Parameswaran Raman **params@ucsc.edu,** http://people.ucsc.edu/~praman1

Background

My main research interests lie in optimization methods for large-scale machine learning, bayesian inference, ranking/recommender systems, bayesian deep learning. I have experience building parallel optimization/inference algorithms in distributed memory settings for a variety of ML models.

Education

PhD - Computer Science, UC Santa Cruz **Aug 2013 - present**
Thesis Advisor: S.V.N Vishwanathan
(Transferred from **Purdue University (2013 - 2014)**)

Masters - Computer Science, Georgia Institute of Technology **Aug 2009 - May 2011**

MSc (Integrated) - Software Engineering, PSG College of Technology, India **2003 - 2008**

Research Experience

Graduate Student Researcher - *UC Santa Cruz* **Aug 2014 - present**

- Working on building distributed stochastic optimization algorithms to scale Factorization Machines to large data and latent variables.
- Extreme Stochastic Variational Inference: Distributed Inference for Large-Scale Mixture Models (**Accepted for AISTATS 2019**).
- Scaling Multinomial Logistic Regression via Hybrid-Parallelism **(Accepted for KDD 2019)**.

Graduate Student Researcher - *Purdue University* **Aug 2013 - May 2014**

- Proposed a new Learning to Rank algorithm (RoBiRank) inspired by Robust Binary Classification, which directly bounds NDCG. Extended it to the Latent Collaborative Retrieval setting and developed scalable stochastic optimization method to scale to large datasets. RoBiRank was deployed and tested at LinkedIn (internship) on part of the live traffic. Online evaluation results were promising (**Accepted for NIPS 2014**).

Applied Scientist Intern - *Amazon AI (Palo Alto)* **Summer 2017**
(Mentors: Anima Anandkumar, Zack Lipton)
Worked on video recommendation using Deep Neural Networks based temporal models. Part of the work involved exploring use of the new MXNet Gluon framework to build the recommender system.

Research Intern - *Adobe Research (STL)* **Summer 2016**
(Mentors: Hung Bui, Branislav Kveton)
Worked on clustering user-behavior in Adobe analytics data using user url click information.

Research Intern - *Microsoft (Cloud and Information Services Lab)* **Summer 2015**
(Mentors: Sathiya Keerthi Selvaraj, Dhruv Mahajan)
Worked on the problem of extrapolating learning curves in machine learning. The goal was to study if it was feasible to use information from the models learnt on various sizes of small bites of data to extrapolate performance of the algorithm on the full data.

Research Intern - *Search Relevance (SNA), LinkedIn* **Summer 2014**
(Mentors: Viet Ha-Thuc, Shakti Sinha)
Worked on resolving issues of sample bias and position bias present in learning to rank systems with implicit feedback. Explored a variety of approaches, and ran offline and online experiments on LinkedIn Job Search portal to verify the effectiveness of the models.

Graduate Student Researcher - *ITAP, Purdue University* **Aug 2013 - Aug 2014**
Applied machine learning on educational mobile & web apps data to infer relevance of user posts to the lecture topics. Results helped improve student engagement in classrooms (**Accepted for EDM 2014**).

Independent Research - *Info Lab, Stanford University* **Summer 2012**
Explored the scope of using learning methods in crowd-sourcing systems, to improve label complexity and quality of judgements among workers. In addition, experimentally analyzed the effects of using various

interfaces for categorization of items in a taxonomy, simultaneously trying to model their error rates.

Graduate Student Researcher - *Sonification Lab, Georgia Tech* **Aug 2009 - May 2011**
Prototyped tools to demonstrate key ideas that came up in two projects Auditory Menus and In-Vehicle Assistive Technology (IVAT). Used machine learning for driver mood detection & providing alerts (**Work was presented in several demos and accepted for proceedings in ICAD 2010, CSUN 2010, AutomotiveUI 2011, ASSETS 2011)**.

Graduate Student Researcher - *Dept of Maths & Computer Applications, PSG Tech* **2007 - 2008**
Worked with Dr Nadarajan and Dr Maytham Safar to develop effective cache replacement policies for Location-Dependent Data in mobile environments and implement tools for evaluating them (**Accepted for DCCA Jordan 2007 and PETRA 2008)**.

Industry Experience

Software Engineer - *Yahoo!, Sunnyvale* **Jul 2011 - Jul 2013**

- Worked for the Personalization group, on an entity detection/resolution system used by all personalization services. Used machine learning and NLP to detect word/phrase boundaries and rank extracted entities. Built a Knowledge Graph from scratch to power Yahoo! search products.
- Worked on the Web of Objects project, to create a semantic knowledge base of entities to enable personalization. Designed features for Entity Matching models and wrote tools to evaluate them.
- Worked on Apache Oozie (a widely used job scheduler for Hadoop), implementing several features and fixing bugs in the system.

Software Engineering Intern - *Intel, Chandler* **Summer 2010**
Developed a searching & indexing infrastructure to help silicon engineers find relevant product design information. Gathered requirements, developed & tested the system, and deployed in production.

Application Developer - *ThoughtWorks, Bangalore* **Jun 2008 - Jul 2009**
Designed and implemented web-services for the train ticket retailing system - thetrainline.com. Worked in a fully agile setup following iterative test-driven software development.

Publications & Posters

- Parameswaran Raman, Sriram Srinivasan, Shin Matsushima, Xinhua Zhang, Hyokun Yun, S.V.N Vishwanathan. "**Scaling Multinomial Logistic Regression via Hybrid-Parallelism**," *KDD* 2019.
- Parameswaran Raman, Jiong Zhang, Hsiang-Fu Yu, Shihao Ji, S.V.N Vishwanathan. "**Extreme Stochastic Variational Inference: Distributed and Asynchronous** ," *AISTATS* 2019.
- Hyokun Yun, Parameswaran Raman, S.V.N. Vishwanathan. "**Ranking via Robust Binary Classification and Parallel Parameter Estimation in Large-Scale Data**," *NIPS*. 2014.
- Mariheida Córdova Sánchez, Parameswaran Raman, Luo Si, Jason Fish. "**Relevancy Prediction of Micro-blog Questions in an Educational Setting**," in *Proceedings of the 7th International Conference on Educational Data Mining, EDM*. 2014.
- Myounghoon "Philart" Jeon, Parameswaran Raman, Jung-Bin Yim, J B, Bruce N. Walker. "**Participatory Design Process for an In-Vehicle Affect Detection and Regulation System for Various Drivers** ," in *Proceedings of the 13th International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS)*. 2011.
- Myounghoon "Philart" Jeon, Jonathan Schuett, Jung-Bin Yim, Parameswaran Raman, Bruce N. Walker. "**ENGIN (Exploring Next Generation IN-vehicle INterfaces): Drawing a New Conceptual Framework through Iterative Participatory Processes**," in *Proceedings of the 3rd International Conference on Automotive User Interfaces and Interactive Vehicular Applications (AutomotiveUI)*. 2011.
- Myounghoon "Philart" Jeon, Benjamin Davison, Jeff Wilson, Parameswaran Raman, Bruce N. Walker. "**Advanced Auditory Menus for Universal Access to Electronic Devices**," in *Proceedings of*

CSUN International Technology & Persons with Disabilities Conference. 2010.

- Parameswaran Raman, Benjamin Davison, Myounghoon "Philart" Jeon, Bruce N. Walker. "**Reducing repetitive development tasks in auditory menu displays with the auditory menu library**," in *Proceedings of the 16th International Conference on Auditory Display (ICAD)*. 2010.

- Parameswaran Raman, Narayanan Ramakrishnan, Manohar Ganesan, Gourab Kar, Dr Gregory D. Abowd. "**PiX-C: Express and Communicate (Augmenting Communication with Visual Input for Children in the Autism Spectrum)**," in *Poster presented at ACM Symposium on User Interface Software and Technology (UIST)*. 2010.

- Mary Magdalene Jane, Parameswaran Raman, Maytham Safar, Nadarajan R. "**PINE-guided cache replacement policy for location-dependent data in mobile environment**," in *Proceedings of the First international conference on Pervasive Technologies Related to Assistive Environments, PETRA*. 2008.

- Parameswaran Raman, Raghavendra Prasad, Nadarajan R, Mary Magdalene Jane. "**Weighted Angular Distance Based Cache Replacement Strategy for Location-Dependent Data in Wireless Environment**," in *Proceedings of the DCCA Conference, Jordan*. 2007.

Community Activities

- Reviewer for UAI 2014, AISTATS 2015, COLT 2015, JMLR 2015, TPAMI 2015, AISTATS 2016, ICML 2016, NIPS 2018, ICML 2019, NIPS 2019
- Reviewed a book chapter for *"Mathematics for Machine Learning", Marc Peter Deisenroth, A Aldo Faisal, and Cheng Soon Ong*, Cambridge University Press, 2018
- Developed and taught undergrad bootcamp on Unix & Shell commands at UC Santa Cruz, Fall 2015
- Teaching Assistant for CMPS 242 - Grad Level Machine Learning course at UC Santa Cruz (Instructor: S.V.N. Vishwanathan)

Honors & Awards

- Graduate Research Assistantship, UC Santa Cruz
- Graduate Research Assistantship, Georgia Tech
- Winner of Facebook Hackathon 2010 at Georgia Tech & finalist at FB HQ
- Finalist for the poster presentation at UIST Student Innovation Contest 2010

Computer Skills

- *Programming Languages*: C++, Java, Python, Matlab, Lisp
- *Deep Learning frameworks*: PyTorch, MXNet
- *Parallel Programming*: MPI, Open MP, Intel TBB
- *Scientific Computing / Numerical Lin Algebra*: PETSc/TAO, EIGEN
- *Distributed ML frameworks*: Hadoop, Apache Spark
- Unix