



Visual Strategies for Heterogeneous Data: network analyses in Earth and space sciences.

Peter Fox, Anirudh Prabhu, Mark Parsons, and the DTDI team

Rensselaer Polytechnic Institute, Tetherless World Constellation, Troy, United States (pfox@cs.rpi.edu)

Recent successes in the application of complex network theory (including multi-partite) and algorithms to how minerals, fossils and proteins evolve over billions of years, have raised expectations that more general graph-based approaches offer the opportunity for new discoveries – more needles in the haystacks. The science goal is to explore how the geosphere and biosphere may have co-evolved under the influence of the super-continent cycle and increases in oxygen in the atmosphere and oceans. A key approach to reaching this goal has been representing large or multi-dimensional data in visual forms through a highly collaborative process that teams analytics specialists with domain scientists. The collaborators can then use visual analytics to spur quantitative analytics, dimension reduction, clustering, etc. Central to exploring this data space is the movement from two-dimensional spatial representations to three-dimensions as well as capturing additional data dimensions with color and size of network nodes, and strength of connections in gravity-based, force-directed renderings animated in time. As network/ graph densities increase, virtual reality becomes a natural way to enter and navigate the network space. This PICo presentation will explore data-rich network analyses for solid Earth geoscience, using illustrative examples in mineral and fossil evolution and offer future paths for consideration.