

Tushar Athawale

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Research Interest

Data visualization, statistical uncertainty quantification, topological data analysis, visualizations for large-scale/high-dimensional data, in situ computing and analysis, data science

Research and Work Experience

University of Utah

Since Oct, 2016

Post-Doctoral Fellow in the scientific visualization group supervised by Distinguished Prof. Chris R. Johnson at the Scientific Computing and Imaging (SCI) Institute. Research in statistical uncertainty quantification and visualization for scientific data with applications ranging from biomedical imaging to large-scale simulations.

Co-Instructor, teaching CS6635/5635, Scientific Visualization, Spring 2018 and Spring 2019.

Co-Instructor, teaching CS6962, Decomposition-Based Techniques in Data Analysis, Spring 2017.

Seminar Leader, scheduling weekly SCI Institute *visualization seminars* for two semesters.

MathWorks, Inc.

May 2015 - Oct 2016

Application Support Engineer in the Engineering Development Group (EDG). Technical support for customers working with MATLAB, software development for the IMROTATE 3 function of the Image Processing Toolbox, and part of the interviewing team for hiring new candidates in EDG.

University of Florida

May 2011 - May 2015

Research Assistant in the visualization group led by Prof. Alireza Entezari in the Department of Computer and Information Science and Engineering (CISE). Research in uncertainty quantification for isosurface visualizations, where isosurfaces are rendered with the widely used marching cubes algorithm.

Teaching Assistant for the graduate- and undergraduate-level courses on Computer Graphics (CAP 4730/ 5705), Advanced Data Structures (COP 5536), and Programming Fundamentals for CIS Majors 1 (COP 3502).

Nvidia Corporation

Aug 2009 - May 2010

Software Engineering Intern. Integration of the screen space ambient occlusion (SSAO) algorithm with Nvidia graphics drivers.

Education

Doctor of Philosophy (PhD) in Computer and Information Science and Engineering

May 2010 - May 2015

University of Florida, Gainesville, FL

Dissertation: Quantification and visualization of spatial uncertainty in isosurfaces for parametric and nonparametric noise models [[link](#)]

Advisor: Prof. Alireza Entezari

Graduated with highest distinction, GPA: 3.75/4.00

Master of Science (MS) in Computer and Information Science and Engineering

May 2010 - May 2014

University of Florida, Gainesville, FL

Graduated with highest distinction, GPA: 3.75/4.00

Relevant Coursework: Analysis of Algorithms, Advanced Data Structures, Computer Graphics, GPU Architecture and Programming, Machine Learning

Bachelor of Engineering (BE) in Computer Engineering

May 2006 - May 2010

University of Pune, Pune, India

Graduated with highest distinction, GPA: 8.81/10.00

Teaching

CS6635/5635 - Visualization for Scientific Data, University of Utah

2018, 2019

Co-instructor with Distinguished Prof. Chris R. Johnson. Graduate-level lectures on visualizations for scalar-field and vector-field data, ParaView software, and uncertainty visualizations. Development and grading of course assignments and projects. Helping students successfully meet their project milestones.

- CS6962 - Decomposition Techniques for Computational Data-Enabled Science and Engineering**, University of Utah **2017**
Co-instructor with Distinguished Prof. Chris R. Johnson. Graduate-level lectures on data decomposition techniques, such as principal component analysis and singular value decomposition. Development and grading of course assignments and projects. Helping students successfully meet their project milestones.
- CAP 4730, CAP 5705 - Computer Graphics**, University of Florida **2012, 2014**
Teaching Assistant for Prof. Alireza Entezari. Graduate and undergraduate level. Grading of lab assignments and projects. Helping students in problem solving.
- COP 5536 - Advanced Data Structures**, University of Florida **2011, 2015**
Teaching Assistant for Distinguished Prof. Sartaj Sahni. Graduate level. Grading of lab assignments and projects. Helping students in problem solving.
- COP 3502 - Programming Fundamentals for CIS Majors 1**, University of Florida **2013**
Teaching Assistant for Dr. Peter J. Dobbins. Undergraduate level. Conducting student labs on Java programming language and grading lab assignments.

Peer-Reviewed Journal Publications

1. **Tushar M. Athawale**, Bo Ma, Elham Sakhaee, Chris R. Johnson, and Alireza Entezari, Direct Volume Rendering with Nonparametric Models of Uncertainty. *IEEE Transactions on Visualization and Computer Graphics (to appear)*, Special Issue on 2020 IEEE VIS Conference, 2021. [[link](#)] [[pdf](#)]
2. **Tushar M. Athawale**, Dan Maljovec, Lin Yan, Chris R. Johnson, Valerio Pascucci, and Bei Wang, Uncertainty Visualization of 2D Morse Complex Ensembles Using Statistical Summary Maps. *IEEE Transactions on Visualization and Computer Graphics (to appear)*, 2020. [[link](#)] [[pdf](#)]
3. **Tushar M. Athawale** and Chris R. Johnson, Probabilistic Asymptotic Decider for Topological Ambiguity Resolution in Level-Set Extraction for Uncertain 2D Data. *IEEE Transactions on Visualization and Computer Graphics*, Special Issue on 2018 IEEE VIS Conference, vol. 25, no. 1, pp 1163-1172, Jan 2019. [[link](#)] [[pdf](#)] [[code](#)]
4. **Tushar M. Athawale**, Kara A. Johnson, Chris R. Butson, and Chris R. Johnson, A Statistical Framework for Quantification and Visualization of Positional Uncertainty in Deep Brain Stimulation Electrodes. *Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization*, vol. 7, no. 4, pp. 438-449, Jul 2019. [[link](#)] [[pdf](#)] [[code](#)]
5. **Tushar M. Athawale**, Elham Sakhaee, and Alireza Entezari, Isosurface Visualization of Data with Nonparametric Models for Uncertainty. *IEEE Transactions on Visualization and Computer Graphics*, Special Issue on 2015 IEEE VIS Conference, vol. 22, no. 1, pp. 777-786, Jan 2016. [[link](#)] [[pdf](#)] [[code](#)]
6. **Tushar M. Athawale** and Alireza Entezari, Uncertainty Quantification in Linear Interpolation for Isosurface Extraction. *IEEE Transactions on Visualization and Computer Graphics*, Special Issue on 2013 IEEE VIS Conference, vol. 19, no. 12, pp. 2723-2732, Dec 2013. [[link](#)] [[pdf](#)] [[code](#)]

Conference Proceedings

1. **Tushar M. Athawale**, Alireza Entezari, Bei Wang, and Chris R. Johnson, Statistical Rendering for Visualization of Red Sea Eddy Simulation Data. *2020 IEEE SciVis Contest (to appear)*, Oct 2020. [[pdf](#)]
[Selected among the top seven contest entries invited for presentation at the IEEE VIS 2020.]
2. **Tushar M. Athawale**, Kara A. Johnson, Chris R. Butson, and Chris R. Johnson, A Statistical Framework for Visualization of Positional Uncertainty in Deep Brain Stimulation Electrodes. *2019 IEEE Workshop on Visual Analytics in Healthcare (VAHC)*, pp. 54-55, Oct 2019. [[link](#)] [[pdf](#)]

Published Books

1. Debabala Swain, Prasant Kumar Pattnaik, and **Tushar M. Athawale** (Eds.), Machine Learning and Information Processing. *Advances in Intelligent Systems and Computing 1311*, Springer Singapore (to appear), 2021. [[link](#)]

Selected Presentations

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|---|-----------------|
| Invited talk at the ICMLIP 2020 , Virtual Event
Applications of Uncertainty Visualization for Analysis of Scientific Data [slides] | Nov 2020 |
| Paper presentation at IEEE SciVis 2020 , Virtual Event
Direct Volume Rendering with Nonparametric Models of Uncertainty
[slides] [video] | Oct 2020 |
| Paper presentation at IEEE SciVis 2020 , Virtual Event
Uncertainty Visualization of 2D Morse Complex Ensembles Using Statistical
Summary Maps [slides] [video] | Oct 2020 |
| Paper presentation at IEEE SciVis Contest 2020 , Virtual Event
Statistical Rendering for Visualization of Red Sea Eddy Simulation Data
[slides] [video] | Oct 2020 |
| Invited talk on a poster at IEEE VIS 2020 , Virtual Event
Statistical Rendering for Visualization of Red Sea Eddy Simulation Data [poster] | Oct 2020 |
| Keynote speaker at the ICMLIP 2019 , Pune, India
Statistical Analysis for Uncertainty Quantification and Visualization of Scientific Data | Dec 2019 |
| Invited talk at the Indian Institute of Science (IISc) , Bengaluru, India
Statistical Analysis for Uncertainty Quantification and Visualization of Scientific Data | Nov 2019 |
| Invited talk on a poster at the 2019 Workshop on Visual Analytics in
Healthcare (VAHC) , Vancouver, BC, Canada
A Statistical Framework for Visualization of Positional Uncertainty in Deep Brain
Stimulation Electrodes [poster] | Oct 2019 |
| Invited talk at the Oak Ridge National Laboratory (ORNL) , TN, USA
Statistical Analysis for Uncertainty Quantification and Visualization of Ensemble/
Large-Scale Data [slides] | May 2019 |
| Invited talk at the Los Alamos National Laboratory (LANL) , NM, USA
Statistical Analysis for Quantification and Visualization of Spatial Variability in Features
of Uncertain Data | Dec 2018 |
| Paper presentation at IEEE SciVis 2018 , Berlin, Germany
Probabilistic Asymptotic Decider for Topological Ambiguity Resolution in Level-Set
Extraction for Uncertain 2D Data [slides] [video] | Oct 2018 |
| Paper presentation at IEEE SciVis 2015 , Chicago, Illinois
Isosurface Visualization of Data with Nonparametric Models for Uncertainty
[slides] | Oct 2015 |
| Paper presentation at IEEE SciVis 2013 , Atlanta, Georgia
Uncertainty Quantification in Linear Interpolation for Isosurface Extraction [slides] | Oct 2013 |

Professional Services

- Member of the **program committee** for IEEE VIS 2020 short papers
- **Journal reviewer** for the IEEE TVCG, CGF, and IJCSM journals
- **Conference reviewer** for the IEEE Visualization, EuroVis, and China Visualization Conferences
- **Poster reviewer** for undergraduate student posters presented at the **Undergraduate Research Symposium** in 2018 and 2019
- **Student volunteer** at IEEE VIS 2013