Pushkar Tripathi

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RESEARCH INTERESTS

Theoretical Computer Science in the area of market algorithms and mechanism design. I am also interested in the applications of theory in other domains.

EDUCATION

Georgia Institute of Technology, Atlanta, GA
Ph.D., Computer Science. GPA 4.0 Expected May 2013

Indian Institute of Technology (IIT) Delhi, India
B.Tech., Computer Science & Engineering. GPA 9.42/10 July 2008

PROFESSIONAL EXPERIENCE

- **Google**, Pittsburgh, PA (Internship) Jun-Aug 2009
  Worked with the ad serving group and proposed improvements to the algorithms for ad selection and placement.
- **Microsoft Research** , Bangalore, India (Internship) May-July 2007
  Worked with Rigorous Software Engineering(RSE) group on a novel approach to detect faults in software prior to execution. The aim of the project was to statically analyze binaries and detect bugs in them without exploring all possible execution paths.

RESEARCH EXPERIENCE

- **Submodular Combinatorial Optimization** Nov-April 2009
  Analyzed the complexity of combinatorial optimization problems where the cost functions are submodular. Gave tight lower and upper bounds for a number of fundamental problems in this setting. Also studied the complexity of these problems in multi-agent setting.
- **Visibility of Noisy Point Cloud Data** Jan-July 2009
  Advisor: Niloy Mitra
  Proposed algorithms for reconstructing boundaries of 2D objects given a noisy set of boundary points. Analysed the complexity of the method and extended it to 3D objects. The reconstruction was based on determining the visibility of the given boundary points when the object was viewed from a number of view points. Theoretical and experimental results showed that this method was robust against noise in the given data.
- **Alomost Optimal CDMA Channel Allocation** Oct-Dec 2008
  Advisor: Mustafa Amar
  Gave a simple distibuted randomized algorithm for assignment of channels in CDMA protocal which achieved optimal channel utilization with high probability. The proposed method was topology unaware and only required information about the maximum degree of a node in the network.
- **Algorithms for Min-cost Multi Commodity Flow** Jan-Dec 2008
  Advisor: Naveen Garg
  Approximation algorithms for min-cost multicommodity flow, using primal dual method. Also did empirical run time analysis to gauge the effectiveness of the optimizations.
- **Static Binary Analysis** May-July 2007
  Mentor: Ganesan Ramalingam and Sriram Rajamani
  Worked on a scheme to statically detect memory leaks in device driver code using a provably correct

technique that was guaranteed not to give false positives. The method was based on differntiating basic variables and aggregate varaibles(struct and arrays) based on their memory usage pattern.

- **Power Efficient Electronic Design Automation:** May-Dec 2007
  Advisor: Preeti Ranjan Panda
  Proposed a novel approach to resource chaining in automated hardware synthesis systems to save power by avoiding some register write operations by resource chaining. The proposed method balanced the trade-off between chaining which is power-efficient and storing the result in a register which frees up the resource for further use. Experimental results showed a decrease of 15-20% in power consumption. Also studied the computational complexity of the problem and showed it to be NP-Hard.

PUBLICATIONS AND PREPRINTS

- Gagan Goel, Chinmay Karande, Pushkar Tripathi and Lei Wang. "Approximability of Combinatorial Problems with Multi-agent Submodular Cost Functions". In *IEEE Symposium on Foundations of Computer Science (FOCS) 2009*, Atlanta, USA.
- Pushkar Tripathi, Rohan Jain, Srikanth Kurra and P.R. Panda. "REWIRED: Register Write Inhibition by Resource Dedication", In *Asia Pacific Design Automation Conference (ASPDAC) 2008*, Seoul, Korea.
- Ravish Mehra, Pushkar Tripathi and Niloy Mitra. "Visibility of Noisy Point Cloud Data". Submitted *Eurographics 2010*, Norkoping, Sweden.
- Naveen Garg, Shubham Mittal and Pushkar Tripathi. "Computing minimum cost multicommodity flows for large graphs". Submitted 2009.

MANUSCRIPTS

- G. Ramalingam, Pushkar Tripathi and L. Valega. "Inferring Top-Level Variables from Executables". Technical Report, *Microsoft Research India*, Dec 2007.
- Pushkar Tripathi, Pushkar Sachdeva and Mustafa Amar. "Alomost Optimal CDMA Channel Allocation". Manuscript 2009.

ACADEMIC AWARDS

- ACO student fellowship for the year 2008-2009
- 13^{th} position worldwide in the Algorithms competition of Microsoft Imagine Cup, 2008.
- Placed 6^{th} in the Asia regionals of ACM Inter Colligate Programming Contest, 2008.
- Secured All India Rank 68 among 200,000 students at the Indian Institute of Technology Joint Entrance Exam (IIT-JEE).
- Among the top 0.1% of all participating students at the Indian National Physics Olympiad.
- Winner of the National Talent Search Scholarship(NTSE), one of the most prestigious scholarships awarded by the Directorate of Education, India.

Talks

- "Combinatorial Optimization with Submodular Utility Function". Georgia Tech ACO Seminar, Oct 09.
- "Power Efficient Methods in EDA". Asia Pacific Design Automation Conference, Seoul, Jan 08.

Servics and Professional Practices

- Reviewed papers for FOCS 2009.
- Active member of AID, Atlanta (Association for India's Development). A NGO which promotes sustainable and equitable development by supporting grassroots organizations in India.
- Member of National Service Scheme, India.
- Organized the International Online Programming Contest which had over 1000 contestants from 50 countries.

COMPUTER SKILLS

Programming: C, C++, Java, Verilog, Perl, Python, PHP, HTML, XML, SQL, 8086, Shell Script
Tools & APIs: MPI, openMP, openGL, GDB, SVN, Makefile, Latex, Gnuplot, MS-DOS, MS Office