

CIS 410/510: Project #3

Due Jan 22, 2020

(which means submitted by 6am on January 23, 2020)

Worth 7% of your grade

Please read steps (4) and (5) closely ... they are dense and have a lot of instructions. If you miss part of their meaning, you will likely get the wrong answer.

Assignment:

- 1) Download skeleton file `proj3.cxx` and file `data_proj3.vtk` and put them in a new directory.
 - a. `proj3.cxx` has an empty implementation for `EvaluateFieldAtLocation` ... copy your implementation from `proj2`.
- 2) Re-use your `CMakeLists.txt` from the last project ... copy it to the new directory and rename as appropriate to reflect `proj3`.
- 3) Run `cmake`, compile the program and run the program. It will generate incorrect output. It generates three outputs ... "`bluehot.png`", "`difference.png`", and "`hsv.png`". If you open them, they will be all black.
- 4) Look for the comment with "`ITERATE OVER PIXELS`". You need to implement code here. Your code should map the physical space $X=-9 \rightarrow 9$, $Y=-9 \rightarrow 9$ to an image of size n_x by n_y . Specifically, map $i=0, j=0$ to $X=-9, Y=-9$ and $i=n_x-1, j=n_y-1$ to $X=+9, Y=+9$. Each of the n_x times n_y pixels will get mapped to a two-dimensional location. Once you know that two-dimensional location, interpolate the field to that location. Once you have done that, the pre-existing code ("`I TAKE OVER HERE`") will call a function to map the field value to a scalar.
- 5) Implement the following functions (all functions defined in function header in the source code):
 - a. `ApplyBlueHotColorMap`
 - b. `ApplyDifferenceColorMap`
 - c. `ApplyHSVColorMap`Note that the scalar field has a minimum value of 1.2 and a maximum value of 5.02. You should take this into account when you do your color mapping. For example, field values of 3.11 (= 50% of the way between 1.2 and 5.02) should be mapped to the middle of the color map.
- 6) Upload your source code when it is working. Make sure to cross-reference with the correct images posted on the website using the differencer. (I expect the images to be correct, and expect less than half credit if it is not.)