Srikrishna Sridhar, Graduate student

Computer Sciences, University of Wisconsin-Madison

Contact: srikris@cs.wisc.edu

Research   My work focuses on developing tools and algorithms for large scale problems in mathematical optimization, statistical computing and data analysis.

Contact   4241, Wisconsin Institutes for Discovery, University of Wisconsin-Madison

Education

University of Wisconsin, Madison   2013 (Expected)
Ph.D Computer Sciences
GPA 3.85/4

University of Wisconsin, Madison   2012
M.S, Computer Sciences
GPA 3.85/4

Birla Institute of Technology and Science (BITS) Pilani , India   2009
B.E(Hons) Computer Science
GPA 9.55/10

Interests   Numerical optimization, statistical computing, parallel computing, big-data p

Publications

THETIS: An approximate efficient LP solver, for LP rounding.
Srikrishna Sridhar, Victor Bittorf, Ji Liu, Christopher Re, Stephen Wright (Submitted 2013)
Many problems in machine learning can be solved by rounding the solution of an appropriate linear program (LP). In this work, we have developed algorithms to solve LPs approximately. Our software is an order of magnitude faster than Cplex (a commercial LP solver) and yields similar solution quality.

An Asynchronous Parallel Stochastic Coordinate Descent Algorithm.
Ji Liu, **Srikrishna Sridhar**, Victor Bittorf, Christopher Re, Stephen Wright (Submitted 2013)
We describe an asynchronous parallel stochastic coordinate descent algorithm that achieves sublinear convergence (at rate 1/k) on general convex functions and a linear convergence rate on functions that satisfy an essential strong convexity property. The analysis also indicates that nearly linear speedup can be expected; this result is borne out by the computational observations.

Models for Production Planning Problems with Increasing Byproducts.
Srikrishna Sridhar, Jeff Linderoth, James Luedtke (JOGO 2013)
We developed novel convex relaxations for production planning processes involving desirable products and undesirable by-products. In addition to being 10% more accurate, our models are also an order of magnitude faster than previously proposed formulations.

Locally ideal formulations for piecewise linear functions with indicator variables.
Srikrishna Sridhar, Jeff Linderoth, James Luedtke (OR Letters 2013)
We proposed strong mixed integer programming formulations for piecewise linear functions that are required to be evaluated when a binary variable is turned on. We show that our formulations, in the absence of other constraints, perfectly model the problem under consideration.

Financial Benefits of HIE Participation: An Operations Research Approach
Srikrishna Sridhar, Patricia Brennan, Stephen Wright, Stephen Robinson (JAMIA 2012)
We developed mathematical models to quantify the financial consequences of Health information exchanges on insurance companies, HMOs and health care providers. We applied our model on data obtained over a 12 month period from 3 EDs in Milwaukee, Wisconsin.

Channel Assignment in Multi-Radio WMN's : A Graph-Theoretic Approach
Srikrishna Sridhar, Jun Guo, Sanjay Jha (IEEE-COMSNETS 2009)
We developed and tested algorithms to optimally assign channels to radio interfaces in a multi-radio, multi-channel wireless mesh networks. We demonstrated that our scalable algorithms minimize overall network interference on networks with thousands of nodes.

Current Projects	**Production planning problems with complex fiscal objectives.** **Srikrishna Sridhar**, Jeff Linderoth, James Luedtke We consider optimization models for operational planning problems where the objective functions consider complex fiscal structures like taxes, tariffs, royalties etc. We developed novel formulations, algorithms and solution techniques that obtain solution quality that is an order of magnitude better than previous models.

Experience

Intern, Pivotal   **May-Sep 2013**
Developing parallel solvers for linear systems, linear programming, and singular value decomposition (SVD) on multi-gigabyte data sets. My solvers are currently being used by companies in a wide range of domains including insurance, energy and communications.

Intern, Greenplum   **May-Sep 2012**
Developed scalable and parallel solvers to run statistical regression (linear, logistic, multi-logistic and cox-proportional hazards) on multi-gigabyte data sets. My solvers now run on Greenplum powered clusters using MADlib, an open-source library for scalable in-database analytics.

Intern, University of New South Wales, Sydney   **Jun-Dec 2009**
with Dr. Jun Guo, Prof. Sanjay Jha
Developed algorithms for assigning channels to radio interfaces in multi-radio, multi-channel wireless mesh networks.

Intern, Indian Institute of Science, Bangalore   **Jun-Aug 2007**
with Prof. Umapathy, Dept. of Organic Chemistry
Automated an advanced laser application facility through a remotely controlled centralized computing system.

Technical Skills   **Languages**: Python, C, C++, SQL
Scientific Tools: GAMS, MatLab, AIMMS, AMPL, R
Web Frameworks: Django, HTML, CSS, PHP

Software   **MADlib**
Active developer of MADlib, an open-source library for scalable in-database analytics.

Primetime!
Developed a DNA search tool that helps biologists at the University of Wisconsin-Madison choose the best DNA template that contains the DNA target region to be amplified. A task that used to take them hours can now be done in seconds.

PickMe!
Developed a student-project assignment tool that matches up students to projects based on their skills, experience and desire to work with certain colleagues. This tool is currently used by graduate level courses for software engineering at the University of Wisconsin-Madison.

Press Coverage	Two of Wisconsin's leading political journals Medical Economics and Wispolitics highlighted the importance of our JAMIA paper!

Invited Talks

Production planning models with Increasing by-products.
Optimization and Analytics: New Frontiers in Theory and Practice - The Fourth INFORMS
Optimization Society Conference
University of Miami, February 24 2012.

Discrete choice non-linear models for chemical engineering applications.
Systems, Information, Learning and Optimization (SILO) seminar series
University of Wisconsin-Madison, February 1 2012.

Engineering applications of discrete optimization
Graduate research seminar series at the Wisconsin Institutes for Discovery
University of Wisconsin-Madison, February 16 2012.

Grad School life: From a PhD angle
Alumni Research Talks 2012
Birla Institute of Technology and Science, Pilani India, January 15 2012.

Posters

THETIS: An approximate solver for large scale combinatorial problems
EMC University Day, EMC, Santa Clara, July 2013

New models for production planning problems with increasing byproducts
Mixed Integer Programming Workshop, University of California-Davis, July 2012

Optimizing financial effects of HIE: A multi-party linear programming approach
WARF Discovery Challenge, University of Wisconsin-Madison, May 2012

Graduate Coursework

Optimization: Linear & Non-Linear Optimization, Stochastic & Integer Programming
Statistics: Statistical Computing, Mathematical Statistics, Regression analysis
Computing: Methods of Computational Mathematics, Econometrics

Awards & Honors

- Selected by 3-Day startup as one of Madison's 40 young entrepreneurs in 2011.
- BITS-Pilani outstanding undergraduate award 2005, 2006.
  Description : Awarded bi-annually to 10 students with outstanding academic records.
- National level award for the Indian National Informatics Olympiad 2003.
- National level award for the Indian National Mathematics Olympiad 2005.
- 6th rank at the National Talent Search Exam (NTSE) 2003.
- CBSE (Central Board of Secondary Education) merit scholar 2005
  Description: Awarded to 400 outstanding students (out of 3 lakh nationwide) undergraduate freshmen.

References

- Stephen Wright, University of Wisconsin-Madison (swright@cs.wisc.edu)
- Christopher Re, University of Wisconsin-Madison (chrisre@cs.wisc.edu)
- Jeff Linderoth, University of Wisconsin-Madison (linderoth@wisc.edu)