CMSC 435 / 634 Introduction to Computer Graphics

Project Assignment 6: Coloring

Goals of this project:
Understand how to apply the knowledge we learn in class to solve real-world problems. Once this project is completed, you will understand how colors affect interpretation of scientific data.

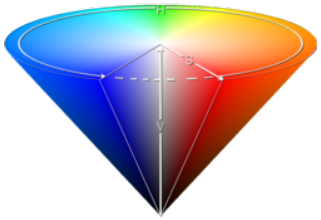
This is also the project that the instructor won't provide any supporting code to give you maximum flexibility to start engineering your own computer graphics program.

This project is part of your final project, for students who are not currently working with me.

The Assignment
In this project, you will design your own color palette to color some line field derived from medical imaging. Researchers in perception and visualization have been investigating the efficacy of palettes, based on the ways our brains and eyes physically respond to light. Color scales are crafted to achieve the principal goals of spatial displays: to show patterns and relationships in data, and to allow a viewer to accurately read individual values.

In this assignment, your coloring tool must support:

- A color picker program for interactive real time color updates based on one of the two attributes: ***orientation*** of the lines or the ***attribute*** at each vertex.
- For the color palettes, you will implement the following color mapping approaches:
    - HSV color space (hue, saturation, and value (brightness)).

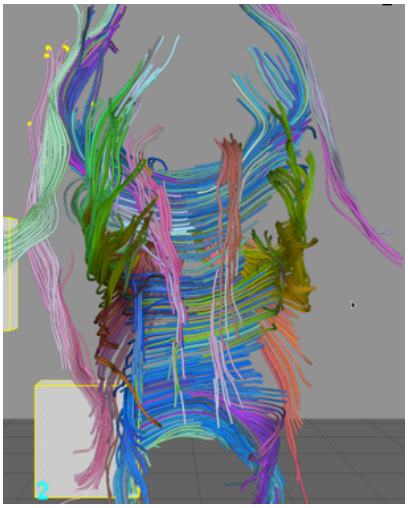


To select colors from the HSV color space, your code should allow independent selection of hue, saturation, and lightness. You can use keyboard ('H' and 'h' to increase or decrease hue, 'S' and 's' to increase or decrease saturation, and 'V' and 'v' to increase or decrease value (brightness).

- A rendering window to show the coloring result.

Input File Format
The input file includes both **geometry** and **attribute**, in plain ASCII format. The ASCII file contains sequences of lines to describe the geometry.

10 ← total number of line segments
3 <- total number of vertices on the 1st line segment
vx00 vy00 vz00 a0 a0 a0 <- the first 3 numbers represent the (x,y,z) coordinate
vx01 vy01 vz01 a1 a1 a1 <- the last 3 numbers represent the attribute
vx02 vy02 vz02 a2 a2 a2
4 <- total number of vertices on the 2nd line segment
vx10 vy10 vz10 a3 a3 a3
vx11 vy11 vz11 a4 a4 a4
vx21 vy21 vz21 a5 a5 a5
…



Answer the following (open-ended) questions.

(1) Among the hue, saturation, and value, which one is more effective at showing the scalar field? Justify your answer.
(2) Describe what you see from the colored line field.

Save your answers to a word or pdf file when you submit your code to the TA. You **MUST** include pictures rendered in your program to justify your answers.

Start **now**! Or you will probably not finish. Really, I promise you will not be able to do it in the last two days.

Extra credits

- For 15 points, color your line field based on the following rule: for lines following similar directions, using the same color.

What to turn in

Source code only by email to TA. Please do not include any .o files. Please include:

- A README with your handin containing basic information about your design decisions and any known bugs or extra credit;
- How to compile and run your code as if you are telling a colleague that is to continue the development.

Note: Please comment on your code. The better Alisa understands your code, the higher your grade is likely to be.