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GASTVORTRAG

Dr. Susanne K. Suter

Universität Zürich

„Interactive Multiresolution and Multiscale Visualization of Large Volume Data“

Abstract:

Interactive visualization and analysis of large and complex volume data is an ongoing challenge. Data acquisition tools produce hundreds of Gigabytes of data and are one step ahead of visualization and analysis tools. Therefore, the amount of data to be rendered is typically beyond the limits of current computer and graphics hardware performance. We tackle this challenge in the context of state-of-the-art out-of-core multiresolution direct volume rendering by using a common mathematical framework (a) to extract relevant features from these large datasets, (b) to reduce and compress the actual amount of data, and (c) to directly render the data from the framework coefficients.
As a common framework, we introduced the higher-order extension of the matrix singular value decomposition - tensor approximation (TA) – as a compact volume data representation. In particular, the bases of tensor approximation were exploited to model state-of-the-art multiresolution volume visualization and multiscale feature extraction with one set of global bases. Based on this contribution, a feature scale metric was developed to automatically select a feature scale and a resolution for the final reconstruction.
Thanks to the compact data representation by TA, a significant data compression and GPU-based real-time visualization was achieved. The new algorithms were tested on volume datasets from micro-computed tomography and phase-contrast synchrotron tomography that range up to 32 Gigabytes.

Biography:

Dr. Susanne K. Suter is a post-doctoral researcher in the field of 3D visualization and computer graphics at the University of Zurich, Switzerland. She graduated from her PhD in early 2013. Her scientific expertise lies in data compression, feature extraction, automation, real-time interactive visualization, and linear algebra in visualization. Susanne Suter contributed to the field of interactive direct volume rendering by showing that tensor approximation is practical for out-of-core multiresolution rendering and multiscale volume feature visualization.

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