Subhashis Hazarika

Contact Information

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Research Interests

Large-Scale Data Visualization, Statistical Data Modeling, Machine Learning, Visual Analytics.

Education

The Ohio State University, Columbus, Ohio, USA **Aug 2013 - present**

Ph.D Candidate, Computer Science and Engineering
- Major: *Computer Graphics*
- Minors: *Artificial Intelligence*, *High Performance Computing.*
- CGPA: 3.82/4.00
- Advisor: Dr. Han-Wei Shen

National Institute of Technology, Durgapur, West Bengal, India **2007 - 2011**

B.Tech., Computer Science and Engineering,
- CGPA: 9.12/10.00

Professional Experience

Los Alamos National Laboratory, Los Alamos, New Mexico, USA
Graduate Summer Intern (Programming Models Team, CCS-7) **May, 2017 - August, 2017**

Gravity Research Lab, The Ohio State University, Columbus, Ohio, USA
Graduate Research Associate **May, 2016 - present**

Novell Software Development (India) Pvt. Ltd., Bangalore, Karnataka, India
Senior Software Engineer **June, 2011 - May, 2013**

European Organization for Nuclear Research, CERN, Geneva, Switzerland
Summer Intern Student **May, 2010 - August, 2010**

Research Projects

Deep Learning Assisted Visual Analysis Framework:

We use DNNs as surrogate models to assist complex compute-intensive scientific simulations. We then utilize the state-of-the-art interpretability and uncertainty quantification techniques for DNNs to gain insights into the simulated physical phenomena. The trained model serves as an effective back-end for our interactive visual-analysis tool.

Flexible Multivariate Statistical Models for Visualization using Copula Functions:

We propose a flexible approach towards modeling multivariate distributions using Gaussian Copula functions. This allows us to use hybrid mixture of distributions (parametric and/or non-parametric) for data modeling. We show how to use such hybrid distribution models for probabilistic feature extraction and visual analysis in large-scale simulations.

Extreme-scale Distribution-based Data Analysis Library (EDDA):

This *C++/Python* library aims at visualizing distribution data for uncertainty analysis. The goal is to provide a unified data model with generic distribution representations for the development of uncertainty visualization algorithms.

Information-theoretic Framework for Visualizing Ensemble Isocontours:

Using information-theory measures like mutual-information, specific-information and conditional entropy, we propose novel analysis techniques to understand ensemble of isocontours in large-scale data generated from scientific simulations. Data specially corresponding to weather forecasting and ocean simulation.

Publications

Subhashis Hazarika, Soumya Dutta, Han-Wei Shen, Jen-Ping Chen: "*CoDDA: A Flexible Copula-based Distribution Driven Analysis Framework for Large-Scale Multivariate Datasets*", IEEE Transactions on Visualization and Computer Graphics, 25(1): 1214-1224 (2019).

Subhashis Hazarika, Ayan Biswas, Han-Wei Shen: "*Uncertainty Visualization Using Copula-Based Analysis in Mixed Distribution Models*", IEEE Transactions on Visualization and Computer Graphics, 24(1): 934-943 (2018).

Subhashis Hazarika, Ayan Biswas, Soumya Dutta, Han-Wei Shen: "*Information Guided Exploration of Scalar Values and Isocontours in Ensemble Datasets*", Entropy 2018, 20(7), 540. (Special Issue Information Theory Application in Visualization).

Junpeng Wang, **Subhashis Hazarika**, Han-Wei Shen: "*Visualization and Visual Analysis of Ensemble Data: A Survey*", IEEE Transactions on Visualization and Computer Graphics, (2018).

Subhashis Hazarika, Soumya Dutta, Han-Wei Shen: "*Visualizing the Variations of Ensemble of Isosurfaces*", Pacific Visualization Symposium (PacificVis), 2016 IEEE, 209-213.

Subhashis Hazarika, Tzu-Hsuan Wei, Rajaditya Mukherjee, Alexandru Barbur: "*Visualizing the life and anatomy of dark matter*", Scientific Visualization Conference (SciVis), 2015 IEEE, 101-106.

Sanjib Sadhu, **Subhashis Hazarika**, Kapil Jain, Saurav Basu, Tanmay De: "*GRP-CH Heuristic for Generating Random Simple Polygon*", 23rd International Workshop on Combinatorial Algorithms 2012: Page 293-302, Springer LNCS Volume.

Honors and Awards

- O'Donnell Graduate Fellowship for first year of Ph.D, 2013.
- Summer Student at CERN, Geneva, 2010.

Teaching Experience

Department of Computer Science, OSU, Columbus, OH, USA

Graduate Teaching Instructor — **August, 2014 - April, 2016**
CSE1222:Introduction to Computer Programming in C++.

Technical Skills

- Programming Language: C/C++, Python.
- Web Technology: HTML, JavaScript, D3.js.
- Graphics Programming: OpenGL, GLSL.
- ML tools: Keras, Tensorflow, PyTorch, SciKit-learn.

Reference

Dr. Han-Wei Shen(shen.94@osu.edu)