UNCLASSIFIED

Special Information Science and Technology Seminar Speaker

David Thompson
Kitware

Sublinear Sampling for Exploratory Visualization

Tuesday, March 4, 2014

3:00 - 4:00 PM

TA-3, Bldg. 1690, Room 102 (CNLS Conference Room)

Abstract: First impressions from initial renderings of data are crucial for directing further exploration and analysis. In most visualization systems, variable selection is achieved by alphabetic order (or occasionally their order on disk) and default colormaps are generated by simply linearly interpolating color in some space based on a value's placement between the minimum and maximum taken on by the dataset. We propose a simple sampling-based method for generating colormaps that highlights prominent features and uses random sampling to determine the distribution of values observed in the data. For variable selection, it is possible to estimate eigenvectors that group correlated sets of variables using sampling. The sample size required is independent of the dataset size and only depends on certain accuracy parameters. This leads to a computationally cheap and robust algorithm for initial presentation. Our approach (1) uses perceptual color distance to produce palettes from color curves, (2) allows the user to either emphasize or de-emphasize prominent values in the data, (3) uses quantiles to map distinct colors to values based on their frequency in the dataset, and (4) supports the highlighting of either inter- or intra-mode variations in the data.

Biography: Dr. Thompson is an R&D Engineer who aims to be a generalist. His interests include conceptual design, solid modeling, computational simulation and visualization, and mechatronics.

Dr. Thompson received his B. S. in Mechanical Engineering from Louisiana State University in 1992 and went on to earn a M. S. in Engineering and a Ph. D. from the University of Texas at Austin. He joined Sandia National Laboratories in 2001 and Kitware in 2012. His graduate research included computational tools for rapid prototyping techniques; a feasibility study of a geometric technique for conceptual mechanical design that yielded lumped-parameter models for concept selection; and an approach for parallel isocontouring. At Sandia, his work included developing visualization techniques for higher-order finite elements and monitoring HPC platforms to detect and statistically characterize failures.

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