Data Visualization-Class Notes:

Scientific Visualization

Devanshi Bhatt

Warmup activity:

1. False colour image- probably not the colour that would be seen by human eye.
   To show the difference in scale, to show how big the black hole is- showing Sun, Pluto and the Voyager1.
2. Top left- family tree of the dinasaurs
   Selecting a point on the left scatter plot- gives location of that species in the world and a brief description of that on top right.

Scientific Visualization:

Spatial data

- smoke flume example- particle effect, polygonal surface, direct rendering of volume data
- polygons: triangle- always planar,
- point cloud: points scattered thru volume- volumetric- typically the largest type of dataset- most efficient repr of a dataset-
- volumetric fields- ink falling in water- with help of virtual geometric – difficult
- scalar- information has a scalar data type- scalar fields take only 1 float per cell- vectors are larger and more space consuming- GIS software can create these viz
- vector- wind map- reading of live wind vector data- velocity and direction of wind plotted- 3d vector data can be stored as a scalar or volumetric form
- magnetic field- vector data- magnetic activity on the outer 3rd of the Sun. cloudy orange and yellow portions- created by using the magnetic data
- stretch grid, quad tree

Spatial data Types

- Statistical
- Observational
- simulated by computer models

Visualizing Point Data

- Dots with scale- solid image from far but when you move closer, gaps between dotted patterns seen evidently
- Sprites- slap any kind of image to get a neat looking viz
- Meshing- creating a polygon surface over the points- use of point cloud-

Visualizing polygon data

- 2d data
- 3d scan data

Visualizing scalar fields

- Slices- give a sense of the overall dataset
- Iso-surface
- 3D columetric rendering

Visualizing Vector Fields

- Arrow glyphs
- Streamlines