

Human-Centered Data Visualization

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In the big data era, we are witnessing an unprecedented amount of information emerging from every aspect of society and daily life—from information systems and sensor networks to social networks and much more. The data we encounter appears in many different formats, including text, images, videos, geometric meshes and shapes, and multimedia. Thus, effectively handling and comprehending such data becomes key to gaining value and insight from them. Designing proper visualization and analysis tools with human engagement is then critical for data interaction.

In this special issue, we introduce several recent works on human-centered visualizing and interacting with various types of data, including text, geometric meshes, graphs, and network transactions. As part of this work, it's necessary to develop novel algorithm and interaction designs to support the processing and analysis of each corresponding data type.

In "WordlePlus: Expanding Wordle's Use through Natural Interaction and Animation," Jaemin Jo, Bongshin Lee, and Jinwook Seo leverage natural interaction and animation to enable new features for the popular visualization technique Wordles. The proposed interactive authoring tool, Wordle-Plus, allows users to directly manipulate wordles with pen and touch interaction and a new two-word multitouch manipulation feature. Users can also add animation for richer text visualizations.

Takayuki Itoh and Karsten Klein, in their ar-

ticle, "Key-Node-Separated Graph Clustering and Layouts for Human Relationship Graph Visualization," present a novel graph clustering and layout technique that separates and emphasizes important nodes from dense graphs. The proposed algorithm can effectively visualize complex graph data. The authors tested their approach on human relationship graph datasets containing coauthorship and social media communication network data.

The third article in this special issue, titled "ENT-Vis: A Visual Analytic Tool for Entropy-Based Network Traffic Anomaly Detection," by Fangfang Zhou, Wei Huang, Ying Zhao, Yang Shi, Xing Liang, and Xiaoping Fan introduces a visual analytic system to help users better understand entropy-based traffic metrics and achieve accurate traffic anomaly detection. The authors designed three coordinated views in their system to map the network traffic statistical properties and the corresponding entropy-based measurements onto the temporal, visual clustering, and IP/port spaces. Rich interactive tools are provided to demonstrate how interaction can help users gain insights from challenging datasets.

Lastly, "Angle-Preserving Quadrilateral Mesh Parameterization" by Wenying Gong, Xiaohua Xie, Rui Ma, and Tieru Wu provides algorithms for direct parameterization of quadrilateral meshes. Focusing on direct parameterization with minimal angle distortion, this article provides solid solutions for both topological disk and topological sphere surfaces.

This special issue represents only a small sample of works on human-centered data visualization and interaction to address data challenges. We hope this special issue can inspire more novel visualization and computer graphics techniques to further important research in this area of data understanding and sense making. ❖

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IEEE CG&A CALL FOR ARTICLES

Special Issue on Quality Assessment and Perception in Computer Graphics

Final submissions due: 20 November 2015 ■ Publication date: July/August 2016

The computer graphics community has successfully exploited knowledge about the human visual system (HVS) and its limitations for several years. As a typical example, the limits of the visual perception have been used in rendering systems to simplify the simulation of light photons and thus save computational time while maintaining high visual quality. In addition to quality-oriented efforts, a large and diverse set of perception-related algorithms have been introduced, including best viewpoint generation, saliency estimation, material perception, and so on. Compared with the cases of natural images and video, perceptual computer graphics and animation have received relatively little attention thus far, de-

spite their importance and emerging research trends in related areas.

See www.computer.org/web/computingnow/cgacfp4 for the full call for papers for the upcoming CG&A special issue on visual quality and perception for computer graphics.

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