

The University of Chicago Computer Science Department
PRESENTS:

Visualization for People + Systems



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Abstract:

Making sense of large and complex data requires methods that integrate human judgment and domain expertise with modern data processing systems. To meet this challenge, my work combines methods from visualization, data management, human-computer interaction, and programming languages to enable more effective and more scalable methods for interactive data analysis and communication.

More specifically, my research investigates automatic reasoning over domain-specific representations of visualization and analysis workflows, in order to produce both improved human-centered designs and system performance optimizations. My work on Vega-Lite provides a high-level declarative language for rapidly creating interactive visualizations. Vega-Lite can serve as a convenient representation for tools that generate visualizations. To create effective designs, these tools must also consider perceptual principles of design. My work on Draco provides a formal model of visual encodings, a knowledge base to reason about visualization design decisions, and methods to learn design rules from experiments. Draco can formally reason over the visualization design space to recommend appropriate designs but its applications go far beyond. Draco makes theoretical design knowledge a shared resource that can be extended, tested, and systematically discussed in the research community. The Falcon and Pangloss systems enable scalable interaction and exploration of large data volumes by making principled trade-offs among people's latency tolerance, precomputation, and approximation of computations.

A recurring strategy across these projects is to leverage an understanding of people's tasks and capabilities to inform system design and optimization.

Bio:

Dominik Moritz is a Computer Science PhD candidate at the University of Washington. He works with Jeffrey Heer and Bill Howe in the Interactive Data Lab and the Database Group. Dominik's research develops scalable interactive systems for visualization and analysis. His systems have won awards at premier academic venues and are available as open source projects with significant adoption by the Python and JavaScript data science communities.

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