2022 VGTC Visualization Technical Achievement Award

Shixia Liu, Tsinghua University



The 2022 VGTC Visualization Technical Achievement Award goes to Shixia Liu for her research on topic-based visual text analysis and visualization on explainable artificial intelligence, which has made a strong positive impact on the academic and industrial communities.

Shixia Liu is a professor in the School of Software at Tsinghua University, China, where she founded the visual analytics team and serves as the director of the academic committee. Before she joined Tsinghua in 2014, she worked as a lead researcher at Microsoft Research Asia from 2010 to 2014 and a research staff member and research manager at IBM China Research Lab from 2022 to 2010. She received her Ph.D. in Computer Science in 2002 from Tsinghua University, China. She received an M.S. and B.S. in Mathematics at Harbin Institute of Technology, China.

Shixia's earlier work focuses on topic-based visual text analysis, which aims to address the challenge of diverse meanings of natural language expressions. She and her coworkers tightly integrated sophisticated analytical techniques with powerful interactive interfaces to allow people to incrementally explore and understand analysis results that would otherwise not be possible using traditional approaches. Her landmark work, TIARA, is the first to combine sophisticated, topic-based text summarization techniques with interactive visualization to support iterative and progressive text analysis. TIARA was followed by TextFlow for analyzing topic merging/splitting. It is based on a hierarchical Dirichlet process mixture of multinomial distributions and a river metaphor. Later, she and her coworkers demonstrated the usefulness of visual analytics for streaming text analysis and heterogeneous text analysis. She received 4 honorable mentions, and had 2 IEEE TVCG spotlight articles and an IEEE PacificVis Top 1 cited paper in the past decade. Her IEEE VIS paper on TextFlow is highlighted as one of the representative works in the 25 years' history of IEEE VIS. Her topic-based text visualization technology has been used in mass-market products, including IBM Cognos, Microsoft Bing, and Microsoft Power BI.

Shixia has also contributed to visualization for explainable artificial intelligence. Her work on understanding deep learning models particularly stands out. In the past, most analysis systems for machine learning models focus on understanding the model results without knowing the inner workings of the models. She and her coworkers fundamentally changed this situation on analyzing machine learning models. Her work, CNNVis, is among the first to employ visual analytics techniques to explain the inner workings of deep convolutional neural networks and diagnose the ones with unsatisfactory performance. She and her coworkers further proposed visual analytics approaches for 1) understanding model robustness; 2) debugging deep generative models, boosting models, and data quality issues. Her work also attracts interest from industry. For example, CNNVis and BOOSTVis were used in Alibaba Cloud's PAI machine learning platform, a machine learning solution of Siemens, Inventec Co., and Kuaishou Co., facilitating model developers in building a high-performance machine learning model more efficiently.

Through high-quality publications, keynotes, workshop organization, special issue organization, and community service, she has further fostered and popularized the research topics of visual analytics for text analysis and visualization on explainable artificial intelligence. She has published over 150 impactful papers in visual analytics and machine learning and has over 50 patents. She was a paper co-chair of IEEE VAST (VIS) in 2016/2017 and IEEE PacificVis 2014. She has been on the IEEE VIS steering committee since 2020. She is an associate editor-in-chief of IEEE Transactions on Visualization and Computer Graphics and an associate editor of Artificial Intelligence, IEEE Transactions on Big Data, and ACM Transactions on Interactive Intelligent. She was inducted to the IEEE Visualization Academy in 2020 and elected an IEEE Fellow in 2021.

2022 VGTC Visualization Technical Achievement Award

Valerio Pascucci, University of Utah



The 2022 VGTC Visualization Technical Achievement Award goes to Valerio Pascucci for his seminal contribution in using topology for visualization and analysis of data.

Valerio Pascucci is the John R. Parks Inaugural Endowed Chair of the University of Utah, a Professor of Computer Science in the School of Computing, a faculty member of the Scientific Computing and Imaging Institute, and the Founding Director of the Center for Extreme Data Management Analysis and Visualization (CEDMAV) at the University of Utah. He received a Ph.D. in computer science from Purdue University after moving from Italy to the US. Valerio's Ph.D. research was titled "Multi-dimensional and multi-resolution geometric data-structures for scientific visualization" and investigated the effective use of visualization techniques to enable the interactive, intuitive exploration of big scientific data.

Valerio has pioneered the effective use of topological analysis for visualization and analytics for many different types of data, including scalar fields, vector fields, and high dimensional data with applications ranging from clean energy and climate modeling to cosmology and nuclear engineering. Valerio's topology research started in 1998 (as a Ph.D. student) with his work on "Visualization of scalar topology for structural enhancement" presented at the IEEE VIS conference (formerly SciVis, InfoVis, and VAST) where he has continued to publish every single year for over 25 years. This body of work has been recognized with seven Best Paper Awards and the 15-year Test of Time Award for his 2002 SciVis paper on "Efficient computation of the topology of level sets." Overall, Valerio published 6 edited books and over 250 refereed papers (107 in journals, 129 in conferences proceedings, and 25 as book chapters) that involve a breadth of the work including the theoretical foundations of topological data analysis, its robust implementation in software packages, and its direct use in science and engineering. In addition to topology, Valerio has focused a major portion of his research on the development of techniques to manage and visualize massive scientific data. The results have been mainly implemented in the OpenVisus library (visus.org) and deployed via the National Science Data Fabric initiative.

Valerio's work has been used in several commercial applications, such as in the oil and gas industry, to better understand and label seismic data, in the aerospace industry, to design new light materials with improved performance, and in agriculture, to facilitate fast collection of massive data sets from drones. Valerio's work also led to significant outreach activities, including the presentation of the topological analysis of combustion simulations in a year-long (2018-2019) Exhibit of Fire at the top museum of science in Europe (Cité des Sciences in Paris) and the live demonstrations of virtual reality neuroscience tools at the Leonardo Museum of Science in Utah (2019-2020).

Valerio's devotion to teaching and mentoring was recognized with the 2016 Distinguished Mentor Award from the Graduate School of the University of Utah for introducing topology methods and visualization techniques in the classroom and for advising and supporting many Ph.D. students and postdocs.

Valerio Pascucci has demonstrated exemplary service to the visualization community. As a general chair of IEEE VIS 2020, he navigated successfully through the COVID-19 pandemic, turning it into an opportunity to grow the conference's reach to an unprecedented number of community members. Valerio also served twice as an Associate Editor of the IEEE TVCG journal and organized seven other major meetings: IEEE eScience 2022, ACM SoCG 2010, TopoInVis 2013 and 2009, IEEE Volume Graphics 2008, Dagstuhl Perspective Workshop 2014, ACM SIGHPC Workshop on Visual Performance Analysis (with SC14) 2014.

Outside of his main academic job, Valerio is the founder of Data Intensive Science, a 501(c) nonprofit providing outreach and training to promote the use of advanced technologies for science and engineering, he is the Founding President of ViSOAR LLC, a University of Utah spin-off, and he is a co-founder of Leggera Romana, a Utah corporation whose mission to popularize gourmet Pinsa, the roman ancestor of pizza, outside Italy.