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Personal Data

Date of birth: October 6, 1974
Citizenship: Indian
Current visa status: Permanent resident of the United States of America
Marital Status: Married

Professional Experience and Education

North Carolina State University, Raleigh, USA
Assistant Professor, Dept. of Mathematics (from August 2005)

McMaster University, Hamilton, Canada
Postdoctoral Fellow, Dept. of Computing & Software (July 2003 - July 2005)
Sponsor: Prof. *Tamás Terlaky*

Rice University, Houston, USA
Lecturer, Dept. of Computational and Applied Mathematics (July 2002 - June 2003)
Sponsor: Prof. *Yin Zhang*

Rensselaer Polytechnic Institute, Troy, USA
Ph.D. in Mathematics (August 1998 - July 2002)
Advisor: Prof. *John Mitchell*
Thesis: *Linear Programming approaches to Semidefinite Programming problems*

Indian Institute of Science, Bangalore, India
Masters in Electrical Engineering (August 1996 - June 1998)
Research Advisor: Prof. *P.S. Nagendra Rao*
Thesis: *Graph Algorithms for Loss Minimization in Feeder Reconfiguration*

Government College of Engineering, Pune, India
B.E. in Electrical Engineering (June 1992 - June 1996)

Research Interests

I am interested in the theory, algorithms, and applications of conic programming, with an emphasis on linear programming, second order cone programming, and semidefinite programming; and development of associated software. Conic programming has applications in control; approximation algorithms for combinatorial optimization; planning under uncertainty including robust optimization; and more recently in polynomial optimization and lift and project schemes for solving mixed integer and nonconvex problems. My current focus is on developing *conic interior point based decomposition methods* for solving large scale semidefinite programs (SDPs). The basic idea is to solve such an SDP using existing primal-dual interior point methods (IPMs); in an iterative fashion between a coordinating master problem (mixed conic problem over linear, second order, and smaller semidefinite cones); and *decomposed* and *distributed* subproblems (smaller SDPs) in a parallel and distributed high performance computing environment. I am also interested in incorporating the conic decomposition approach in the *pricing phase* of an SDP based *conic branch-cut-price* framework for solving mixed integer and nonconvex problems arising in industry. Other interests include development of active set and simplex-like approaches for solving conic problems, and also using these algorithms to *warm-start* mixed integer conic problems after branching or addition of cutting planes.

Details of Professional Experience

1. Tenure track Assistant Professor, Department of Mathematics, North Carolina State University, Raleigh, USA, August 2005 - present.
2. Postdoctoral Fellow, Department of Computing and Software, McMaster University, Hamilton, Canada, July 2003 - July 2005.
3. Lecturer, Department of Computational and Applied Mathematics, Rice University, Houston, USA, July 2002 - June 2003.
4. Graduate Research Assistant with John Mitchell, Department of Mathematical Sciences, Rensselaer Polytechnic Institute, Troy, USA, January 2000 - July 2002.
5. Graduate Teaching Assistant, Department of Mathematical Sciences, Rensselaer Polytechnic Institute, Troy, USA, August 1998 - December 2000.
6. Research Student with P.S. Nagendra Rao, Department of Electrical Engineering, Indian Institute of Science, Bangalore, India, August 1996 - June 1998.
7. Graduate Engineer, Tata Engineering and Locomotive Company Ltd., (TELCO), Pune, India, June - August 1996.

Professional Activities

1. Referee for Computational Optimization and Applications, Journal of Global Optimization, Journal of Optimization Theory and Applications, Mathematical Programming, Operations Research, Operations Research Letters, Optimization and Engineering, Optimization Methods and Software, SIAM Journal on Optimization, and SIAM Review.
2. Stream organizer for *nonsmooth optimization* in the 2nd MPS International Conference for Continuous Optimization (ICCOPT II), McMaster University, Hamilton, Canada, August 12-17, 2007.
<http://iccopt-mopta.mcmaster.ca/program.htm>
3. Organized sessions within the nonsmooth optimization stream (3 speakers) at ICCOPT II, the Computational Optimization and Software cluster (4 speakers) at the INFORMS Annual Meeting 2007, the 2008 SIAM Conference on Optimization (4 speakers), and the Computational Optimization and Software cluster (4 speakers) at the INFORMS Annual Meeting 2008.
4. Served in the Operations Research Admissions Committee at NC State for new graduate student recruitment, Fall 2006 and Fall 2007.
5. Served as a faculty consultant in the Industrial & Statistical Modeling Workshops (IMSM 2006 and 2007) for graduate students held at NC State University.
6. Member of the organizing committee for the *McMaster Optimization Day* workshop held in McMaster University, Hamilton, Canada, on the 10th of May 2004.
<http://www.cas.mcmaster.ca/~oplab/mmod2004>
7. Organized the Optimization seminars in the Department of Computing & Software at McMaster University, Hamilton, Canada with Tamás Terlaky (July 2003 -July 2005).
8. Past organizer of the weekly optimization seminars, Department of Mathematical Sciences, Rensselaer Polytechnic Institute, Troy, USA, September 2001 - May 2002.
<http://www4.ncsu.edu/~kksivara/opt.html>
9. Member of American Mathematical Society (AMS), Institute for Operations Research and Management Sciences (INFORMS), Mathematical Programming Society (MPS), and Society for Industrial and Applied Mathematics (SIAM).

Teaching Experience

Details can be found at <http://www4.ncsu.edu/~kksivara/teaching.html>

1. *OR 706: Nonlinear Programming*, North Carolina State University, Raleigh, USA, Spring 2008.
2. *MA/CSC 427: Introduction to Numerical Analysis I*, North Carolina State University, Raleigh, USA, Fall 2007.
3. *MA 796S/OR 791K: Convex Optimization and Interior Point Methods*, North Carolina State University, Raleigh, USA, Fall 2007.
4. *MA/OR/IE 505: Linear Programming*, North Carolina State University, Raleigh, USA, Spring 2006, Fall 2006, and Spring 2007.
5. *MA 242: Calculus III*, North Carolina State University, Raleigh, USA, Fall 2006.
6. *MA 341: Applied Differential Equations I*, Department of Mathematics, North Carolina State University, Raleigh, USA, Fall 2005 and Summer 2007.
7. *SE 4C03: Computer Networks and Computer Security*, Department of Computing and Software, McMaster University, Hamilton, Canada, Spring 2004 and Spring 2005.
8. *CAAM 353: Computational Numerical Analysis*, Department of Computational and Applied Mathematics, Rice University, Houston, USA, Spring 2003.
9. *CAAM 664: Convex Programming and Interior Point Methods*, Department of Computational and Applied Mathematics, Rice University, Houston, USA, Fall 2002.
10. *CAAM 378: Introduction to Operations Research and Optimization*, Department of Computational and Applied Mathematics, Rice University, Houston, USA, Fall 2002.

Graduate Students and mentoring experience

1. Sahar Karimi, Ph.D. student, Department of Mathematics, North Carolina State University, Fall 2006 onwards.
2. Eric Sullivan, Masters Project, Operations Research program, North Carolina State University, Summer 2008.
3. Shon Albert, Masters Project, Department of Mathematics, North Carolina State University, Fall 2006.
4. Kristin Cheman, Masters Project, Department of Mathematics, North Carolina State University, Spring 2006.
5. I serve on the Ph.D. committees for the following students at NC State:
 - (a) Lan Li, Department of Industrial and Systems Engineering, Ph.D. advisor: Shu-Cherng Fang.
 - (b) Pingke Li, Department of Industrial and Systems Engineering, Ph.D. advisor: Shu-Cherng Fang.
 - (c) Zhe Liu, Department of Industrial and Systems Engineering, Ph.D. advisor: Yahya Fathi.
 - (d) Chanyoun Won, Department of Electrical and Computer Engineering, Ph.D. advisor: Paul Franzon.
 - (e) Xiangzhong Xue, Department of Electrical and Computer Engineering, Ph.D. advisor: Paul Franzon.
6. Member of the Examination and Thesis committees of Bixiang Wang, Masters student, Department of Computing & Software, McMaster University, Hamilton, Canada, August 2003.
7. Mentor for Gema Plaza Martinez, a visiting Ph.D. student, University of Alicante, Alicante, Spain in the Advanced Optimization Laboratory at McMaster University, Hamilton, Canada, September 2004-July 2005 (with Tamás Terlaky). Gema worked with me on a *decomposition principle* aimed at solving large scale semidefinite programs. She is now a Ph.D. student in the ORIE department at Cornell University.
8. Mentor for Neha Gupta, a visiting undergraduate summer student, IIT Delhi, India, in the Advanced Optimization Laboratory at McMaster University, Hamilton, Canada, May-August 2004 (with Tamás Terlaky). Neha worked with me on a *simplex-like* approach for second order cone programming.

Awards and Honors

- Invited participant in the IMA Workshop on *Optimization and Control*, IMA Thematic Year on Applications of Algebraic Geometry, Institute for Mathematics and its Applications, Minneapolis, January 16-20, 2007.
<http://www.ima.umn.edu/2006-2007/W1.16-20.07/>
- Declared the *Most Valuable Professor* in the 4th year Software Engineering courses at McMaster University, Software Engineering Awards Night, McMaster University, Hamilton, Canada, 30th March 2004.
- Founders Award of Excellence, Rensselaer Polytechnic Institute, Troy, 2001.
- National Merit Scholarship, Government of India.
- Ranked 6th in the University of Pune, Pune, India (approx. 300 students) in my final year B.E. examinations.

Publications and Presentations

I appear as K. KRISHNAN or K. SIVARAMAKRISHNAN in all my publications.

- Refereed publications

1. K. SIVARAMAKRISHNAN, *A parallel interior point decomposition algorithm for block- angular semidefinite programs*, Technical Report, Department of Mathematics, North Carolina State University, April 2008; accepted for publication in *Computational Optimization and Applications*.
<http://www4.ncsu.edu/~kksivara/publications/parallel-conic-blockangular.pdf>
2. K. KRISHNAN AND J.E. MITCHELL, *A unifying framework for several cutting plane methods for semidefinite programming*, *Optimization Methods and Software*, 21(2006), pp. 57-74.
3. K. KRISHNAN AND J.E. MITCHELL, *A semidefinite programming based polyhedral cut and price approach for the maxcut problem*, *Computational Optimization and Applications*, 33(2006), pp. 51-71.
4. K. KRISHNAN AND T. TERLAKY, *Interior point and semidefinite approaches in combinatorial optimization*, GERAD 25th anniversary volume on *Graph Theory and Combinatorial Optimization*, edited by D. Avis, A. Hertz, and O. Marcotte, Springer, 2005, pp. 101-157.
5. K. KRISHNAN AND J.E. MITCHELL, *Semi-infinite linear programming approaches to semidefinite programming*, *Novel Approaches to Hard Discrete Optimization*, edited by P.M. Pardalos and H. Wolkowicz, Fields Institute Communications Series, American Mathematical Society, 2003, pp. 123-142.

- Submitted to journals

1. K. SIVARAMAKRISHNAN AND J.E. MITCHELL, *Properties of a cutting plane method for semidefinite programming*, Technical Report, Department of Mathematics, North Carolina State University, September 2007 (under review in *Journal of Optimization Theory and Applications*, substantially revised version of an earlier report from May 2003).
http://www4.ncsu.edu/~kksivara/publications/properties_revised.pdf
2. K. SIVARAMAKRISHNAN, G. PLAZA, AND T. TERLAKY, *A conic interior point decomposition approach for large scale semidefinite programming*, Technical Report, Department of Mathematics, North Carolina State University, December 2005 (under first revision in *Mathematical Programming*).
<http://www4.ncsu.edu/~kksivara/publications/conic-ipm-decomposition.pdf>

- Technical Reports

1. K. SIVARAMAKRISHNAN, *A parallel interior point decomposition algorithm for polynomial optimization problems*, Technical Report, Department of Mathematics, North Carolina State University, March 2008.

- Conference Proceedings

1. E. KALTOFEN, B. LI, K. SIVARAMAKRISHNAN, Z. YANG, AND L. ZHI, *Lower bounds for approximate factorizations via semidefinite programming (extended abstract)*, Proceedings of SNC 07, London, Ontario, Canada, July 25-27, 2007, pp. 203-204. Available at
http://www4.ncsu.edu/~kksivara/publications/snc_sdp.pdf

- Presentations in Conferences

Selected talks are available at <http://www4.ncsu.edu/~kksivara/talks.html>

1. INFORMS Annual Meeting, Washington DC, October 2008.
Invited Talks: *An interior point decomposition algorithm for semidefinite programs via matrix completion.*
2. SIAM Conference on Optimization (OP08), Boston, USA, May 2008.
Invited Talk: *A parallel interior point decomposition algorithm for polynomial optimization.*
3. INFORMS 2008 Optimization Conference, Atlanta, USA, March 2008.
Contributed Talk: *A parallel interior point decomposition algorithm for block-angular semidefinite programs.*
4. Institute for Operations Research and Management Sciences (INFORMS) Annual Meeting, Seattle, USA, November 2007.
Invited Talk: *A parallel interior point decomposition algorithm for polynomial optimization problems.*
5. 2nd MPS International Conference on Continuous Optimization ICCOPT II & MOPTA-07, McMaster University, Hamilton, Canada, August 2007.
Invited Talk: *A parallel conic interior point decomposition approach for block-angular semidefinite programs.*
6. INFORMS Annual Meeting, Pittsburgh, USA, November 2006.
Invited Talk: *A parallel conic interior point decomposition approach for block-angular semidefinite programs.*
7. 19th International Symposium on Mathematical Programming (ISMP 2006), Rio de Janeiro, Brazil, July-August 2006.
Invited Talk: *A conic interior point decomposition approach for block-angular semidefinite programs.*
8. INFORMS Annual Meeting, San Francisco, USA, November 2005.
Invited Talk: *A conic interior point decomposition approach for large scale semidefinite programming.*
9. SIAM 2005 Optimization Conference, Stockholm, Sweden, May 2005.
Invited Talk: *A conic interior point decomposition approach for large scale semidefinite programming.*
10. INFORMS Annual Meeting, Denver, USA, October 2004.
Invited talk: *Towards a practical simplex method for second order cone programming.*
11. First MPS Conference on Continuous Optimization, ICCOPT I, Rensselaer Polytechnic Institute, Troy, USA, August 2004.
Contributed talk: *Towards a practical simplex method for second order cone programming.*
12. First MPS Conference on Continuous Optimization, ICCOPT I, Rensselaer Polytechnic Institute, Troy, USA, August 2004.
Contributed talk: *An unifying framework for several cutting plane methods for semidefinite programming (with John Mitchell).*
13. 4th McMaster Optimization conference (MOPTA 04), McMaster University, Hamilton, Canada, July 2004.
Contributed talk: *Towards a practical simplex method for second order cone programming.*
14. Multiscale Optimization Methods and Applications, Applied Mathematics Special Year 2003-2004, University of Florida, Gainesville, USA, February 2004.
Invited talk: *A unifying framework for several cutting plane methods for semidefinite programming (with John Mitchell).*
15. INFORMS Annual Meeting, Atlanta, USA, October 2003.
Invited talk: *A non-polyhedral primal active set approach for semidefinite programming.*
16. INFORMS Annual Meeting, Atlanta, USA, October 2003.
Invited talk: *Properties of a cutting plane algorithm for semidefinite programming (with John Mitchell).*
17. International Symposium on Mathematical Programming (ISMP 2003), Copenhagen, Denmark, August 2003.
Invited talk: *A non-polyhedral primal active set approach for semidefinite programming.*
18. International Symposium on Mathematical Programming (ISMP 2003), Copenhagen, Denmark, August 2003.
Invited talk: *Properties of a cutting plane method for semidefinite programming (with John Mitchell).*
19. 3rd Annual McMaster Optimization conference (MOPTA 03), McMaster University, Hamilton, Canada, July 2003.
Contributed talk: *A non-polyhedral primal active set approach for semidefinite programming.*

20. 3rd Annual McMaster Optimization conference (MOPTA 03), McMaster University, Hamilton, Canada, July 2003.
Contributed talk: *Properties of a cutting plane algorithm for semidefinite programming* (with John Mitchell).
 21. INFORMS Annual Meeting, San Jose, USA, November 2002.
Contributed talk: *A cutting plane SDP method for maxcut problems*.
 22. 2nd Annual McMaster Optimization conference (MOPTA 02), McMaster University, Hamilton, Canada, July 2002.
Contributed talk: *A cutting plane SDP method for maxcut problems* (with John Mitchell).
 23. 7th SIAM Conference on Optimization, Toronto, Canada, May 2002.
Contributed talk: *A polyhedral cutting plane approach for semidefinite programming problems*.
 24. 1st Annual McMaster Optimization conference (MOPTA 01), McMaster University, Hamilton, Canada, August 2001.
Contributed talk: *A polyhedral cutting plane approach for semidefinite programming problems*.
 25. Novel approaches to hard discrete optimization, University of Waterloo, Waterloo, Canada, April 2001.
Invited talk: *Solving a semidefinite program as an LP*.
 26. Operations research seminar, IBM, Yorktown Heights, USA, April 2001.
Invited talk: *A linear programming approach for solving semidefinite programming problems* (with John Mitchell).
- Contributed posters in Conferences
 1. IMA workshop on Optimization and Control, Institute of Mathematics and its Applications, University of Minnesota, Minneapolis, USA, January 2007.
Poster: *A parallel conic interior point decomposition approach for block-angular semidefinite programs*.
 2. SHARCNET Fall Workshop on High Performance Programming and Processors, Wilfrid Laurier University, Waterloo, Canada, October 2004.
Poster: *A conic interior point Dantzig-Wolfe decomposition scheme for large scale semidefinite programming*.
 3. Workshop on large scale semidefinite and nonlinear programming, University of Waterloo, Waterloo, Canada, May 2004.
Poster: *Towards a practical simplex method for semidefinite programming*.
 4. IMA workshop on semidefinite programming and robust optimization, Institute of Mathematics and its Applications, University of Minnesota, Minneapolis, USA, March 2003.
Poster: *An active set approach for semidefinite programming* (with Yin Zhang).
 - Unpublished technical reports
 1. K. KRISHNAN AND J.E. MITCHELL, *A linear programming approach to semidefinite programming problems*, Technical report, Department of Mathematical Sciences, RPI, Troy, USA, May 2001.
<http://www4.ncsu.edu/~kksivara/publications/cutsdpsbundle.pdf>
 2. K. KRISHNAN SIVARAMAKRISHNAN, *Linear programming approaches to semidefinite programming problems*, Ph.D. thesis, Department of Mathematical Sciences, Rensselaer Polytechnic Institute, Troy, USA, July 2002.
<http://www4.ncsu.edu/~kksivara/publications/rpithes.pdf>
 3. S. KARTIK KRISHNAN, *Graph algorithms for loss minimization in feeder reconfiguration*, Masters thesis, Department of Electrical Engineering, Indian Institute of Science, Bangalore, India, June 1998.
<http://www4.ncsu.edu/~kksivara/publications/kartik.iisc.pdf>
 - Invited talks in Universities and Companies
 1. Georgia Institute of Technology, Atlanta, USA: Department of Industrial and Systems Engineering, November 2008.
Talk: *A parallel interior point decomposition algorithm for block-angular semidefinite programs*.
Host: Discrete Optimization seminar (DOS) group.

2. Northwestern University, Evanston, USA: Department of Industrial Engineering and Management Sciences, May 2008.
Talk: *A parallel interior point decomposition algorithm for block-angular semidefinite programs.*
Host: Sanjay Mehrotra.
3. University of Minnesota, Minneapolis, USA: Department of Mechanical Engineering Graduate seminar, March 2007.
Talk: *A parallel conic interior point decomposition approach for block-angular semidefinite programs.*
Host: Bharath Rangarajan.
4. North Carolina State University, Raleigh, USA: Algebra seminar, March 2007.
Talk: *Solving polynomial optimization problems using real algebraic geometry and semidefinite programming.*
Host: Algebra group.
5. North Carolina State University, Raleigh, USA: Operations Research seminar, February 2007.
Talk: *A parallel conic interior point decomposition approach for block-angular semidefinite programs.*
Host: Operations Research group.
6. SAS, Cary, USA: Operations Research seminar, January 2007.
Talk: *A parallel conic interior point decomposition approach for block-angular semidefinite programs.*
Host: Optimization division.
7. North Carolina State University, Raleigh, USA: Symbolic Computation seminar, November 2006.
Talk: *Exploiting sparsity and symmetry in semidefinite programming with applications in polynomial optimization.*
Host: Symbolic computation research group.
8. North Carolina State University, Raleigh, USA: Numerical Analysis seminar, October 2006.
Talk: *A parallel conic interior point decomposition approach for block-angular semidefinite programs.*
Host: The NA seminar.
9. University of North Carolina, Chapel Hill, USA: Operations Research seminar, April 2006.
Talk: *A conic interior point decomposition approach for large scale structured semidefinite programs.*
Host: Gábor Pataki.
10. North Carolina State University, Raleigh, USA: Symbolic Computation seminar, January 2006.
Talk: *Solving polynomial optimization problems using real algebraic geometry and semidefinite programming.*
Host: Department of Mathematics.
11. SAS, Cary, USA: Optimization seminar, October 2005.
Talk: *A conic interior point decomposition approach for large scale semidefinite programming.*
Host: Optimization division.
12. North Carolina State University, Raleigh, USA: Numerical Analysis seminar, February and September 2005; and Operations Research seminar, October 2005.
Talk: *A conic interior point decomposition approach for large scale semidefinite programming.*
Host: Departments of Mathematics and Industrial Engineering.
13. Michigan State University, East Lansing, USA: CSE colloquium, February 2005.
Talk: *A conic interior point decomposition approach for large scale semidefinite programming.*
Host: Department of Computer Science and Engineering.
14. Michigan State University, East Lansing, USA: Lyman Briggs School, February 2005.
Talk: *Conic Programming: The optimization paradigm for the 21st century.*
Host: Lyman Briggs School.
15. University of Waterloo, Waterloo, Canada: Computational Mathematics seminar, January 2005.
Talk: *A conic interior point decomposition approach for large scale semidefinite programming.*
Hosts: Hans De Sterck and Henry Wolkowicz.
16. Rensselaer Polytechnic Institute, Troy, USA: Math Sciences colloquium, April 2004.
Talk: *Towards a practical simplex method for conic programming.*
Host: John Mitchell.
17. University of Guelph, Guelph, Canada: Math and Stat colloquium, November 2003.
Talk: *A non-polyhedral primal active set approach for semidefinite programming.*
Hosts: Heinz Bauschke and Hristo Sendov.

18. University of Waterloo, Waterloo, Canada: Optimization seminar, October 2003.
Talk: *A non-polyhedral primal active set approach for semidefinite programming.*
Host: Henry Wolkowicz.
19. McMaster University, Hamilton, Canada: CAS colloquium, February 2003.
Talk: *A survey of cutting plane methods for semidefinite programming.*
Host: Department of Computing and Software.
20. University of Michigan at Dearborn, Detroit, USA: Math colloquium, February 2003.
Talk: *Semidefinite based cut and price algorithms for the maxcut problem.*
Host: Department of Mathematics.
21. Rice University, Houston, USA: CAAM colloquium, October 2002.
Talk: *An SDP cut and price algorithm for maxcut problems.*
Hosts: Steve Cox and Yin Zhang.
22. Courant Institute of Mathematical Sciences, New York University, NYC, USA: Special Numerical Analysis seminar, November 2001.
Talk: *A linear programming approach for solving semidefinite programming problems.*
Host: Michael Overton.

References

Available upon request.
