Ayan Biswas

email: ayanju04@gmail.com   phone: 614-440-6367   Location: Los Alamos, NM

Status: Permanent Resident of USA (Green Card holder)

Skill Set:

Programming Languages	Python, C, C++, Julia, Java (& J2ME)
Parallel Programming	MPI, OpenMP, Thrust, CUDA

Expertise: 1) in situ streaming data analysis/reduction, 2) Machine Learning for big data, 3) uncertainty quantification/visualization, 4) distributed parallel large-scale data analytics, 5) explainability for AI/ML

Education

2010-2016	Ph.D. and M.S., Computer Graphics and Data Visualization, The Ohio State University, Columbus, OH, GPA: 3.94 Thesis: "Uncertainty and Error Analysis in the Visualization of Multidimensional and Ensemble Data Sets"
2003-2007	B.E., Computer Sc. and Engg., Jadavpur University, Kolkata, India, GPA: 8.88

Employment

2021-current	Staff Scientist 3, Los Alamos National Lab, Los Alamos, NM (**Role:** mentor, developer, project leader, budget management, hiring)
2018-2021	Staff Scientist 2, Los Alamos National Lab, Los Alamos, NM (**Role:** developer, mentor, project leader, budget management)
2017-2018	Postdoctoral Researcher, Los Alamos National Lab, Los Alamos, NM (**Role:** developer, code maintenance, deployment and release, publication)
2011-2016	Graduate Research Assistant, The Ohio State University, Columbus, OH (**Role:** developer, code maintenance, deployment and release, publication)
2012-2015(summer)	Graduate Research Intern, Los Alamos National Lab, Los Alamos, NM (**Role:** developer, publication)
2010-2011	Graduate Teaching Assistant, The Ohio State University, Columbus, OH (**Role:** grading, office hours, proctoring examinations)
2007-2010	Software Engineer, STEricsson/STMicroelectronics, Greater Noida, India (**Role:** develop video codecs, code maintenance and delivery, testing)

Project Leadership/Parternship

(2019-2022) **Co-PI** of LANL sponsored LDRD-DR project "In-Situ Inference", **$5M over 3 years**
(2023-2024) **Co-I** of LANL sponsored LDRD project "High-Performance Artificial Intelligence", **$1M**

Research Projects

1. **Fighting Fire with Fire: Enabling a Proactive Approach to Wildland Fire (2022-2025)**: create predictive machine learning models for in-depth analysis and visualization of ensemble wildfire data, and create explainable models for such large-scale ensembles.
2. **In-Situ Inference: Bringing Advanced Data Science Into Exascale Simulations (2019-2022):** create in situ Machine Learning algorithms for modeling extreme events and perform sophisticated statistical inference, use neural networks for Gaussian Process parameter estimation, unsupervised clustering for feature tracking/identification, couple Julia runtime with Fortran simulation codes, develop new streaming and parallel distributed inference techniques, scalability analysis and handle very large-scale simulation datasets, deliver to open-source repo PRISM .

3. **ECP ALPINE: Algorithms and Infrastructure for In Situ Visualization and Analysis (2018-2023):** under Exascale computing project, develop automatic feature-based sampling method for compression of extreme-scale spatio-temporal datasets, contribute HistSampling filter to VTK-m/VTK-h code base, use Summit for scaling and testing
4. **Real-time Adaptive Acceleration of Dynamic Experimental Science (2017-2019):** automation of LabVIEW-based tools via machine learning and feature detection algorithms, acceleration of existing ML regression code on GPU and multi-core CPU for faster computation, UQ for high dimensional data and PCA-based reduction, developed interactive open-source tools for data exploration, sensitivity study for determining input parameter saliency.
5. **Extreme-Scale Distribution Based Data Analysis (2015-2016):** worked with domain experts from climatology to explore an ensemble time-varying multi-resolution data, performed sensitivity study, created interactive data visualization tools for comparative analysis, developed algorithms for scalable streamline generation, used supercomputers to test the performance
6. **Interactive Multi-Scale Machine Learning (2013-2015):** used viz tool for gathering expert labels for different flow fields, used machine learning algorithms to check for the accuracy of the prediction, formulate the vortex detection as an uncertain feature detection problem, used information theory and physics-based methods for fuzzy analysis and classification.

Conference Organizing Committee
1. Member of International Program Committee (IPC) for IEEE Vis 2018-2021 (Scivis Short Papers), ISVC 2018-current, HPC Asia 2021.
2. "Video Previews and Fast-Forward" Chair for IEEE Vis 2018-19, "Meetups" chair IEEE Vis 2020-2022, "Vis in Practice" chair IEEE Vis 2023.

Awards and Recognitions
1. Received "Best Paper" awards in ISAV 2018 and ISAV 2021
2. Awarded "Excellent Employee Contributor" for quality and timeliness of software delivery in STEricsson (2010) for the memory management module of the software release.

Selected Publications
D Banesh, N Panda, **Ayan Biswas**, et al. "Fast GP Estimation for In-situ Inference using Convolutional Neural Networks". The 6th IEEE International Workshop on Big Spatial Data. IEEE Big Data, 2021.

S Hazarika, L Tang, S Morley, V Jordanova, **Ayan Biswas**, et al., "Unsupervised Clustering and In-situ Feature Tracking in Magnetospheric Simulation", 2nd Eddy Cross Disciplinary Symposium, 2021

S Dutta, N Klein, L Tang, J Wolfe, L Van Roekel, **Ayan Biswas**, et al., "In Situ Climate Modeling for Analyzing Extreme Weather Events", ISAV 2021, co-located with SC 2021 **(**Best Paper**)**

M Grosskopf, E Lawrence, K Rumsey, **Ayan Biswas**, N Urban, "Estimating a Spatial Inference Model to a Climate Simulation In-Situ with Sparse Gaussian Processes", ISAV 2021.

Ayan Biswas, S Dutta, E Lawrence, J Patchett, J Calhoun, J Ahrens, "Probabilistic data-driven sampling via multi-criteria importance analysis", IEEE Vis 2021, also on IEEE TVCG journal, 2020.

Ayan Biswas, Soumya Dutta, Jesus Pulido, and James Ahrens. "In Situ Data-Driven Adaptive Sampling for Large-scale Simulation Data Summarization". ISAV 2018, co-located with Supercomputing 2018.

M Larsen, A Woods, N Marsaglia, **Ayan Biswas**, S Dutta, C Harrison, and H Childs. "A Flexible System for In Situ Triggers". ISAV 2018, co-located with Supercomputing 2018. **(**Best Paper**)**