ANIRBAN ROYCHOWDHURY

Department of Computer Science and Engineering
The Ohio State University
395 Dreese Laboratories
2015 Neil Avenue
Columbus, OH 43210-1277

(614) 805-2558
roychowdhury.7@osu.edu

INTERESTS

Statistical machine learning techniques (Bayesian nonparametrics, Hamiltonian Monte Carlo samplers, variational inference), manifold optimization, and deep learning, applied to exciting large-scale data analysis problems.

EDUCATION

Ph.D., Computer Science and Engineering — August 2012 - 2017 (expected)
• **Ohio State University**, Columbus, OH
Major GPA: 4.0/4.0

M.S., Computer Science and Engineering — December 2016
• **Ohio State University**, Columbus, OH
GPA: 3.95/4.0

B.E., Computer Science and Engineering — July 2006 - April 2010
• **Jadavpur University**, Kolkata, India
GPA: 9.33/10 (absolute), First Class (Honors), ranked 1st among 65 students

INTERNSHIPS

Google — Kirkland, WA, USA
• Software Engineering Intern — May 2016 - August 2016
• *Ads & Commerce*

- Wrote multi-head deep neural nets along with data extraction and post-processing stages for classification of large scale data.
- C++ (pre/post processing), Tensorflow, TF-Learn, and TF-Serving.
- Mentors, collaborators: Li He, Arthur Asuncion, Alex Chen, Zakaria Haque.

Adobe Research — San Jose, CA, USA
• Data Scientist Intern — May 2015 - August 2015
• *Big Data Experience (Systems Technology) Lab, Imagination Lab*

- Used deep learning techniques along with multitask learning and stochastic subsampling for classification of highly imbalanced data.
- Implemented using Python wrappers and Caffe modifications.
- Mentors, collaborators: Hung Bui, Trung Bui, Hailin Jin.

PUBLICATIONS

In Submission
• **A. Roychowdhury**, S. Parthasarathy, *Accelerated Stochastic Quasi-Newton Optimization on Riemann Manifolds*.
In Preparation
• A. Roychowdhury, *Adaptive Stochastic Monte Carlo with Manifold Optimization*.

Peer Reviewed Conference
• **A. Roychowdhury**, B. Kulis, S. Parthasarathy, *Robust Monte Carlo Sampling using Riemannian Nosé-Poincaré Hamiltonian Dynamics*. In *International Conference on Machine Learning (ICML), 2016*.
[Oral. Acceptance rate 24.3%]

• **A. Roychowdhury**, B. Kulis, *Gamma Processes, Stick-Breaking, and Variational Inference.* In *Artificial Intelligence and Statistics (AISTATS), 2015.*
[Acceptance rate 26.7%]

• **A. Roychowdhury**, K. Jiang, B. Kulis, *Small-Variance Asymptotics for Hidden Markov Models.* In *Adv. Neural Information Processing Systems (NIPS), 2013.*
[Spotlight. Acceptance rate $< 5\%$]

Workshop Papers
• **A. Roychowdhury**, B. Kulis, *Gamma Processes, Stick-Breaking, and Variational Inference.* In *Workshop on Advances in Variational Inference* at NIPS, 2014.
[Spotlight.]

PATENTS

• Digital Content Interaction Prediction and Training that Addresses Imbalanced Classes. (Filed 1/2016)
  – with Hung Bui, Trung Bui, Hailin Jin.

• Content Presentation Based on a Multi-Task Neural Network. (Filed 3/2016)
  – with Hung Bui, Trung Bui, Hailin Jin, John Kucera.

SELECTED HONORS AND AWARDS

• Invited to Facebook PhD ML Summit (Seattle, 2017).
• Invited to Amazon Graduate Research Symposium (Seattle, 2014, 2017).
• Travel Awards: NIPS 2013, NIPS 2014 (AVI workshop), ICML 2016.
• Upsilon Pi Epsilon (UPE) nomination.
• University Fellowship, 2012-2013, The Ohio State University.
• University Medal, Jadavpur University, 2010.
• Best Student award (gold medal), Tata Consultancy Services, 2010.
• M.R. Mitra Memorial Award (gold medal), JU Alumni Association, 2009.

SERVICE

• Program Committee: CIKM (2017), WWW (2017), AISTATS (2016, 2017), NIPS Advances in Approximate Bayesian Inference Workshop (2015, 2016).
• Reviewer: ICML (2016, 2017), NIPS (2017).

ACADEMIC RESEARCH EXPERIENCE

Computer Science and Engineering, The Ohio State University
• *Graduate Research Associate* August 2013 - present
  – Researching quasi-Newton optimization algorithms on Riemann manifolds, as a way to accelerate constrained (in Euclidean space) optimization problems. Further applications may include learning the mass matrices in Hamiltonian Monte Carlo-based stochastic samplers adaptively, as a cleaner alternative to state-of-the-art Riemannian approaches.
  – Researching novel stochastic Markov chain Monte Carlo and variational inference techniques for parameter estimation in Bayesian nonparametric models. Using Riemannian manifold corrections and other structural cues to better fit the sampling techniques to the underlying parameter space. Work published in ICML 2016 proceedings.
  – Researching novel constructions of Bayesian nonparametric models and deriving efficient inference algorithms for application on large-scale data. Derived new recursive construction of Gamma process and novel variational inference algorithm. Short version presented at NIPS 2014 Workshop on Advances in Variational Inference. Full version published in AISTATS 2015 proceedings.
  – Using small-variance asymptotics to derive fast inference algorithms for convolutional restricted Boltzmann machines and deep belief networks. Preliminary

results presented at Amazon Graduate Research Symposium 2014 in Seattle.

The Ohio State University

• *University Fellow* August 2012 - July 2013
  – Used small-variance asymptotics to derive fast and accurate inference algorithms for hidden Markov models, both finite and infinite. Work published in NIPS 2013 proceedings.

Machine Intelligence Unit, Indian Statistical Institute Kolkata, India

• *Summer research intern* June 2009 - October 2009

SELECTED TALKS

• Robust Monte Carlo Sampling using Riemannian Nosé-Poincaré Hamiltonian Dynamics
  – International Conference on Machine Learning (ICML), 2016, New York (NY)

• Gamma Processes, Stick-Breaking, and Variational Inference
  – Workshop on Advances in Variational Inference, NIPS 2014, Montreal

• Small-Variance Asymptotics for HMMs and c-RBMs
  – (Invited poster) Amazon Graduate Research Symposium 2014, Seattle
  – (Guest lecture) CSE 5522 Fall 2014, Ohio State University

• Small-Variance Asymptotics for Hidden Markov Models
  – Neural Information Processing Systems (NIPS) 2013, Lake Tahoe
  – AI Seminar, Ohio State University

GRADUATE COURSEWORK

Random Graph Theory and Combinatorics, Machine Learning, Advanced Data Mining Seminar, Stochastic Processes, Computability and Complexity, Advanced Artificial Intelligence, Probability (measure-theoretic), Statistical Theory II, Programming Languages, Algorithms, Probabilistic Graphical Models, Mathematical Statistics, Advanced Operating Systems.

WORK EXPERIENCE

Adobe Systems Incorporated Noida, India

• *Senior Member of Technical Staff* (Software Developer 2) Jan. 2012 - July 2012
• *Member of Technical Staff* (Software Developer) May 2010 - Dec. 2011

TECHNICAL SKILLS

• Experienced in C, C++, Java, Python, Bash scripting, Latex, Matlab, SQL.
• Familiar with JavaScript, ActionScript, Flex.
• Experienced in Numpy, Scipy, Scikit-learn, matplotlib etc.
• Familiar with LibSVM, LibLinear.
• Experienced in Vim, Eclipse, KDevelop, Netbeans, MS Visual Studio.
• Operating Systems : Linux (openSUSE/KDE, Ubuntu), OSX, Windows.