Animal Vision – 2/3 Report

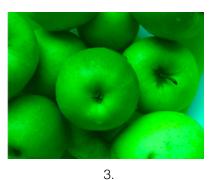The following scripts/functions are provided in the Matlab Code:

- *main.m:* reads an image and displays it like an animal would see it (using the luminance of the original image). In the variable *sensitivities* one can specify the cone sensitivities of the animal we wish to simulate (ex: [420, 530, 560]. These wavelengths must be in ascending order and in the range 380-720 nm.)
- *img2Animal(in, sensitivities):* takes an image and transforms every pixel to the corresponding animal vision RGB triplet using the sensitivities specified above.
- *rgb2Animal(R, G, B, sensitivities):* transforms a single RGB triplet to the corresponding animal vision RGB triplet.
- *rgb2spectrum(red, green, blue):* converts an RGB triplet to a spectrum with 10 bins, ranging from 380nm to 720 nm. [1]
- *wavelength2rgb(lambda):* takes a wavelength in the range 380-720 nm and outputs a corresponding RGB triplet using a discretization of 10 nm per RGB value.[2]
- *getInterpolated(samplePoints, spectrum, x):* returns the value of the spectrum — which is only known at positions *samplePoints* — at wavelength x using interpolation.

Below we show example outputs for
1. the made up cone sensitivities [390, 450],
2. the sensitivities [435, 546, 700] corresponding to the wavelength of blue, green and red
3. the sensitivities [455, 537] corresponding to the cone peak sensitivities of the white-tailed deer[3]

1.   2.   3.

For comparison, the input image is the following[4]:

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[1] Ressource: Smits, Brian. "An RGB to Spectrum Conversion for Reflectances." (2000).

[2] using the values provided by https://academo.org/demos/wavelength-to-colour-relationship/

[3] VerCauteren, Kurt C. and Pipas, Michael J., "A review of color vision in white-tailed deer" (2003). USDA National Wildlife Research Center - Sta Publications. Paper 284.

[4] taken from Flickr user zaveqna, "Apples," (2008). Accessed March 2017, https://www.flickr.com/photos/zaveqna/2872120203/