

Research Interest My research interests lie primarily in the interpretation of complex data-driven models, especially by devising novel high-dimensional data analysis and visualization techniques.

Education

University of Utah 2009 - 2016
Ph.D. in Computing, Graphics Track Advisor Dr. Valerio Pascucci (pascucci@sci.utah.edu)

Huazhong University of Science and Technology 2005 - 2009
BS. in Computer Science BE. in Biomedical Engineering

Professional Experience

Lawrence Livermore National Laboratory Postdoctoral Researcher
Livermore, CA 2017 - Present
Developing novel interpretation techniques for understanding complex data-driven models such as deep neural networks and simulation ensembles.

Scientific Computing and Imaging Institute, University of Utah Research Assistant
Salt Lake City, UT 2010 - 2016
Developed visualization techniques for high-dimensional data and multivariate volumetric data.

Lawrence Livermore National Laboratory Research Aide Intern
Livermore, CA Summer 2014, 2013
Developed high-dimensional data visualization techniques utilizing subspace clustering (2014).
Developed super-voxel segmentation algorithm for industrial CT-scan (2013).

Argonne National Laboratory Research Aide Intern
Lemont, IL Summer 2012, 2011
Optimized GPU cluster load balance for v13 parallel volume renderer (2012).
Improved rendering quality and streaming speed of v13 parallel volume renderer (2011).

Peer-Reviewed Journal Publications

NLIZE: A Perturbation-Driven Visual Interrogation Tool for Analyzing and Interpreting Natural Language Inference Models
Shusen Liu, Zhimin Li, Tao Li, Vivek Srikumar, Valerio Pascucci and Peer-Timo Bremer. *IEEE Transactions on Visualization and Computer Graphics (InfoVis 2018)*, 25(1), 651-660, 2019

Exploring High-Dimensional Structure via Axis-Aligned Decomposition of Linear Projections
Jayaraman J. Thiagarajan, Shusen Liu, Karthikeyan Natesan Ramamurthy and Peer-Timo Bremer. *Computer Graphics Forum 37 (3)*, 241-251, 2018

Visual Exploration of Semantic Relationships in Neural Word Embeddings
Shusen Liu, Peer-Timo Bremer, Jayaraman J. Thiagarajan, Vivek Srikumar, Bei Wang, Yarden Livnat and Valerio Pascucci. *IEEE Transactions on Visualization and Computer Graphics (InfoVis 2017)*, 24(1), 553-562, 2018

Visualizing high-dimensional data: Advances in the past decade
Shusen Liu, Dan Maljovec, Bei Wang, Peer-Timo Bremer and Valerio Pascucci *IEEE Transactions on Visualization and Computer Graphics 23 (3)*, 1249-1268, 2017

The Grassmannian Atlas: A General Framework for Exploring Linear Projections of High-Dimensional Data
Shusen Liu, Peer-Timo Bremer, Jayaraman J. Thiagarajan, Bei Wang, Brian Summa and Valerio Pascucci. *Computer Graphics Forum (CGF)*, 2016

Visual Exploration of High-Dimensional Data through Subspace Analysis and Dynamic Projections.

Shusen Liu, Bei Wang, Jayaraman J. Thiagarajan, Peer-Timo Bremer, Valerio Pascucci. *Computer Graphics Forum (EuroVis15)* 34(3), 271-280, 2015

Distortion Guided Structure-Driven Interactive Data Exploration.

Shusen Liu, Bei Wang, Peer-Timo Bremer, Valerio Pascucci. *Computer Graphics Forum* 33 (3), 101-110, 2014.

CT Based Computerized Identification and Analysis of Human Airways: A Review.

Jiantao Pu, Suicheng Gu, Shusen Liu, Shaocheng Zhu, David Wilson, Jill M. Siegfried, David Gur. *Med. Phys.* 39, 2603, 2012.

Feature-Based Statistical Analysis of Combustion Simulation Data.

Janine Bennett, Vaidyanathan Krishnamoorthy, Shusen Liu, Ray Grout, Jackie Chen, Valerio Pascucci, Bremer Timo. *IEEE Transaction on Computer Graphics and Visualization*, 2011.

Fast Blood Flow Visualization of High-Resolution Laser Speckle Imaging Data Using Graphics Processing Unit.

Shusen Liu, Pengcheng Li, Qingming Luo. *Optics Express*, Vol.16, Issue 19, 2008.

**Peer-Reviewed
Conference
Publications**

Visual Interrogation of Attention-Based Models for Natural Language Inference and Machine Comprehension

Shusen Liu, Tao, Li, Zhimin Li, Vivek Srikumar, Valerio Pascucci, and Peer-Timo Bremer. *Conference on Empirical Methods in Natural Language Processing (EMNLP) Demonstration Track*, 2018.

Embedded Domain-Specific Language and Runtime System for Progressive Spatiotemporal Data Analysis and Visualization

Cameron Christensen, Shusen Liu, Giorgio Scorzelli, Ji-Woo Lee, Peer-Timo Bremer and Valerio Pascucci. *IEEE Symposium on Large Data Analysis and Visualization (LDAV)*, 2016.

Multivariate Volume Visualization through Dynamic Projections.

Shusen Liu, Bei Wang, Jayaraman J. Thiagarajan, Peer-Timo Bremer, Valerio Pascucci. *IEEE Symposium on Large Data Analysis and Visualization (LDAV)*, 2014

Analyzing Simulation-Based PRA Data Through Clustering: a BWR Station Black-out Case Study.

Dan Maljovec, Shusen Liu, Bei Wang, Valerio Pascucci, Peer-Timo Bremer, Diego Mandelli, Curtis Smith. *International Conference on Probabilistic Safety Assessment and Management (PSAM)*, 2014

Gaussian Mixture Model Based Volume Rendering.

Shusen Liu, Joshua A. Levine, Peer-Timo Bremer, Valerio Pascucci. *IEEE Symposium on Large-Scale Data Analysis and Visualization* **Best paper award**, 2012.

Full Publication List (Google Scholar: <http://goo.gl/Py5KEZ>)

Qualifications

Programming Languages: C++/C, Python, JavaScript, R, Matlab
APIs/Libraries: D3.js, PyTorch, TensorFlow, OpenGL/GLSL, CUDA, Qt, Boost, etc.
Tools: CMake, Git, GNU toolchain, Visual Studio, L^AT_EX, Vim, MongoDB, Paraview, etc.

**Professional
Service**

Reviewer: TVCG, CGF, InfoVis, SciVis, VAST, CHI, Journal of Visualization, EuroVis, LDAV, PacificVis, etc.
Program Committee: SC ISAV Workshop 2018.