Simulating the ChromaDepth Effect for CMYK-based Print Media

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1) Print

Figure 1: HP Photosmart 5525 printer

2) Put on the glasses

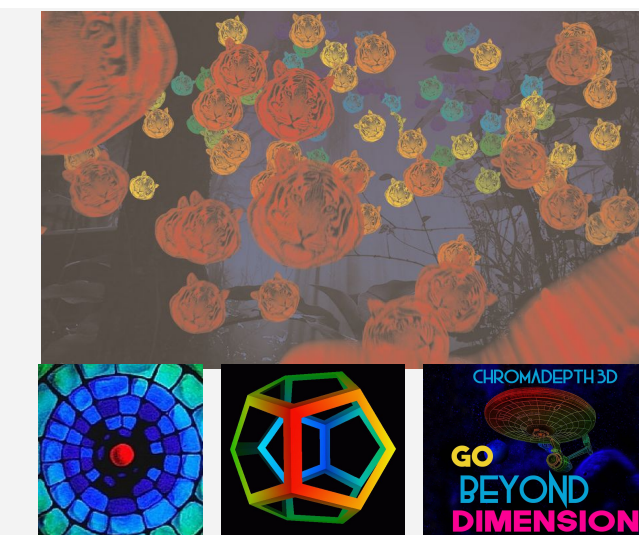Figure 2: ChromaDepth glasses

3) See depth

Figure 3: ChromaDepth Images

Simulate the printer using the YNSN* model to get a spectral image

YNSN simulates halftone printing by estimating the areas of the paper covered by ink.
It can give good results (Average Delta E = 2.21 in my tests)

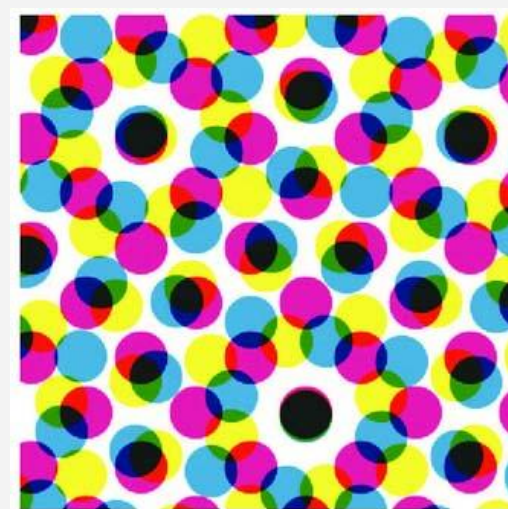Printers print using Cyan, Magenta, Yellow and blacK (CMYK) but images are stored using RGB.

Figure 4: Halftone print under microscope.

Cheap printers - like mine - do RGB to CMYK conversion themself and have no color profile available to do that conversion externally, causing problems in color accuracy using YNSN.

* YNSN : Yule-Nielsen modified Spectral Neugebauer

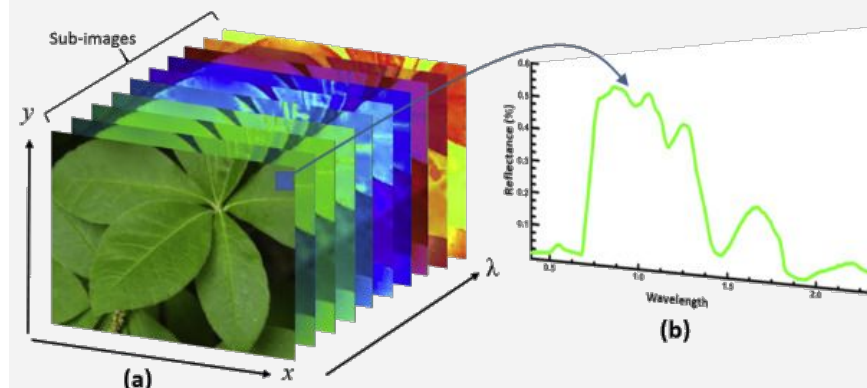### Model the glasses as a mixed diffraction grating and prism mix

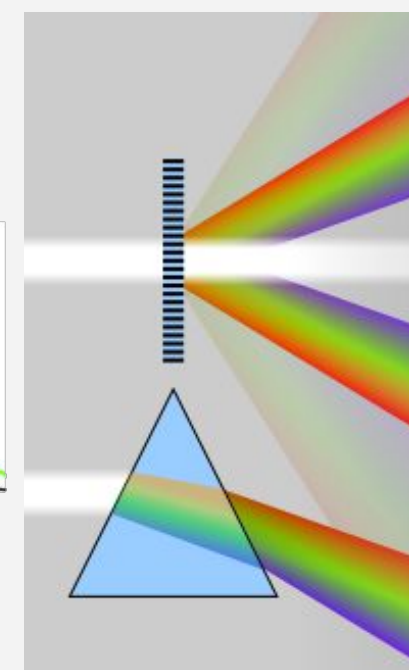Figure 5: Spectral Image and spectrum of a pixel.

Figure 6: How a diffraction grating and a prism bend light.

To simulate the glasses: shift each single wavelength image in the spectral image by the same amount that wavelength shifts.

This however makes the entire image shift to one side too much, so shift the image back to keep one wavelength in place.

Show the resulting color and or depth

Simulating one eye gives a good idea of the artifacts, but does not show depth.

Showing both images in VR shows color and depth well, but is cumbersome.

Figure 7: Colored lines appear around objects after simulation.

Creating parallax motion shows color and depth in most cases, except when the colors are far away from each other.

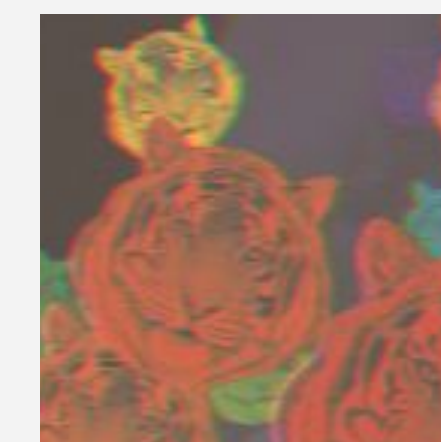Creating a depth map does not show color and using OpenCV implementation does not always produce good results.