Sambuddha Roy

New Jersey, USA
shombuddho@gmail.com
+1 (862) 500-1604
http://www.sambuddharoy.com
/in/sambuddharoy
DBLP Sambuddha Roy
sambuddha-roy

Work Experience

- **2017– present**
  As a Data Science/Deep Learning Consultant, New Jersey, USA.
- **2015–2016 (1 year 1 month)**
  I was a Staff Data Scientist at **LinkedIn**, Bangalore, India, in the *Relevance/Machine Learning* team.
- **2014–2015 (1 year 7 months)**
  I was a Senior Machine Learning Scientist at **Amazon**, Bangalore, India, in the *Advertising Optimization* team.
- **2006–2014 (7 years 8 months)**
  I was a Research Staff Member at **IBM Research**, India, in the New Delhi Lab.
  - 2006–2011: worked in the *Analytics & Optimization* group
  - 2011–2014: worked in the *High Performance Computing* group.

Education

- **Rutgers University**, New Brunswick, NJ.
  Ph.D. in Computer Science, 2006.
  Research Advisor: Professor Eric Allender.
- **Indian Institute of Technology, Kanpur**, India.
  Bachelor of Technology (BTech), July 1998.
  Undergraduate Research Advisor : Professor Manindra Agrawal.

Awards

- 4^{th} *rank* in India in the IIT Joint Entrance Exam, 1994.
- 3^{rd} *rank* in the Roorkee Entrance Exam, 1994.
  University of Roorkee is now IIT Roorkee. At that time, this was a separate exam that used to be held all across India.
- 1^{st} *rank* in the WBJEE exam, 1994.
  This is held in the state of West Bengal, India.
- *Silver medal* in International Mathematics Olympiad (IMO), Turkey, 1993.
- *Silver medal* in International Mathematics Olympiad (IMO), Hong Kong, 1994.
- Awarded a *McCormick Fellowship* at University of Chicago, 1998-1999.
- Awarded an *Outstanding Technical Achievement Award (OTAA)* in IBM Research, 2010, for work on the project OptiManage.

Other Honors

- Program Committee member, ACM CODS COMAD 2018 to be held in Goa, January 2018.

- Program Committee member, ACM Compute 2017 to be held in Bhopal, November 2017, focus on Artificial Intelligence.
- Program Committee member, ACM Compute 2016 held in Gandhinagar, October 2016.
- Invited for a 3-day talk series at Veritas, Pune, August 2016. *Topics*: Hands-on lectures on Machine Learning with a focus on Deep Learning
- Invited speaker to CODS (iKDD Conference on Data Science), Pune, March 2016. *Title*: Fast Detection of Near Duplicates.
- Invited speaker to School on Approximability Microsoft Research, 2011. *Title*: Primal Dual Approximation Algorithms
- Invited speaker to Chennai Mathematical Institute (CMI), 2014. *Title*: Some topics in Submodular Optimization - a survey
- Adjunct Faculty, University of Delhi, 2011-2014.
- Proposed problem that was shortlisted for IMO 1998.

Project Experience

- **Summary of work**, 2006-present. The following provides topic tags for my work in the companies IBM Research, Amazon and LinkedIn. The keywords refer to the core methodologies/technologies utilized.
  - My work in the initial phase at IBM consisted of *optimization* and *algorithms*.
    Keywords: Optimization, Mixed Integer Programming, Approximation Algorithms, Primal-dual algorithms, Scheduling Algorithms.
  - Towards the latter part of my tenure at IBM, my work consisted of convex optimization in the framework of *online learning*. Aligned with convex optimization, I also worked on submodular optimization, in the context of the densest subgraph problem.
    Keywords: Online convex optimization (OCO), regret minimization framework, submodular optimization, graph density.
  - At Amazon, my work primarily consisted of optimization as well as unsupervised clustering of large datasets. This work primarily involved *structured data* (such as transaction data, bid impression data, etc.).
    Keywords: Unsupervised learning, spectral clustering techniques.
  - At LinkedIn, my work primarily involved *unstructured data* such as text and images. Most of my work involved detecting (variants of) *similarity* between different pieces of content (either text or images).
    Keywords: Near-duplicate detection, Locality Sensitive Hashing (LSH), Word Embeddings (word2vec, GloVe).
  - Currently, my work primarily consists of various machine learning approaches for text, in the specific areas of topic modeling, keyword extraction and (extractive) summarization for dense, semi-structured niche text data-sets.
    Keywords: word2vec, LSTM, Attention Mechanisms, Topic Modeling, Keyword Extraction, Summarization.

  In the following, we provide details for work in specific business contexts (in reverse chronological order).
- **Current Work**, 2017-present. I have been working on certain problems in the areas of natural language processing (NLP) and understanding (NLU) for certain niche text datasets. Part of this work was performed as a consultant to an existing startup in Bangalore, India. This work consists primarily of unsupervised and semi-supervised approaches in NLP, specifically in the areas of keyword extraction and extractive summarization.

◇ **LinkedIn**, 2015-2016. I worked in the Relevance/Machine Learning team at LinkedIn, working on various projects in the space of spam filtering, involving aspects of (a) text spam, (b) image spam, and (c) exploring graph based techniques in order to detect spam.

1. *Near Duplicate Detection*: This work involved detecting near duplicates of text. To this end, we used hashing techniques such as Locality Sensitive Hashing (LSH), after appropriately normalizing/anonymizing the data. This work improved some of the key business metrics by 50+%. We later extended these LSH approaches to apply to *image data* (such as memes, puzzles), and we observed significant lifts in precision because of this work.

   In work related to this context, I also guided two interns at LinkedIn, in order to build an end-to-end platform for detecting image spam on LinkedIn. The aim of the platform was (a) to provide the human labelers an easier access to the images to be labeled; this also involved clustering the images appropriately so as to display similar images on the same page for easier labeling, (b) the labeled images are then fed into the training pipeline of the (ensemble of) machine learning models, which scores the images, as well as (c) an active learning component where images closest to the decision boundary are then surfaced for human labeling.
2. *Matching between shorter and longer texts*: This work involved assigning *quality scores* to content. While the problem is quite general, our primary motivation was the use-case of ensuring *consistency* between (given) shorter highlights of content and the actual long-form content (an example can be job titles and job descriptions). To this end (along with other collaborators at LinkedIn), we devised approaches using representational learning techniques.

   We also explored similar approaches for a more ambitious problem: to provide *consistency scores* of a piece of larger text (for instance, do different parts of a job description contradict each other?). This problem proved to be significantly harder, given the paucity of labeled data.
3. *As manager*: At LinkedIn, I managed a small team for some time, and supervised/guided their work. The team worked on several data analysis problems (discovering network effects, etc.) as well as some ML problems on text (spam classifiers on niche content on LinkedIn).

◇ **Amazon**, 2014-2015. I worked in the Advertising Optimization/Advertising Technology group at Amazon, focusing on fraud detection in online advertising. More specifically, my work consisted of three broad themes:

1. *Spectral Clustering and variants*: This work was to detect (in an unsupervised fashion) publisher fraud on an advertising network. In this regard, we translated the problem to the world of graphs, and then reduced the problem to a clustering problem. We explored various traditional approaches (such as k-means, NMF, approaches based on *graph density*) as also *spectral clustering* approaches. The latter approaches showed significant promise in the specific domain of the problem.
2. *Bid Optimization:* This involved optimizing the acceptance of bids in the presence of seller-specified thresholds/reserve prices. We formulated this as an *online optimization* problem and we were able to draw from the rich literature of *online primal-dual* algorithms in order to present an effective (approximation) algorithm for this problem. We were able to observe significant improvements in the key metrics as an outcome of our algorithm. This work also resulted in an internal publication at the Amazon Machine Learning Conference (AMLC), 2015.
3. *Pricing and Monetization:* This line of work involved designing combinatorial auctions, second price mechanisms, etc. The setting of the problem is as follows: the entities of the problem are that there are advertisers (buyers) with *budgets* and publishers (sellers). The problem explored was to design suitable *reserve prices* for sellers so as to hedge against the bid distributions of the various advertisers. The main sources of

complexity of the problem were: (a) the very nature of the problem precludes A/B testing, and (b) wide disparities between the bid distributions of different buyers, as well as (c) shifting landscape of the bid distributions over time. This work involved intensive data analysis and partial experimentation in order to tease out the intricacies of the problem.

- ◇ **IBM Research**, 2013-2014. My work consisted of the following broad themes:
  1. *Online Optimization*: Along with colleagues, I worked on a couple of problems in the space of *Online Learning/Algorithms*; more specifically in the context of the *Online Convex Optimization* (OCO) framework. Some of the problems I worked on were as follows: (a) explore connections between algorithms for the *metrical tasks system*(MTS) problem and the OCO framework, from the standpoint of a *shifted regularizer* in the OCO model, (b) online learning with *delayed feedback*, in order to get *drift*-related regret bounds (via Nemirovski's approach using 2 Bregman projections). (We later discovered that part of this work was subsumed by an earlier ICML13 paper).
  2. *Crop Yield Maximization*: I worked on a crop yield maximization model; the underlying problem was to determine the optimal dates of transplantation of the crop in order to maximize the yield of the crop, by taking into consideration the forecasted weather conditions and the most suitable conditions for growth of the crop. Published a patent as an outcome of this project.
- ◇ **IBM Research**, 2012-2013.
  1. *Economic Dispatch*: The Economic Dispatch problem is an *optimization problem* involving the dispatch of electricity over a power grid. The specific variant that I worked on regards the dispatch problem in the presence of storage devices. A paper in SmartGrid Comm 2013 arose from this project.
  2. *Graph Density*: The densest subgraph problem is a well-known problem in the area of community detection in telecom call graphs, as well as in team-formation. The principal problem here is to compute the *most tightly* connected subgraph (where the specific notion of *tightly connected* is dictated by the *density* of the subgraph). We considered this problem under several natural constraints, and were able to obtain improvements of existing results, as well as achieve vast generalizations of the constraints under which the improved results apply. En passant, we also exhibited the natural roots of the problem to be in the domain of *supermodular* function optimization.
- ◇ **IBM Research**, 2009-2011.
  1. *Primal Dual Algorithms*: We explored primal dual algorithms to derive efficient algorithms for various scheduling problems (both minimization as well as maximization variants). This work resulted in papers in conferences such as Principles of Distributed Computing (PODC), Integer Programming and Combinatorial Optimization (IPCO), etc.
  2. *Contact Center Staffing:* Worked on the OptiHire project, that concerns the domain of contact center staffing. The underlying problem is to optimize the staffing with full-time and part-time agents, with varying agent restrictions, in order to fulfill the provided SLA requirements. Three papers arose from the project: a presentation at INFORMS 2009, an IPCO 2011 paper, and an IPDPS 2011 paper (listed in the full publication list).
- ◇ **IBM Research**, 2007-2009.
  1. *Workforce Management*: I worked on the OptiManage project, that went on to win a Research Accomplishment; I was awarded an Outstanding Technical Achievement Award (OTAA) for my work on the project. OptiManage is a decision support system for workforce management. This work also resulted in the publication of a patent.

TEACHING EXPERIENCE

- ◇ **Instructor**, Rutgers University, New Jersey, USA, Summer 2003. I taught an undergraduate course on Discrete Mathematics and Probability (CS 206).

- **Guest Lecturer**, Rutgers University, New Jersey USA. Served as guest lecturer in a graduate course in Complexity Theory (taught Barrington's theorem).
- **Teaching Assistant**, Rutgers University.
  Courses:
  - Complexity of Computation. CS 538, Spring 2005.
  - Discrete Mathematics I, CS 205, Fall 2004.
  - Discrete Mathematics and Probability II, CS 206, Summer 2002.
  - Computer Organisation, CS 211, Fall 2001.
  - Foundations of Computer Science, CS 509, Fall 2000.
- **Instructor**, Delhi University, Delhi, India, 2011. I taught a graduate level course on Approximation Algorithms.
- **Instructor**, Delhi University, Delhi, India, 2012. I taught an undergraduate course: MCS 101, Design and Analysis of Algorithms.
- **Coaching Olympiad students**, India.
  Trained students for the International Mathematics Olympiad, and involved in other problem solving and problem creating activities for the Indian contingent to the Olympiad.
- **Mentoring high school students in mathematics**, 2015-2016, India.

Research interests

Machine Learning, Deep Learning, Optimization, Approximation Algorithms, Primal Dual methods, Data Visualization.

Proficiencies

Languages: Python, Pig, R, C, LaTeX, Java, Octave.

Domains: Deep Learning, Machine Learning, Algorithms, Optimization, MapReduce/Hadoop.

Representative Publications

Representative Publications

We first present a short list of representative publications; the chronologically ordered exhaustive list is relegated to the end of the resume.

- *Density Functions subject to a Co-Matroid Constraint*.
  Coauthors: Venkatesan T. Chakaravarthy, Natwar Modani, Sivaramakrishnan R. Natarajan, Yogish Sabharwal.
  Appears in Foundations of Software Technology and Theoretical Computer Science (FSTTCS), 2012.
  Outline: This paper considers the problem of finding the *densest subgraph* subject to a very broad class of constraints called *co-matroid constraints*. We connect the problem to its supermodular roots, and provide 2-factor approximations, vastly generalizing and unifying previous results in this area.
- *Fast Algorithms for Constrained Graph Density Problems*.
  Coauthors: Venkatesan Chakaravarthy, Neelima Gupta, Aditya Pancholi.
  Appears in WALCOM, 2015 (followup to the paper above).
  Outline: This continues the work above, but the motivation here is to improve the runtime in an important (and realistic) scenario. We achieve this by providing *linear-time* algorithms with only a slight loss in the approximation guarantee.
- *Parity Problems in Planar Graphs*.
  Coauthors: Mark Braverman, Raghav Kulkarni.
  Appears in IEEE Conference on Computational Complexity (CCC), pp. 222-235, 2007.

Outline: In this work, we consider space bounded variants of some (modular) counting problems. For instance, we prove that counting the number of spanning trees in a *planar* graph modulo 2^k may be effectively parallelized. We also prove that computing a determinant modulo 2^k (for constant k) is also parallelizable. These results involve a surprising interplay of computation and algebraic topology.

◇ *Contact Center Scheduling with Strict Resource Requirements*.
Coauthors: Aman Dhesi, Pranav Gupta, Amit Kumar, Gyana R. Parija.
Appears in the 15^{th} conference on Integer Programming and Combinatorial Optimization (IPCO), June 15-17, 2011.
Outline: This work considers an optimization problem in scheduling. While the original problem has provable NP-hardness, we circumvent this by considering relaxations and proving (almost) tight results about its approximability.

◇ *Distributed Algorithms for Scheduling on Line and Tree Networks with Non-uniform Bandwidths*.
Coauthors: Venkatesan T. Chakaravarthy, Anamitra R. Choudhury, Yogish Sabharwal.
Appears in 27th IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2013.
Outline: This work presents distributed primal-dual algorithms for scheduling problems.

Patents

◇ *Decision support system and method for distributed decision making for optimal human resource deployment*. US8818832 B2, 2014.
Co-inventors: Munish Goyal, Nandakishore Kambhatla, Pavithra Krishnan, Shivaram Kulkarni, Rohit Manohar Lotlikar, Debapriyo Majumdar, Gyana Parija, Sambuddha Roy, Soujanya Soni, Simon Thomas, Milind V. Vaidya.

◇ *Scheduling Crop Transplantations*. US20160307135 A1, 2016.
Co-inventors: Subhrajit Bhattacharya, Sambuddha Roy, Yogish Sabharwal, Jayasuriya M.R. Sarath Bandara, Vanessa Teo.

Residency

◇ Permanent Resident, USA.

◇ Citizen of India.

Languages

◇ Fluent in English, Bengali, Hindi.

References

◇ **Available upon request.**

Publications

Conference Publications

Listed in reverse chronological order, according to area
Representative conferences: FSTTCS(6), CCC(5), STACS(3), IPDPS(2), IPCO, PODC, PODS, ICALP, APPROX-RANDOM, ESA.
Principal topics of publication: graph density for large scale graphs, scheduling, distributed algorithms, covering problems.

Algorithms & Optimization

- *Fast Algorithms for Constrained Graph Density Problems*.
  Coauthors: Venkatesan Chakaravarthy, Neelima Gupta, Aditya Pancholi.
  Appears in WALCOM, 2015.
- *Improved Algorithms for Resource Allocation Under Varying Capacity*.
  Coauthors: Venkatesan Chakaravarthy, Anamitra Roy Choudhury, Shalmoli Gupta, Yogish Sabharwal.
  Appears in European Symposium of Algorithms (ESA), 2014.
- *Knapsack Cover subject to a Matroid Constraint*.
  Coauthors: Venkatesan Chakaravarthy, Anamitra Roy Choudhury, Sivaramakrishnan Natarajan.
  Appears in Foundations of Software Technology and Theoretical Computer Science (FSTTCS), 2013.
- *Distributed and Parallel Algorithms for Set Cover Problems with Small Neighborhood Covers*.
  Coauthors: Archita Agarwal, Venkatesan Chakaravarthy, Anamitra Roy Choudhury, Yogish Sabharwal.
  Appears in Foundations of Software Technology and Theoretical Computer Science (FSTTCS), 2013.
- *Scheduling Jobs with Multiple Non-uniform Tasks*.
  Coauthors: Venkatesan T. Chakaravarthy, Anamitra R. Choudhury, Yogish Sabharwal.
  Appears in Euro-Par, 2013.
- *Distributed Algorithms for Scheduling on Line and Tree Networks with Non-uniform Bandwidths*.
  Coauthors: Venkatesan T. Chakaravarthy, Anamitra R. Choudhury, Yogish Sabharwal.
  Appears in 27th IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2013.
- *Approximation Algorithms for the Partition Vertex Cover Problem*.
  Coauthors: Suman Kalyan Bera, Shalmoli Gupta, Amit Kumar.
  Appears in WALCOM, 2013.
- *Density Functions subject to a Co-Matroid Constraint*.
  Coauthors: Venkatesan T. Chakaravarthy, Natwar Modani, Sivaramakrishnan R. Natarajan, Yogish Sabharwal.
  Appears in Foundations of Software Technology and Theoretical Computer Science (FSTTCS), 2012.
- *Scheduling Resources for Executing a Partial Set of Jobs*.
  Coauthors: Venkatesan T. Chakaravarthy, Arindam Pal, Yogish Sabharwal.
  Appears in Foundations of Software Technology and Theoretical Computer Science (FSTTCS), 2012.
- *Distributed algorithms for scheduling on line and tree networks*.
  Coauthors:Venkatesan T. Chakaravarthy, Yogish Sabharwal.
  Appears in Principles of Distributed Computing (PODC), 2012.

- *Scheduling Resources for Throughput Maximization*.
  Coauthors: Venkatesan T. Chakaravarthy, Amit Kumar, Vinayaka Pandit, Yogish Sabharwal.
  Appears in APPROX-RANDOM, 2011.
- *Resource Allocation for Covering Time Varying Demands*.
  Coauthors: Venkatesan T. Chakaravarthy, Amit Kumar, Yogish Sabharwal.
  Appears in European Symposium on Algorithms (ESA), 2011.
- *Maximizing throughput of jobs with multiple resource requirements*.
  Coauthors: Venkatesan T. Chakaravarthy, Yogish Sabharwal, Neha Sengupta.
  Appears in High Performance Computing (HiPC), 2011.
- *Contact Center Scheduling with Strict Resource Requirements*.
  Coauthors: Aman Dhesi, Pranav Gupta, Amit Kumar, Gyana R. Parija.
  Appears in the 15^{th} conference on Integer Programming and Combinatorial Optimization (IPCO), June 15-17, 2011.
- *Minimum Cost Resource Allocation for Meeting Job Requirements*.
  Coauthors: Venkatesan T. Chakaravarthy, Amit Kumar, Gyana R Parija, Yogish Sabharwal.
  Appears in 25^{th} IEEE International Parallel & Distributed Processing Symposium (IPDPS), May 16-20, 2011.
- *VMSpreader: Multi-tier Application Resiliency through Virtual Machine Striping*.
  Coauthor: Pradipta De.
  Appears in IFIP/IEEE International Symposium on Integrated Network Management (IM), 2011.
- *Finding Independent Sets in Unions of Perfect Graphs*.
  Coauthors: Venkatesan T. Chakaravarthy, Vinayaka Pandit, Yogish Sabharwal.
  Appears in Foundations of Software Technology and Theoretical Computer Science (FSTTCS), pp. 251-259, 2010.
- *Approximating Decision Trees with Multiway Branches*.
  Coauthors: Venkatesan T. Chakaravarthy, Vinayaka Pandit, Yogish Sabharwal.
  Appears in International Colloquium on Automata, Languages and Programming (ICALP), pp. 210-221, 2009.
- *Decision trees for entity identification: approximation algorithms and hardness results*.
  Coauthors: Venkatesan T. Chakaravarthy, Vinayaka Pandit, Pranjal Awasthi, Mukesh K. Mohania.
  Appears in Symposium on Principles of Database Systems (PODS) pp. 53-62, 2007.

Complexity Theory

- *Arthur and Merlin as Oracles*.
  Coauthor: Venkatesan T. Chakaravarthy.
  Appears in Mathematical Foundations of Computer Science (MFCS) pp. 229-240, 2008.
- *Finding Irrefutable Certificates for S_2^p via Arthur and Merlin.*.
  Coauthor: Venkatesan T. Chakravarthy.
  Appears in Symposium on Theoretical Aspects in Computer Science (STACS) pp. 157-168, 2008.
- *Deterministically Isolating a Perfect Matching in Bipartite Planar Graphs*.
  Coauthors: Samir Datta, Raghav Kulkarni.
  Appears in Symposium on Theoretical Aspects in Computer Science (STACS) pp. 229-240, 2008.
- *Parity Problems in Planar Graphs*.
  Coauthors: Mark Braverman, Raghav Kulkarni.
  Appears in IEEE Conference on Computational Complexity (CCC), pp. 222-235, 2007.

◇ *Grid Graph Reachability Problems.*
Coauthors: Eric Allender, David A. Mix Barrington, Tanmoy Chakraborty, Samir Datta.
Appears in IEEE Conference on Computational Complexity (CCC) pp. 299-313, 2006.

◇ *Oblivious Symmetric Alternation.*
Coauthor : Venkatesan T. Chakravarthy.
Appears in Symposium on Theoretical Aspects in Computer Science (STACS) pp. 230-241, 2006.

◇ *The directed planar reachability problem.*
Coauthors: Eric Allender, Samir Datta.
Appears in Foundations of Software Technology and Theoretical Computer Science (FSTTCS), 2005.

◇ *Topology inside NC^1.*
Coauthors : Eric Allender, Samir Datta.
Appears in Proc. 20th. Annual IEEE Conference on Computational Complexity (CCC), pp. 298-307, 2005.

◇ *Derandomization and Distinguishing complexity.*
Coauthors : Eric Allender, Michal Koucky, Detlef Ronneburger.
Appears in Proc. 18^{th} Annual IEEE Conference on Computational Complexity (CCC), 2003, pp. 209-220.

◇ *Time-Space Tradeoffs in the Counting Hierarchy.*
Coauthors : Eric Allender, Michal Koucky, Detlef Ronneburger, V. Vinay.
Appears in Proc. 16^{th} Annual IEEE Conference on Computational Complexity (CCC), 2001, pp. 295-302.

Other

◇ *Effective Decision Support for Workforce Deployment Service Systems.*
Coauthors: Kashyap Dixit, Munish Goyal, Pranav Gupta, Nanda Kambhatla, Rohit Lotlikar, Debapriyo Majumdar, Gyana R. Parija, Soujanya Soni.
Appears in IEEE SCC pp. 104-111, 2009.

◇ *Extracting dense communities from telecom call graphs.*
Coauthors: Vinayaka Pandit, Natwar Modani, Sougata Mukherjea, Amit Anil Nanavati, Amit Agarwal.
Appears in COMSWARE pp. 82-89, 2008.

Journal Publications

Representative venues: Computational Complexity (2), Theory of Computing Systems (2).

◇ *Improved algorithms for resource allocation under varying capacity.*
Coauthors: Venkatesan T. Chakravarthy, Anamitra R. Choudhury, Shalmoli Gupta, Yogish Sabharwal.
Appears in Journal of Scheduling, 2017.

◇ *Arthur and Merlin as Oracles.*
Coauthor: Venkatesan T. Chakravarthy.
Appears in Computational Complexity (CC), 2011.

◇ *The pervasive reach of resource-bounded Kolmogorov complexity in computational complexity theory.*
Coauthors: Eric Allender, Michal Koucký, Detlef Ronneburger.
Appears in Journal of Computing System Sciences (JCSS) 77(1): 14-40, 2011.

- ◇ *Decision trees for entity identification: Approximation algorithms and hardness results.*
  Coauthors: Venkatesan T. Chakaravarthy, Vinayaka Pandit, Sambuddha Roy, Pranjal Awasthi, Mukesh K. Mohania.
  Appears in ACM Transactions on Algorithms 7(2): 15 (TALG), 2011.
- ◇ *Deterministically Isolating a Perfect Matching in Bipartite Planar Graphs.*
  Coauthors: Samir Datta, Raghav Kulkarni.
  Appears in Theory of Computing Systems (ToCS) 47(3): pp. 737-757, 2010.
- ◇ *Planar and Grid Graph Reachability Problems.*
  Coauthors: Eric Allender, David A. Mix Barrington, Tanmoy Chakraborty, Samir Datta.
  Appears in Theory of Computing Systems (ToCS) 45(4) pp. 675-723, 2009.
- ◇ *Approximating maximum weight K-colorable subgraphs in chordal graphs.*
  Coauthor: Venkatesan T. Chakravarthy.
  Appears in Information Processing Letters (IPL) 109(7) pp. 365-368, 2009.
- ◇ *Space-Efficient Counting in Graphs on Surfaces.*
  Coauthors: Mark Braverman, Raghav Kulkarni.
  Appears in Computational Complexity (CC) 18(4) pp. 601-649, 2009.
- ◇ *Some Combinatorial and Algorithmic applications of the Borsuk-Ulam theorem.*
  Coauthor : William Steiger.
  Appears in Graphs and Combinatorics 23, pp. 331-341, 2007.
- ◇ *Effective Decision Support Systems For Workforce Deployment.*
  Coauthors: Vijil Chenthamarakshan, Kashyap Dixit, Mahesh Gattani, Munish Goyal, Pranav Gupta, Nanda Kambhatla, Rohit M. Lotlikar, Debapriyo Majumdar, Gyana R. Parija, Soujanya Soni, Karthik Visweswariah.
  Appears in the IBM Research & Development Journal, 2010.

Preprints

- ◇ *Fenchel Duals for Drifting Adversaries.*
  Coauthors: Suman K Bera, Anamitra R Choudhury, Syamantak Das, Sambuddha Roy, Jayram S. Thathachar.
  On arXiv as arXiv:1309.5904, 2013.