Spatial Frequency and “The Dress”

American University
Computer Science Department
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Setting/Context: In what computer environment are you going to complete your capstone experience?

Python, numPy, Mechanical Turk

Capstone Problem and Rationale: Describe the technology-related need, problem, or question to be addressed by the capstone. What does the literature say about addressing this need/problem/question?

The dress was a phenomena swept the internet in 2015 in which some people saw the dress as blue and black and others saw it as white and yellow. We are going to examine whether aspects of the dress can be recreated by looking at spatial frequency components of the image. In particular we will decompose the dress image and other images into different spatial components and recombine them at with different weights and colors to see if we can create a similar disparities in individual variation.

There are a large number of interpretations about 'the dress.' Many of them assume that individual differences arise because of how people interpret the lighting. A different theory was proposed by Dixon and Shapiro (2016), in which individual differences in spatial frequency was the root cause. Here we will follow up on Shapiro's theory.

Objectives/Deliverables:

Based on the need/problem/question you found, what are your objectives? How do you plan to respond to this need/problem/question?
What deliverables will result from this capstone? [Bulleted lists]

1. Take images and decompose them along two different dimensions: Spatial frequency, and color
2. Recombine them in a variety of ways, giving lower and higher weights to different components of the image
3. For assessments and screening procedure for different color images.
4. Assess the variation of color labels for each image class.

Project Description:

a. Narrative: Describe what you will be doing.

We are on a search for generating colored images in which there are individual differences in the interpretation. We think we can do this by looking at the spatial frequency and color components.

b. Timeline: Provide a table or chart that describes your schedule.

*Tentative Date	Task
9/30	Decompose the dress image and see how much variation there is as the weight of the spatial frequency component is increased.
10/14	Create random image at spatial scales from different colors.
11/04	Decompose and reconstitute these images with variable weightings.
11/18	Measure whether there are individual differences.

c. Resources: What materials, hardware, software, devices, tools, data will you need to complete your capstone?

Computers in Shapiro lab, python, amazon turk, matlab.