Homework 2 Questions

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CS137

1. Data values are readily discernable in my visualization on the whole. However, in particular, there are two variables – specifically, deformation rate eccentricity and turbulent charge – which were given to us as a near-continuous variable, which I am representing as colored icons at discrete points. In addition, my visualization makes use of color and therefore it may be difficult to discern some color differences for variables which use color – particularly for colorblind users. To aid visual clarity, I added clear visual detents to the velocity vector icons so that vectors of similar value could be distinguished at a high level by comparing the number of detents.
2. Because of the extensive use of icons, each of which does not take up a significant amount of space, I believe all of the variables are both clearly distinct, and easily seen within context. For example, it appears to be easy to see that there is no turbulent current in the swirling eddies, that vorticity is associated with turbulent current, but not always, and that the deformation rate tensor reports greater magnitudes in areas of turbulent current.
3. I wanted it to be easy to see all of the variables simultaneously, but I also wanted to reduce the visual complexity of the sample diagram. To this end, I tried to reduce the size and pixel footprint of all of the icons involved. In addition, I added visual detents to the velocity magnitude icons to make small differences clearer (since the icons rotate it can be difficult to compare without the detents). By reducing the pixel footprint of the icons, I was able to reduce icon overlap and also was able to make more room to see a background gradient (vorticity in this case). I also tried to design the icons to be as different as possible from a visual standpoint so that it was easier to separate them at the cognitive level. Lastly, I tried to pick color ranges which overlapped as little as possible. Although both the colored icons from turbulent charge and the colored icons for deformation rate eccentricity make use of the color red, I found that because the icons were so different visually this did not appear to cause confusion when reading these values.
4. I think that one of the biggest problems in 3D will be object occlusion. Icons, ribbons, and solid color gradients will block out items behind them making it harder to see the entire visualization. This may increase the need for cutaway views.

   Another major concern with 3D visualizations in the CAVE is that the 3D perspective/vanishing point may make it harder to distinguish the relative width, height, and size of icons that are far apart – i.e. it may be hard to tell if a large icon far away is bigger than a small icon up close.

   Another problem is that icons are flat (2D) and may be difficult to see if they are on a flat

billboard from specific vantage points. It may be necessary to create three dimensional versions of icons as needed.

Another issue that may come up in 3D is navigation. If the user zooms in to get a local view of the visualization they may loose their broader context and get lost, and not be sure exactly where they are. It may be necessary to provide a heads up display that includes a map, or perhaps adding road signs or other navigational markers to ensure that the user can maintain their context even when zooming in.