Ayan Biswas

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614-886-8855   Los Alamos, NM, 87544

Skill Set

Programming Languages	C, C++, Python, Java (& J2ME)
OS	WindowsCE, Linux(Android)
Parallel Programming	MPI, OpenMP, Thrust, CUDA

Educational Background

Ph.D.   Computer Graphics and Data Visualization, 2016
            The Ohio State University, Columbus, OH, USA
            GPA: 3.94
            Thesis: "Uncertainty and Error Analysis in the Visualization of Multidimensional
                    and Ensemble Data Sets"
            Advisor: Dr. Han-Wei Shen

M.S.   Computer Graphics and Data Visualization, 2015
            The Ohio State University, Columbus, OH, USA
            GPA: 3.94
            Advisor: Dr. Han-Wei Shen

B.E.   Computer Science and Engineering, 2007
            Jadavpur University, Kolkata, West Bengal, India
            GPA: 8.85

Employment Experience

2018-current   Staff Scientist II
                Los Alamos National Laboratory, Los Alamos, NM, USA

                - work on in situ algorithms for exascale ALPINE project to reduce very large
                data using sophisticated sampling methods using vtk-m
                - work in situ material science experiments for run time analysis and
                visualization of complex shock physics data

2017-2018   Postdoctoral Researcher
                Los Alamos National Laboratory, Los Alamos, NM, USA

                - worked closely with material science and statistics experts to expedite and
                automate their workflow as one of the key milestones of the LDRD project

- analyzed the shock physics ensemble data via feature extraction, PCA-based data analysis, sensitivity analysis
- created python-based interactive exploration tool for exploring high-dimensional input-output datasets
- used GPU/CUDA programming to accelerating the existing emulator code and worked on making the code open source release

2011-2016   Graduate Research Assistant
The Ohio State University, Columbus, OH, USA

- worked closely with aero-space and climatology experts to analyze their domain specific problems and provide data analysis and visualization solutions
- worked extensively on the Computational Fluid Dynamics (CFD) simulation outputs and provided solutions to streamline, stream surface and vortex detection problems
- contributed the vortex detection packages and stream surface generation modules to the open source OSUFlow library
- written papers, attended conferences and provided regular presentations for the concerned projects to meet the project goals and deadlines

2012-2015   Graduate Research Intern
(May-Aug)   Los Alamos National Laboratory, Los Alamos, NM, USA

- worked on projects focusing on parallel streamline generation, R/Python based variable selection tool, Hadoop framework, multivariate relationship for the Parallel Ocean Program data sets, and creating python scripts for Paraview for vector field visualization in multi-processor environment

2010-2011   Graduate Teaching Assistant
The Ohio State University, Columbus, OH, USA

- was grader and lab assistant for the undergraduate/graduate courses for three quarters

2007-2010   Software Engineer
STEricsson(Previously STMicroelectronics), Greater Noida, UP, India

- completed projects in Android and Windows operating systems for mobile devices on different device drivers.
- written and tested video drivers ensuring quality and timely delivery of the product.
- developed and thoroughly tested the memory management module for android product delivery

Research Experience

Project: "ECP ALPINE: Algorithms and Infrastructure for In Situ Visualization and Analysis"

Dates: 2018-current

Supervisor: Dr. James Ahrens

Goals: Delivering exascale-ready in situ data analysis and visualization capabilities to the Exascale Computing Project (ECP) by leveraging and creating new methodologies and systems for the domain scientists with complex simulations

Activities: Generate algorithms for intelligently sampling very large and complex simulation datasets, provide sampling capabilities for time-varying scalar, vector and multivariate datasets, use VTK-m capabilities to detect salient data resolution, important variables, key time-steps as well as use existing importance-based sampling schemes, create and use distributions of the large datasets for statistical analysis and inference.

Project: "Real-time Adaptive Acceleration of Dynamic Experimental Science"

Dates: 2017-current

Supervisor: Dr. James Ahrens

Goals: enable scientists to achieve faster and higher quality scientific results compared to the existing process. The application was primarily directed towards the material science and shock physics applications.

Activities: automation of LabVIEW-based tools via machine learning and feature detection algorithms, acceleration of existing softwares on GPU and multi-core CPU for faster computation, principal component analysis (PCA)-based tools for exploring high dimensional data, using emulators to analyze the uncertainty of the high dimensional input-output space, developing interactive open-source tools for data exploration via brusing and linking, apply feature extraction and sensitivity study for determining input parameter saliency, writing papers and presenting posters.

Project: "Extreme-Scale Distribution Based Data Analysis"

Dates: 2015-2016

Supervisor: Dr. Han-Wei Shen

Goals: enable scientists to achieve fast and reliable data analysis and visualization products when the data is high-dimensional and/or the size is large.

Activities: work with the domain experts from climatology to understand the requirements from an ensemble time-varying multi-resolution data, understand the simulation input parameters via thorough sensitivity study across resolutions and time-steps, use statistical tools to compare the simulations with the observed data, create interactive data visualization tools, develop algorithms for scalable streamline generation, use supercomputers to test the performance, writing papers

Project: "Interactive Multi-Scale Machine Learning"

Dates: 2013-2015

Supervisor: Dr. Han-Wei Shen

<u>Goals</u>:	enable scientists identify regions of interest for large data sets and enhance the robustness of feature detection algorithms. The application was primarily directed towards the detection of the vortex structures for aero-space engineering applications.
<u>Activities</u>:	employ tools 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, use information theory and physics-based methods for fuzzy analysis and classification of the different flow regions, compare with existing solutions and verify the results, write paper

<u>Project</u>:	"Information Theoretic Analysis of Multivariate and Multi-dimensional Datasets"
<u>Dates</u>:	2011-2013
<u>Supervisor</u>:	Dr. Han-Wei Shen
<u>Goals</u>:	enable the exploration of multivariate and vector fields via the use of information theory and creation of useful data analysis products for relationship exploration.
<u>Activities</u>:	employ information theoretic methods for exploration of complex multivariate datasets, use specific information techniques to quantify and explore the saliency of the isosurfaces based on multivariate relationships, create a tool for interactive exploration of the datasets, use point-wise mutual information for understanding and extracting interesting scalars, write papers

<u>Project</u>:	"An SMS Based Application for Agricultural Consultancy"
<u>Dates</u>:	2005-2007
<u>Supervisor</u>:	Dr. P.K.Das
<u>Goals</u>:	provide a real life solution to query for price of crops at the local/remote market using the mobile devices through the support of local language. This application was primarily aimed at helping the farmers such that they could get rid of the middlemen and directly sell their product to the market of their choice.
<u>Activities</u>:	this project required development of middleware for language parsing and creating a valid query string, have access to database for run time query of the current market prices, code J2ME-based programming on a Java enabled mobile phone, present live demos to other universities and collaborators

Teaching Experience

Fall 2010	CSE 616 - Software Requirements Analysis Teaching Assistant The Ohio State University, CSE Department undergraduate level Role: Grader and Lab Instructor, hold weekly office hours

Fall 2010	CSE 581 - Interactive Computer Graphics Teaching Assistant The Ohio State University, CSE Department

undergraduate/graduate level
Role: Grader and Lab Instructor, hold weekly office hours

Winter 2011   CSE 200 - Computer Assisted Problem Solving for Business
Teaching Assistant
The Ohio State University, CSE Department
undergraduate level
Role: Grader and Lab Instructor, hold weekly office hours

Spring 2011   CSE 200 - Computer Assisted Problem Solving for Business
Teaching Assistant
The Ohio State University, CSE Department
undergraduate level
Role: Grader and Lab Instructor, hold weekly office hours

Publication Information

Journal Publications:

1. Subhashis Hazarika, Ayan Biswas, Han-Wei Shen,
   "Uncertainty Visualization Using Copula-Based Analysis in Mixed Distribution Model",
   IEEE Vis 2017, Phoenix, Arizona, USA, also on IEEE Transactions on Visualization and
   Computer Graphics 2017, Volume PP, Pages N/A (IEEE early access article). (impact factor
   2.84)
   DOI: 10.1109/TVCG.2017.2744099
   (google scholar citations: N/A)

2. Ayan Biswas, Guang Lin, Xiaotong Liu, and Han-Wei Shen,
   "Visualization of Time-Varying Weather Ensembles Across Multiple Resolutions",
   IEEE Vis 2016, Baltimore, Maryland, USA, also on IEEE Transactions on Visualization and
   Computer Graphics 2017, Volume 23, Pages 841-850. (impact factor 2.84)
   DOI: 10.1109/TVCG.2016.2598869
   (google scholar citations: 6)

3. Tzu-Hsuan Wei, Chun-Ming Chen and Ayan Biswas,
   "Efficient Local Histogram Searching via Bitmap Indexing"
   EuroVis 2015, Cagliari, Italy, also on Computer Graphics Forum, Volume 34 Issue 3, June
   2015, Pages 81-90. (impact factor 1.61)
   DOI: 10.1111/cgf.12620
   (google scholar citations: 5)

4. Ayan Biswas, Soumya Dutta, Han-Wei Shen, and Jonathan Woodring,
   "An Information-aware framework for Exploring Multivariate Datasets",
   IEEE Vis 2013, Atlanta, Georgia, USA, also on IEEE Transactions on Visualization and
   Computer Graphics 2013, Volume 19, Pages 2683-2692. (impact factor 2.84)

DOI: 10.1109/TVCG.2013.133
(google scholar citations: 40)

Conference Publications:

1. Soumya Dutta, Xiaotong Liu, Ayan Biswas, Jen-Ping Chen and Han-Wei Shen,
   "Pointwise Information Guided Visual Analysis of Time-varying Multi-fields",
   Siggraph Asia Symposium on Visualization 2017, Bangkok Thailand.
   (google scholar citations: 0)

2. Ayan Biswas, Richard Strelitz, Jonathan Woodring, Chun-Ming Chen, and Han-Wei Shen,
   "A Scalable Streamline Generation Algorithm Via Flux-Based Isocontour Extraction",
   Proceedings of the 16th Eurographics Symposium on Parallel Graphics and Visualization
   (EGPGV 2016), Pages 69-78, Groningen, Netherlands.
   DOI: 10.2312/pgv.20161183
   (google scholar citations: 0)

3. Ayan Biswas, David Thompson, Wenbin He, Qi Deng, Chun-Ming Chen, Han-Wei Shen,
   Raghu Machiraju, and Anand Rangarajan,
   "An Uncertainty-Driven Approach to Vortex Analysis Using Oracle Consensus and Spatial
   Proximity",
   8th IEEE Pacific Visualization Symposium (PacificVis 2015), Hangzhou, China.
   DOI: 10.1109/PACIFICVIS.2015.7156381
   (google scholar citations: 11)

4. Chun-Ming Chen, Ayan Biswas and Han-Wei Shen,
   "Uncertainty Modeling and Error Reduction for Pathline Computation in Time-varying Flow
   Fields",
   8th IEEE Pacific Visualization Symposium (PacificVis 2015), Hangzhou, China.
   DOI: 10.1109/PACIFICVIS.2015.7156380
   (google scholar citations:10)

5. Ayan Biswas and Han-Wei Shen,
   "Evaluation of Stream Surfaces Using Error Quantification Metrics",
   SPIE 9017, Visualization and Data Analysis 2014, San Francisco, California.
   DOI: 10.1117/12.2036465
   (google scholar citations: 0)

6. Yu Su, Gagan Agarwal, Jonathan Woodring, Ayan Biswas, and Han-Wei Shen,
   "Supporting Correlation Analysis on Scientific Datasets in Parallel and Distributed Settings",
   Proceedings of the 23rd international symposium on High-performance parallel and
   distributed
   computing (HPDC 2014), Pages 191-202, Vancouver, BC, Canada.
   DOI: 10.1145/2600212.2600230
   (google scholar citations: 13)

Conference Organizing Committee

- Nominated as the "Video/Fast Forwards Chair" for the SciVis sessions for IEEE Vis conference 2018, to be held in Berlin, Germany.
- International Program Committee (IPC) member of SciVis short papers for IEEE Vis Conference 2018, to be held in Berlin, Germany
- International Program Committee (IPC) member of the 13th International Symposium on Visual Computing (ISVC'18), to be held in Las Vegas, USA

Awards and Recognitions

- Awarded "Excellent Employee Contributor" for quality and timeliness of software delivery in STEricsson (2010). Our group of 8 co-workers were awarded and I was in charge of the memory management module of the software release.
- Ranked 84 in West Bengal Joint Entrance Examination (WBJEE) (2003)

Other Leadership Activities

- Vice-president of Los Alamos Postdoc Association(LAPA), Los Alamos (2017)
- First president and co-founder of the cultural group "Buckeye Bengalis" (officially recognized and supported by The Ohio State University), Columbus, (2016)

References

1. Dr. James Ahrens, Los Alamos National Laboratory (Postdoc Supervisor)
   Email: ahrens@lanl.gov, Phone: +1 (505)-667-5797

2. Dr. Han-Wei Shen, The Ohio State University (Ph.D. Advisor)
   Email: shen.94@osu.edu, Phone: +1 (614)-292-0060

3. Dr. Earl Lawrence, Los Alamos National Laboratory
   Email: earl@lanl.gov, Phone: +1 (505)-695-8702

4. Dr. David Thompson, Mississippi State University
   Email: dst@ae.msstate.edu, Phone: +1 (662)-325-2068

5. Dr. John Patchett, Los Alamos National Laboratory
   Email: patchett@lanl.gov, Phone +1 (505)-665-1110