Midterm Study Guide

CAP 5738: Data Visualization

Dr. Sayeed S. Alam

Spring 2018

Important Topics:

Slide1: Visualization Process, properties of sensory and arbitrary symbols, Gibson's affordance theory and its problems.

Slide2: None

Slide3: Surface vs plane, Fiber vs line, Visual angle math problem

Slide4: Visual Acuity Math problem (Snellen chart), Basic acuities, Brain Pixel terminologies, Michelson Contrast Math problem

Slide5: DOG function, Mach Band, Chevreul Illusion, Cornsweet effect,

Slide6: Color/Lightness Constancy, Quantity of light: Luminance, Lightness, Brightness, Steven's magnitude estimation, Monitor gamma function,

Slide7: Color Blindness, CIE Colorimetry, Color Matching, CIE XYZ/ xyY, CIE Chromaticity Diagram properties, Opponent Process theory, Problems with Rainbow coloring

Slide8: Visual Signs: Icon, Index, symbol, Gestalt principle, Visual Channels pop-out effect, Glyph Design criteria.

Sample Questions:

1. Describe Gibson's affordance theory. What are the problems with this theory?
2. Describe Visualization process briefly.
3. State 3 differences between sensory and arbitrary symbols.
4. What is the difference between Surface and a plane according to Gibson's Ecological optics?
5. Describe 4 properties of CIE chromaticity diagram
6. Describe problems of using Rainbow colors
7. Describe the pop out effect of Visual Channels
8. Descibe any 3 gestalt principles.
9. What do you mean by Visual Efficiency / Display efficiency in the context of Brain pixels?
10. Explain Any 5 terms briefly with example:
    a. Grating Acuity
    b. Mach Band

c. Cornsweet effect
d. Brain Pixel
e. Color Blindness
f. Color Constancy/ Lightness Constancy
g. Luminance/Brightness/Lightness
h. Visual Index/Icon/Symbol

Sample Math Problems:

1. If what would be the visual angle to an observer if she can see something 87mm of height from a 12m distance?
2. What will be the Michelson contrast of a pattern where the peak-high luminance is 34.2 candela and peak low is 23.9?
3. For a display, which uses a circular source of light (n=0.33), if 100 V electron gun produces 10 candela brightness, what is the value of gamma? (Hint: Steven's magnitude estimation)
4. Convert from CIE xyY to XYZ, x= 0.2, y= 0.4, Y = 0.8.