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Assignment 2

* 1. Issues with rainbow color scheme:

1. Transitions between some colors, like green and red, occur very rapidly, leading to false contrast.
2. Other transitions, like green, are gradual which causes a loss of detail
3. Overall brightness of the colors increases and decreases over the range of hues, so there is no natural progression of values.
4. If visualizations don’t use the total dynamic range of the rainbow color scheme, variations in the data would not effectively be shown.
   1. Rainbow colors can be used to visualize quantitative information where viewing contrasts in the data is important – because colors in the rainbow scheme are high contrast respective to each other.

3.1 Diesel\_field1

* + BWR shows the data is mostly blue: which shows the data is skewed towards lower values. There is a sliver of high values shown in red along the edge of one quarter of the circle. A chord of white (signifying points in the middle range) separates the red and blue data regions.
  + The heat map shows a large region of red signifying low values over the majority of the circle. This region is also consistent with the low blue colored region in the BWR color scale. There is a sliver of high values shown in white along the edge of one quarter of the circle; also consistent with the high red values in the BWR color scale.

Distance\_field1

* BWR shows low blue values creating a ring along the edge of the figure. High red values create a ring in center of the figure. A bordering of white ring separates the blue and red portions.
* The heat map shows three sections: a low valued red outer ring, a median valued yellow middle ring, and a high valued white center region.

Distance\_field2

* BWR shows low blue values creating a border outlining figure. High red values create a center outline the figure. A white outline separates the blue and red portions.
* The heat map shows three sections: a low valued red outer border outlining the figure, a median valued yellow middle outline, and a high valued white center region.

Iceland\_current\_field

* BWR shows the data is mostly blue: showing the data is skewed towards lower values. There is a thin high valued red strip within the body of blue. There is also a large circular black region signifying invalid values. Wisps of white streaks are sporadic in the regions of blue.
* The heat map shows a mostly red figure signifying low values. A strip of yellowish-white signifying high values is apparent in the image.

Torus\_field

* BWR for the donut figure is homogenously blue except for a spot of red at one end of the donut.
* The heat map for the donut figure is homogenously red except for a spot of yellowish-white at one end of the donut.

3.3

a) For all data sets, decreasing the threshold decreases the amount of blue and increases the amount of white, while increasing the threshold decreases red and increases white. Data sets with values at the lowest or highest range do not change color as the threshold varies.

Given a particular data set, the white threshold value should be the central reference value used to contrast other data. This way, it will be easy to discern which points are very different from another relative to a specific point you care about.

b) My non-linear mapping is an adaptation of logarithmic scaling. Given the min and max data values and a data value *s*:

1. Calculate *t* = (s – min) / (max – min)
2. Calculate saturation = 1 – log(t + 0.1) – 1

Then use the calculated saturation value as *s* in the hsv space. Any value can be used for hue. Value (in HSV context) should be 1.

The generated result of my log color scale differs from the linear mapping in that lower data values are mapped to higher color values. The log color scale could be more suitable in situations where middle and high values should be grouped together to create contrast against lower valued data points. The heat map mapping should be used instead if low, middle, and high values have no precedence over another, so data can be represented by the whole dynamic range.