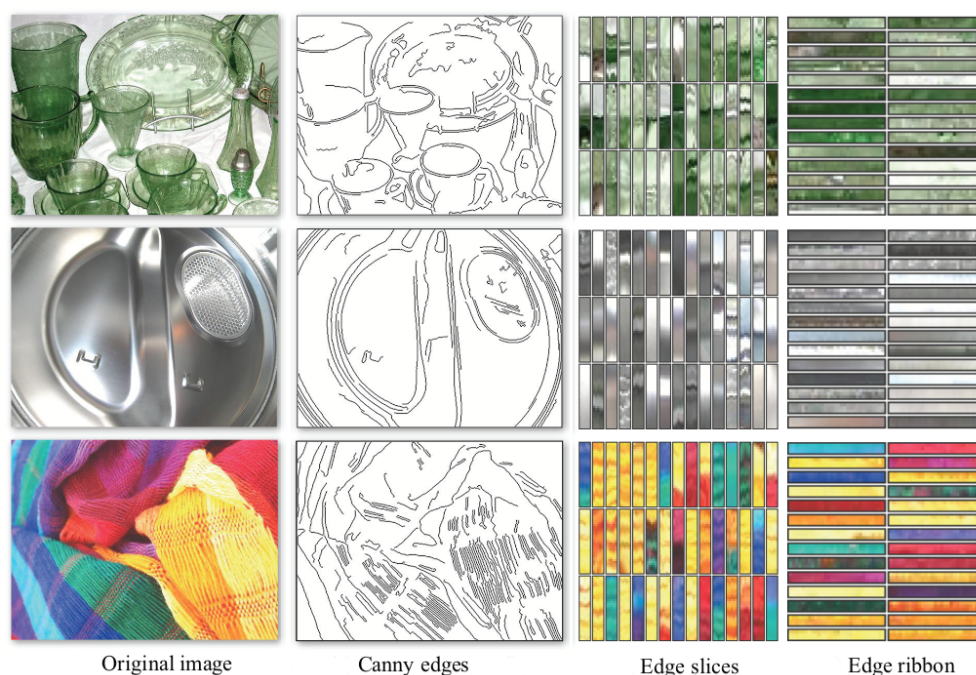

Figure 1: Sharan et al. [2] extract local descriptors of material appearance
by measuring stripes of colors along and across edges (called edge ribbons and edge slices respectively)

Situation

The internship will take place at INRIA Sophia Antipolis, on the beautiful French riviera.

Dates: June - July 2015.

References

[1] Image histogram
http://en.wikipedia.org/wiki/Image_histogram

[2] Exploring features in a Bayesian framework for material recognition
C. Liu, L. Sharan, E. H. Adelson, and R. Rosenholtz
IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
http://people.csail.mit.edu/lavanya/matlrecog.html

[3] Dynamic Time Warping
http://en.wikipedia.org/wiki/Dynamic_time_warping