

2021 VGTC Visualization Dissertation Award

Arjun Srinivasan, Tableau Software



The 2021 VGTC Visualization Dissertation Award goes to Arjun Srinivasan. Arjun Srinivasan is a member of the Senior Research Staff at Tableau Software in Seattle. He received his Ph.D. from the Georgia Institute of Technology under the supervision of Regents Professor John Stasko. His dissertation bridges the fields of Information Visualization, Human-Computer Interaction, and Natural Language Processing to illustrate the potential of visualization interfaces combining natural language (NL) and direct manipulation (DM) for fluid and expressive human-data interaction experiences.

Arjun's dissertation investigates NL- and DM-based multimodal visualization systems through a gamut of research approaches including task analysis, interaction and interface design, system and toolkit development, and user evaluations. The dissertation helps inform the design of data analysis and visualization systems that support NL-only input or multimodal input incorporating NL through four core contributions:

- First, the dissertation presents a high-level framework centered around user goals for NL input in the context of visualization systems. The dissertation also highlights how the framework can be used to gain an overview of the state-of-the-art and identify gaps and research opportunities.
- Second, the dissertation describes the design and implementation of three multimodal visualization systems that combine touch and/or pen with speech. Collectively, these system descriptions highlight challenges in developing

multimodal visualization interfaces and illustrate their

potential to support common visual analysis scenarios as well as novel styles of free-form data exploration that transcend capabilities of current visualization tools.

- Third, the dissertation presents a series of user evaluations of the implemented systems. These evaluations validate end-user preferences for multimodal input over unimodal input and shed light on mappings between modalities and operations along with variations in user interaction patterns.
- Lastly, to facilitate future research and development, the dissertation details NL4DV, an open-source toolkit that simplifies the implementation of NL-based visualization systems. NL4DV encapsulates a series of NLP techniques and provides a high-level API for developers to translate NL utterances into analytic specifications, which, in turn, can be leveraged to support visualization specification and interaction.

For more details, a copy of Arjun's dissertation and the contributing research papers can be found on his website: <https://arjun010.github.io/>

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