CS 453 Project 1

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Problem 1.

Implementing the two color schemes, grey scale and bi-color both inform the user about the scalar field and the values the color represents. The overarching problem with both of these color schemes is that there is no legend for the user to interpret whether color or lack of color represents a high scalar value or a low scalar value. The benefit of having a grey scale map is that it provides a uniform color distribution whether the user will not come in with a basis of whether the color represents something which the data is not representing. However, the white to black color distribution is hard to differentiate between and can cause the visualization to lose fidelity. This is a pro for the bi-color map as you can better see the colors transitioning between the different scalar values.

Figure 1: Difference of grey scale and bi-color mapping of colors to scalars using R9

The added color allows your eyes to better see some of the mapping, especially when using complementary colors your eyes can distinguish more of the difference of colors. However, if the visualization used colors which very similar such as red and magenta it would be more difficult to distinguish.

Problem 2.

Implementing the height map of the scalars (scaled down by 0.00025) allow the user to visualize all the different scalar values for each vector. This allows the user to be able to see the a better representation of what the scalars look like. However, this adds an issue since the general map of scalars is all the same color. This can trick the eye to not be able to properly comprehend the different parts of the field.

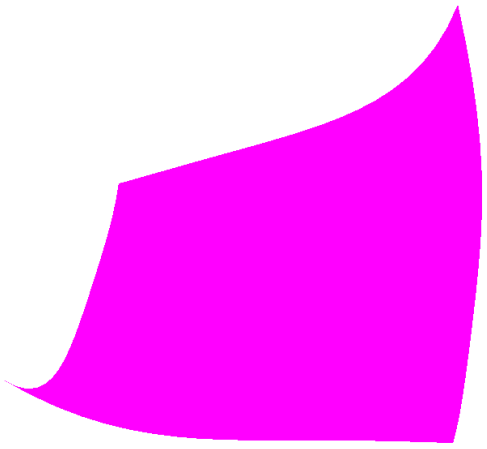
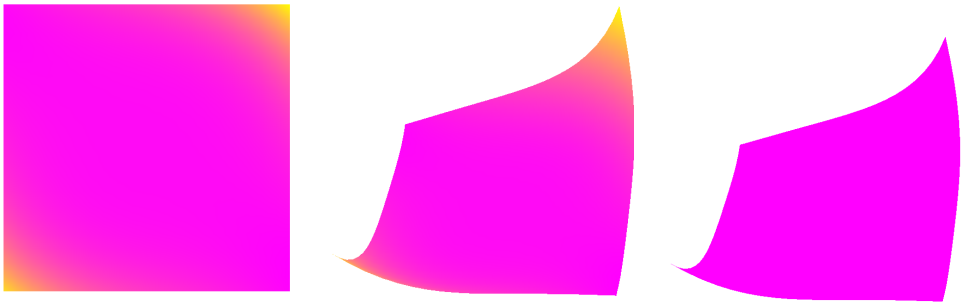


Figure 2: The scalars mapped of R9 by changing the z-value of each vector to its scalar

In this visualization I mapped each z-value of the vector to its scalar value scaled by 0.00025 of its original size. As you can see from figure 2 that looking at some of the edges where the z-value increases, it's hard to differentiate to where the scalar value is increasing more and where it starts to move. For example, the center of the field the scalar field has the average z-value of 0, as we move to one of the edges its hard to see when we start having a scalar value that changes. The color map was able to inform us of that change due to the color mapping between them.

Problem 3.

Comparing all three height field based visualizations of just color, just height, and then a combination of the two we can see that the combination of them both gives us the most detail.



(a) Bi Color (b) Bi Color Height Field (c) Height Field

Figure 3: You can use the tabular environment to organize your figures.

The only downside of the height field bi-color representation is that when viewing in a static view such as figure 3b is that information is lost based on the prospective. For example, the view in 3b does not show the scalar changes in the very bottom left corner can misrepresent the information. The bi-color method, figure 3a, fixes this problem due to it showing a top down view of the scalar view of the field. This allows us to get the whole picture but we miss out on a third axis of information to help convey the scalar value. The just height field, figure 3c, shows this better as we are able to see a third dimension of the field. This again

presents the issue of perspective but with adding the bi-colors we can better see the change of the scalar values. This is why I believe that figure 3b is the best visualization of the scalar field.