Visual Data Analysis
Assignment 2

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April 28, 2020

1 Face-based Luminance Matching

a)

What is the Helmholtz-Kohlrausch effect?
An experiment was conducted to see, if an user was able to find out the luminance match between bipartite fields. The user was presented with two fields,one where two chromatic fields are optically superimposed and the other with doubly intensified white field. Then according to the equation:
$L = K_m \int_\lambda L_e \lambda V(\lambda) d\lambda$
first field will have equal luminance as the brighter white field, but the experiment showed that the first field appears dull (less bright) due to their additive chromaticity which leads them to appear with an out of proportion brightness. This is called Helmholtz-Kohlrausch effect.

b)

Why are the authors proposing to use images of faces?
The authors have suggested a technique for luminance matching using faces because human brain is highly trained when it comes to recognizing faces and our brain has circuitry specially designed to analyze faces.

c)

To what alternative method do the authors compare their newly proposed one in the user study?
The authors have proposed a new method which was double face luminance matching method which was compared against an alternative method called Minimally Distinct Boundary (MDB).The user study that they have conducted showed that luminance matching can be more precisely obtained by the face based method.

d)

Based on the result of the user study, what is the advantage of the newly proposed method?
The two methods, face and MDB were conducted under same experimental setup where the face method showed more precise result of luminance matching. They have analyzed the standard deviation of the user results and came to the conclusion that the face based method showed a more precise way of adjusting luminance than MDB method although they have similar quantitative outputs values.

e)

Why do the authors have to know the monitor gamma while creating a colormap based on the result of the user study?
From the user study, they did not require to to know the gamma of the monitor to create an isoluminant colour map, but if they wanted to produce a continuous range of hues in between colors with the help of interpolation, the knowledge of gamma of the monitor was required.