Santanu S. Dey

CONTACT INFORMATION

Address: Center for Operations Research and Econometrics,
Université Catholique de Louvain,
34, Voie du Roman Pays,
B-1348 Louvain-la-Neuve, Belgium.
Email: dey@core.ucl.ac.be
Phone: +32 10 474319

RESEARCH INTERESTS

Large Scale Optimization
Theory of Mixed Integer Linear and Nonlinear Programming
Real-Time Operations-Related Optimization Problems
Computational Biology

EDUCATION

Ph.D., Industrial Engineering 08/2003-05/2007
Purdue University, West Lafayette, IN, USA
Dissertation: *Strong Cutting Planes for Unstructured Mixed Integer Programs Using Multiple Constraints.*
Dissertation Committee: Prof. Jean-Philippe P. Richard (Chair), Prof. Ronald Rardin, Prof. Yanjun Li, Prof. Bruce Schmeiser
GPA: 4.00/4.00

M.S., Industrial Engineering 08/2001-08/2003
Purdue University, West Lafayette, IN, USA
Thesis: *Classification Algorithm for Microarray Experiment Data and Motif Searching In Proteins.*
Advisor: Prof. Nagabhushana Prabhu and Prof. Clifford F. Weil
GPA: 4.00/4.00

B.E.(Honors), Mechanical Engineering 07/1996-05/2000
Mumbai (Bombay) University, Mumbai, India
Ranked 2nd among approx 742 students in the University

EMPLOYMENT

Research Fellow 09/2007 - Present
Center for Operations Research and Econometric (CORE),
Université Catholique de Louvain, Belgium.

Intern 06/2006-08/2006
Enterprise Optimization Group,
United Airlines, Chicago, USA.

Research/Teaching Assistant 08/2002-05/2007
School of Industrial Engineering,
Purdue University, IN, USA.

Programming Assistant 01/2002-08/2002
Department of Agronomy,
Purdue University, IN, USA.

Teaching Assistant 08/2001-12/2001
Computer Graphics Technology,
Purdue University, IN, USA.

Software Engineer 08/2000-06/2001
Patni Computer Systems, Mumbai, India.

ACADEMIC AWARDS AND HONORS

INFORMS George Nicholson Paper Competition, Finalist 11/2007
Paper entitled "Sequential-Merge Facets for High Dimensional Infinite Group Problems," INFORMS Annual Meeting, Seattle, WA, November 2007.

Purdue Graduate Student Government Travel Grant. Fall 2006
Paper entitled "Two Families of Facets for Two Dimensional Infinite Group Problem."

Kulapati's Gold Medal 05/2000
For standing first throughout the Engineering courses.

Bengal Engineering College Alumni Association Award 1998-99

Jadhavpur University alumni Association Trust Scholarship 1998-99

Sir Ratan Tata Trust Scholarship 1998-00
For all round excellence in academics.

Dr. Pranlal Patel foundation Prize 1997-00
For standing first among all the students in the mechanical engineering class.

Among Top 0.1% of candidates in India in Chemistry 03/1996
Central Board of Secondary Examination.

RESEARCH EXPERIENCE

Research Fellow, CORE UCL. 09/2007 - Present

Partial Sequence Independent Lifting

- Developed techniques for strengthening the cutting planes that are based on maximal lattice-free convex sets in two-dimensional Euclidean space.

Research Assistant, School of IE, Purdue University. 06/2006-08/2006

Facets of High Dimensional Infinite Group Problem: Solved Open Problem

- Developed theory for studying high dimensional infinite group problems. Discovered the first known families of facets for these problems.
- Proved the first known family of discontinuous extreme inequalities of the infinite group problem.
- Developed a method to generalize MIR cuts using three constraints concurrently to generate stronger cuts.

Best Known Computational Results With Primal Cutting Plane Algorithm

Obtained best known computation results: on purely cutting plane based primal algorithms for general Integer Program using a new cut strengthening procedure.

Intern, Enterprise Optimization Group, United Airlines. 06/2006-08/2006

Simulation and Optimization Algorithms for Aircraft Rerouting Problem

- Developed a decision tool for predicting the number of spare aircraft required to mitigate the effect of disruptions such as aircraft failure and bad weather.
- Created a simulation framework to analyze the solution of the real-time aircraft rerouting algorithm.

MS, School of IE, Purdue University. 01/2003-08/2003

Motif Searching in Proteins

- Designed heuristics for multiple sequence alignment problem with complicated objective functions. Designed a simple greedy heuristic for motif searching in proteins. Detected an important motif in Transposase proteins.

Classification Algorithm for Gene Data

- Designed a quick classification algorithm for use on microarray data. Shown to be give better results than some standard techniques and comparable to support vector machines.

TEACHING EXPERIENCE

Teaching Assistant
School of Industrial Engineering, Purdue University (West Lafayette, IN)

Simulation Design and Analysis (IE581) 01/2004-05/2004
Graduate course, emphasis on theoretical aspect of Monte Carlo simulation.
Advance Engineering Economics (IE490A) 08/2003-12/2003
Undergraduate course, basic mathematical tools used in Microeconomics.
Operations Research – Optimization (IE 335) 08/2002-05/2003
Undergraduate course, emphasis on Linear Programming.

Responsibilities:

- Assisted with preparation of lecture material and exam questions
- Graded homework, projects, quizzes and exams
- Instructed and mentored students during office hours
- Maintained course webpage
- Substituted for professor when needed

Laboratory Instructor
Computer Graphics Technology, Purdue University, IN, USA.

Technical Graphics Communication (CGT 110) 08/2001-12/2001
Introductory course, AutoCAD and engineering drawing.

Responsibilities:

- Instructed three, 2-hour sections each week
- Instructed and mentored students during office hours

PROFESSIONAL ACTIVITIES AND AFFILIATIONS

Session Chair 11/2006
Session titled "Advances in Mixed Integer Programming," INFORMS Annual Meeting, Pittsburgh, November 2006

Reviewer
Mathematical Programming A.

Member 05/2006 - Present
INFORMS (Institute for Operations Research and the Management Sciences)

Aussois 2008: Celebrating 50 years of Integer Programming -12th Combinatorial Optimization Workshop, Centre Paul Langevin, Aussois, France.

PUBLICATIONS

Santanu S. Dey, Jean-Philippe P. Richard, "Two families of Facets for the Two-Dimensional Mixed Integer Infinite Group Problem," *Mathematics of Operations Research*, forthcoming.

Santanu S. Dey, Jean-Philippe P. Richard, "A Cut Improvement Procedure and Its Application to Primal Algorithms," *INFORMS Journal of Computing, submitted*, (one revision done) May 2006.

Santanu S. Dey, Jean-Philippe P. Richard, "Some Relations between facets of low- and high-dimensional group problems," *Mathematical Programming A*, submitted, May 2007

Santanu S. Dey, Jean-Philippe P. Richard, Yanjun Li, Lisa A. Miller, "On Extreme Inequalities for Infinite Group Problems," *Mathematical Programming A*, submitted, August 2007.

WORKING PAPERS

Santanu S. Dey, Laurence A. Wolsey, "On the coefficients for integer variables in valid inequalities for two rows," *Working Paper*.

Santanu S. Dey, Jean-Philippe P. Richard, "Generalized MIR inequalities using three constraints," *Working Paper*.

REFREED CONFERENCES PROCEEDINGS

Santanu S. Dey, Jean-Philippe P. Richard, "Sequential-Merge facets for two-dimensional group problems," *Proceeding 12th Conference on Integer Programming and Combinatorial Optimization*, 30- 42, 2007.

INVITED TALKS

Santanu S. Dey, Jean-Philippe P. Richard, "Generalized MIR Cuts," *INFORMS Annual Meeting, Seattle*, November 2007.

Santanu S. Dey, Jean-Philippe P. Richard, "Sequential-Merge Inequalities for Infinite Group Problems," *INFORMS Annual Meeting, Seattle, November 2007*.

Santanu S. Dey, Jean-Philippe P. Richard, "A Family of Facets for Multiple-Constraint Infinite-Group Relaxation of MIPs," *CORE, UCL,* Louvain-la-Neuve, September 2007.

Santanu S. Dey, Jean-Philippe P. Richard, "Cutting Planes for Unstructured Mixed Integer Programs Using Multiple Constraints," *IIT Kharagpur,* Kharagpur, August 2007.

Santanu S. Dey, Jean-Philippe P. Richard, "Cutting Planes for Unstructured Mixed Integer Programs Using Multiple Constraints," *IIT Bombay,* Mumbai, July 2007.

Santanu S. Dey, Jean-Philippe P. Richard, "Sequential-Merge facets for two-dimensional group problems," *IPCO, Ithaca,* June 2007.

Santanu S. Dey, Jean-Philippe P. Richard, Lisa A. Miller, Yanjun Li, "Continuous and Discontinuous Extreme Inequalities for Infinite Group Problem", *INFORMS Annual Meeting, Pittsburgh,* November 2006.

Santanu S. Dey, Jean-Philippe P. Richard, "Two Families of Facets for Two Dimensional Infinite Group Problem", *INFORMS Annual Meeting, Pittsburgh,* November 2006.

Santanu S. Dey, Jean-Philippe P. Richard, "Improved Gomory Cuts for Primal Cutting Plane Algorithms", *INFORMS Annual Meeting, San Francisco,* November 2005.

POSTERS

Santanu S. Dey, Jean-Philippe P. Richard, "Two Families of Facets for the Two-Dimensional Mixed Integer Infinite Group Problem," *MIP 2006, Florida*, June 2006.

GRADUATE COURSE WORK

Operations Research
System Simulation, Linear Programming, Integer Programming, Heuristic Optimization, Dynamic Programming, Advanced Linear Programming.

Mathematics and Statistics
Introduction to Probability, Elementary Stochastic Process, Statistical Inference, Linear Algebra, Abstract Algebra, Topology.

Industrial Engineering
Engineering Economic Analysis, Design and Control of Production and Manufacturing Systems, Human Factors in Engineering.

Bioinformatics/Computational Biology
Biochemistry I, Bioinformatics, Structure and Functions of Proteins.

Other
Preparing Future Faculty

COMPUTER SKILLS

Programming Languages
C, C++, Pascal, COBOL.

Optimization
CPLEX (ILOG), GAMS, MATLAB, MINTO, MPS.

Simulation
ARENA.

Others
MS Access, MS Excel, LaTex.