INTRODUCTION

In visualization, color can be described as an essential part of the everyday work. Most figures contain colors. The Red-Green-Blue (RGB) color palette is used by most common software packages to lead to various problems.

An alternative is the Hue-Chroma-Luminance (HCL) color space. The HCL color space is based on how we perceive colors. Based on HCL palettes one can strongly improve the visual output with barely no additional effort and help the end-user to gather complex data as easy as possible.

HOW COLORS SHOULD BE

- natural & simple: no highly-saturated colors; manageable number of colors
- guiding: help the reader to gather the information; guide to most important parts
- supportive: lead the reader; reproduce well-known patterns (e.g. water is blue)
- appealing & relaxing: if not: reader can get lost, very strenuous for the eye
- customized: who has to interpret the image? regarding visual constraints?
- work everywhere: screen, projector, color- and gray-scale printers

THE PERCEPTION-BASED HCL COLOR SPACE

Most common software packages offer Red-Green-Blue color palettes. Each RGB color is defined as a tripod of red, green and blue. This concept allows to create highly saturated images, but is limited by the RGB disadvantages. With the HCL concept you do have full control over the perceptual dimensions.

H: Hue, defines the color
C: Chroma, defines the colorness
L: Luminance, defines the brightness

EXAMPLE I: PRECIPITATION FORECAST

Figure 1: Juxtaposition of the default RGB rainbow scheme and a similar HCL rainbow. Beside the color wheel: hues of either red, green and blue (for RGB) or hue, chroma and luminance (for HCL) which are defining the color palette. Gray shading: desaturated luminance information underlying the color palette.

EXAMPLE II: WARNING MAP AUSTRIA

The second example shows an alert map for Austria. The original color palette contains highly saturated colors which leads to the same problems as mentioned in EXAMPLE I.

CONCLUSION

Links & Tools

http://ertel2.uibk.ac.at: The online version of our internal weather platform with (mainly) HCL based forecast maps.

R programming language: Open source software; a package called “colorspace” is available to create HCL color palettes (Ihaka et al., 2013).

http://www.wetterleuchte.ch: An online interface to the R colorspace package with full functionality; create and export your own HCL palettes; modules: We have planned to offer the colorspace library (Ihaka, 2005) with an easy-to-use GUI for other programming languages (work in progress).

References


URL http://CRAN.R-project.org/package=colorspace
