Raaz Dwivedi

2028 Dwight Way, 4C
Berkeley, California, USA - 94704

Phone: +1 5108331977
email: *dwivediraaz@gmail.com*

EDUCATION

University of California, Berkeley
Ph. D., Department of Electrical Engineering and Computer Science — Aug 2015- Present
Cumulative Grade Point Average of 4.0/4.0

Indian Institute of Technology - Bombay, Mumbai, India
B.Tech. (Hons.), Department of Electrical Engineering — Jul 2010- May 2014
Core Cumulative Point Index (CPI) of 9.95/10
Honors in Electrical Engineering with CPI 10/10
Minors in Mathematics with CPI 10/10
President of India Gold Medal for being the most outstanding student in the institute
Institute Silver Medal for being the most outstanding student in the department
Best B. Tech. Project Award for the best undergraduate thesis in the department

Sagar Public School, Bhopal, Madhya Pradesh — Apr 2010
Class 12^{th}, CBSE, 95.6%

PUBLICATIONS

"Anomalous charge storage exponents of organic bulk heterojunction solar cells", P. R. Nair, R. Dwivedi, and G. Kumar, American Physical Society, March meeting, 2013

"Removing Sampling Bias in Networked Stochastic Approximation", V. S. Borkar and R. Dwivedi, International Conference on Signal Processing and Communication, 2014

"Gaussian Approximations in High Dimensional Estimation", V. S. Borkar, R. Dwivedi and N. Sahasrabudhe, IEEE Journal of Selected Topics in Signal Processing, 2014 (submitted)

WORK EXPERIENCE

Senior Quantitative Researcher — Jul 2014 – Jul 2015
WorldQuant Research, India

Responsible for researching financial and mathematical literature and analyzing various datasets to seek out sources of inefficiencies, convert them to predictive profitable model *alpha*
Objective is to identify and construct signals, make robust models from them with high Sharpe ratios and significant abnormal returns
Concentrated mainly on seeking low turnover quality *alphas* for trading in the equity market which are used in developing algorithmic daily re-balancing long-short trading strategies on US, Europe, Japan and other markets

RESEARCH EXPERIENCE

Undergraduate Thesis, IIT Bombay — Jan 2014- Apr 2014
Random Projections and Ensemble Kalman Filter — Prof. Vivek S. Borkar
Reviewed ensemble Kalman filter (EnKF) and some advances in the understanding of probability measures with geometric characteristics on Euclidean Spaces

Provided a theoretical justification behind the surprising success of estimation techniques using EnKF which assume validity of Gaussian approximations for estimation purposes, by employing some of the recent results related to random projections on low dimensional subspaces, concentration inequalities, and a variant of the Johnson-Lindenstrauss Lemma

B. Tech. Project, IIT Bombay Aug 2013 – Nov 2013
Online Reputation Systems Prof. Vivek S. Borkar
Reviewed a classical stochastic approximation algorithm implemented on a network of processors placed on a connected graph where the processors communicate with their neighbors at random instants, leading to a complicated asynchronous behavior and identified a sampling bias in it with possible adverse effects on the algorithm's convergence properties, and modified it to get rid of the aforementioned sampling bias Used the above scheme in the online reputation systems, where a user tries to identify a good recommender with high similarity between their likes and dislikes; the proposed modification was able to identify a good recommender independent of his opining frequency

Research and Development Project, IIT Bombay Feb 2014 – Apr 2012
Particle Swarm Optimization Prof. Vivek S. Borkar
Researched particle swarm optimization techniques, and proposed a modified version of the algorithm where the swarm does not keep track of the best so far (the leader) in terms of the objective function and instead uses a spatial annealing procedure akin to simulated annealing through time, in order to ensure that the swarm concentrates on good minima, thereby getting rid of computational overhead associated with finding the leader

Summer Internship, NCPRE, IIT Bombay [*www.ncpre.iitb.ac.in*] May 2012 – Jun 2012
Organic Solar Cell Physics Prof. Pradeep R. Nair and Prof. J. Vasi
Modelled and simulated organic solar cell on Sentaurus; analyzed physics behind its characteristics and came up with a model justifying the charge storage exponents of organic bulk heterojunction solar cells

Internships

Research Internship, Stanford University, USA May 2013 – Jul 2013 *Load Balancing* Prof. Balaji Prabhakar
Researched performance and stability of several Load Balancing schemes on server queues in computer networks and studied the convergence results and associated limit theorems

Proposed a learning algorithm for stable allocation of jobs on servers with unknown service rates; analyzed migration effects of jobs on stability of queue size

Business Analyst, Ivy Mobility, Chennai [*ivymobility.com*] Dec 2012
Handled databases using SQL and generated reports using Business Analytics softwares Qlikview and Tableau and presented Analysis Reports namely ABC Analysis and Stock and Sales on data of FMCGs like GSK and Philips, for an additional feature of company's enterprise mobility solutions

Academic Achievements & Awards

Secured 10^{th} rank amongst 450,000 students in IIT-JEE 2010

Secured 46^{th} rank amongst 1,000,000 students in AIEEE 2010

Secured A+ grade in 3 courses (2 EE, 1 Statistics) at UC Berkeley, and AP grade (A+ equivalent at IIT Bombay awarded to maximum 2% students) in 7 EE, 3 Mathematics and 2 Statistics courses besides being the only securer in 4 of them

Awarded Manjula Bagmal Parikh Foundation Trust Prize and Dilip R. Limaye Academic Excellence Award by IIT Bombay for being the most outstanding student in the department

Received Academic Excellence Prizes, Aditya Choubey Prize and Urvish Medh Memorial Prize from IIT Bombay for academic performance in first, second and third year

Awarded the title of 'The Intellectual' by the school for academic excellence in Class XII

Awarded Certificate of Merit in Maths for being among top $\mathbf{0.1}\%$ students in CBSE XII Exam

KEY PROJECTS

Convex Relaxation Algorithms for Constraint Satisfaction Problems *Course Project*
Prof. Laurent El Ghaoui Oct 2015- Nov 2015
Surveyed and implemented convex relaxation algorithms for finding an approximate solution of a Constraint Satisfaction Problem. Schemes from the literature were critically analyzed for their computational feasibility.

Johnson-Lindenstrauss Lemma *Supervised Research Exposition*
Prof. Vivek S. Borkar Jan 2014 – Mar 2014
Surveyed various variants and applications of the celebrated Johnson-Lindenstrauss Lemma that asserts that any finite collection of points in high dimensions can be embedded into low dimension with low distortion in pairwise distances

Other Projects

- Examined the design of dynamic stochastic optimization model for design and risk management of closed end funds backing guaranteed investment products
- Developed a Python Code to output optimal low cost circuit for a given large graph having boolean expressions and logic gates with associated costs using Breadth First Search and Pattern Matching

POSITIONS OF RESPONSIBILITY

Teaching Assistant - Mathematics Jul 2011 – Feb 2014
Appointed as a Teaching Assistant for first year students at IIT Bombay in Calculus, Linear Algbera and Ordinary Differential Equations, in total 8 times and once in Partial Differential Equations for second year students. Also assisted for an online course on Linear Algbera under Quality Enhancement in Engineering Education programme by Ministry of Human Resource Development, India for over 400 colleges in India.

Teaching Assistant - Physics Jul 2011 – Nov 2011
Appointed as a Teaching Assistant for physics course on Electromagnetism for first year students

Department Academic Mentor Apr 2012 – Apr 2014
Selected twice as a member of the DAMP team responsible for the academic well-being of the students and aided 2 students to gain confidence in academics

Institute Student Mentor Jul 2013 – Apr 2014
Mentored 13 freshmen from diverse backgrounds for overall development as a part of the 80 membered ISMP team responsible for providing guidance to the entire freshmen batch

EXTRA-CURRICULAR ACTIVITIES

Attended the Workshop on 'High Dimensional Network Analytics' - 2013 at IISc Bangalore

Winner of Circuit Design Competition 2012 at institute level, organised by Electronics Club IIT Bombay

Finalist of OP Jindal Engineering and Management Scholarship and Narotam Sekh Saria Scholarship

Finalist of National Talent Search Examination 2008

Quizzing (2006-2009)

- Runner Up of National Gandhi Quiz organized by Gandhi Smriti & Darshan Samiti, New Delhi
- Awarded thrice by Chief Minister and twice by Governor for prizes in Quizzing
- Awarded with titles of 'All Rounder' and 'Best Quiz Champion' by School for session 2007-2008
- Awarded Certificate of High Distinction in Australian National Chemistry Quiz in 2008 and 2009

KEY COURSES

Applied Maths and CS: Theoretical Statistics, Advanced Probability, Markov Decision Processes, Applied Stochastic Processes, Stochastic Optimization, Convex Optimization, Data Structures and Algorithms, Introduction to Machine Learning, Matrix Computations, Games and Information

Communications and Signal Processing: Communication Systems, Communication Networks, Information Theory, Advanced Topics in Signal Processing, Speech Processing

Microelectronics and VLSI: Network Theory, Electronic Devices, Nanoelectronics, Digital Systems, Microprocessors, Analog VLSI, VLSI CAD

Mathematics: Real Analysis, Complex Analysis, Multivariable Calculus, Fourier Analysis, Measure Theory, Basic Algebra