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## **Noam Goldberg**

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## **Education**

**PhD, Rutgers Center for Operations Research (RUTCOR), Rutgers University, New Brunswick, NJ, January 2010**

- Thesis title: “Optimization for Sparse and Accurate Classifiers”.
- Committee members: Jonathan Eckstein (advisor), Endre Boros, Paul Kantor, Robert Schapire (external), and Dan Stratila.

**Master of Science, Leon Recanati School of Business, Tel Aviv University, Tel Aviv, Israel, 2004**

- Decisions & Operations Research

**Bachelor of Science, University of Toronto, Toronto, Ontario, Canada, 1998**

- Computer Science major
- Graduated with High Distinction

**Bachelor of Business Administration, Schulich School of Business, York University, Toronto, Ontario, Canada, 1996**

## **Experience**

**Research Associate, Computer Science Department, Carnegie Mellon University, Pittsburgh, PA, January 2013 – Present**

**Postdoctoral appointee, Mathematics and Computer Science Division, Argonne National Laboratory, Argonne IL, May 2010 – January 2013**

- Modeling and development of algorithms for sparse support vector machines (SVM), cybersecurity, estimating hydroelectric power generation, and power plant operation.

**Postdoctoral scholar, Technion – Israel Institute of Technology, Haifa, Israel, November 2009 – April 2010**

- Funded by the Joint Yale/Technion Rose Homeland Security and Counter-Terrorism Program, the Israeli Council for Higher Education (VATAT), and as a Returning Scientist by the Israeli Ministry of Immigrant Absorption.

- Developed optimization and game theoretic techniques for resource allocation and counter-terrorism.

**Co-op/ part-time position, Telcordia Applied Research, Piscataway, NJ, 12/2008 –8/2009**

- Developed and researched algorithms for assignment of link weights for congestion avoidance in packet routing, and optimization formulations and heuristics for the joint channel assignment and routing problem.

**Intern, Sandia National Lab, Livermore, CA, Summer 2008**

- Extended a global derivative-free optimization algorithm (DIRECT) for running concurrently and using external trial points.

**Research Assistant, Rutgers University, New Brunswick, NJ, 9/2007 – 8/2008**

- NSF funded project, “Deceptive Detection Strategies for Container Inspection”.
- Researched and developed algorithms for optimal sequential inspection for counter-terrorism applications.

**Teaching Assistant, Rutgers University, New Brunswick, NJ, 2004 – 2007**

- Taught recitations and graded courses in Precalculus, Calculus II and Theory of Linear Optimization.

## Journal publications

Endre Boros, Noam Goldberg, Paul Kantor, and Jonathan Word. “*Optimal Sequential Inspection Policies*”. *Annals of Operations Research* 187 (1), 2011, DOI: 10.1007/s10479-010-0799-6.

Jonathan Eckstein and Noam Goldberg. “*An Improved Branch-and-Bound Method for Maximum Monomial Agreement*”. *INFORMS Journal on Computing* 24 (2), DOI: 10.1287/ijoc.1110.0459.

Noam Goldberg and Jonathan Eckstein. “*Sparse Weighted Voting Classifier Selection and its Linear Programming Relaxations*”. *Information Processing Letters* 112 (2012), pp. 481-486, DOI: 10.1016/j.ipl.2012.03.004.

Boaz Golany, Noam Goldberg and Uriel G. Rothblum. “*Allocating Multiple Defensive Resources in a Zero-sum Setting*”, *Annals of Operations Research*, published online before print, August 2012, DOI: 10.1007/s10479-012-1196-0.

Yael Deutch, Boaz Golany, Noam Goldberg, Uriel G. Rothblum, “*Inspection Games with Local and Global Allocation Bounds*”, *Naval Research Logistics* 60 (2), 2013.

Noam Goldberg, Youngdae Kim, Sven Leyffer, Thomas Veselka. “*Adaptively Refined Dynamic Program for Linear Spline Regression*”, Preprint ANL/MCS-P3040-0912,

Argonne National Laboratory, Mathematics and Computer Science Division, October 2012. Computational Optimization and Applications, minor revision, 2013.

## Conference proceeding publications

Noam Goldberg, Sven Leyfer, Todd Munson. “*A new perspective on sparse SVM*”. Proceedings of the SIAM International Conference on Data Mining (SDM) 2013, accepted (acceptance rate 25.5%).

Noam Goldberg and Jonathan Eckstein. “*Boosting Classifiers with Tightened Lo-Relaxation Penalties*”, Proceedings of the 27<sup>th</sup> International Conference of Machine Learning (ICML), 2010 (acceptance rate 26%).

Noam Goldberg and Chung-chieh Shan, “*Boosting Optimal Logical Patterns Using Noisy Data*”, Proceedings of the SIAM International Conference on Data Mining (SDM), 2007. (FP acceptance rate 12%).

Ossama Younis, Andrei Ghetie, Noam Goldberg, Sunil Samtani, Maneesh Vaarshney, Mitesh Patel. “*A Framework for Evaluating Network Optimization Techniques*”. In proceedings of IEEE Sarnoff Symposium, 2012.

Noam Goldberg, Eric van den Berg, Provin Gurung, Sunil Samtani, Aristides Staikos. “*Local Unicast Routing Agent*”. In proceedings of IEEE Military Communications 2009.

## Refereed conferences

Endre Boros, Noam Goldberg, Paul B. Kantor and Jonathan Word. “*Optimal Sequential Inspection Policies*”. MSOM, 2010. URL: [http://msom.technion.ac.il/conf\\_program/papers/Poster%20session/59.pdf](http://msom.technion.ac.il/conf_program/papers/Poster%20session/59.pdf)

Jonathan Eckstein and Noam Goldberg. “*Improved Branch-and-Bound Method for Maximum Monomial Agreement*”. Neural Information Processing Systems (NIPS) Workshop in Optimization for Machine Learning Whistler BC, Canada, 2008. URL: <http://opt2008.kyb.tuebingen.mpg.de/papers/eckstein.pdf>

## Under review and working papers

Boaz Golany, Noam Goldberg, and Uriel G. Rothblum, “*A Two-Resource Allocation Algorithm with an Application to a Zero-sum Defensive Resource Allocation Game*”, revised and resubmitted.

Noam Goldberg, Sven Leyffer. “*Projected Gradient for Second-Order Cone Programming*”. Working paper, 2013.

Noam Goldberg, Sven Leyffer, and Ilya Safro, “*Optimal Response to Epidemics and Cyber Attacks in Networks*”. Preprint ANL/MCS-1992-0112, Argonne National Laboratory, Mathematics and Computer Science Division, January 2012. URL: [http://www.optimization-online.org/DB\\_HTML/2012/01/3320.html](http://www.optimization-online.org/DB_HTML/2012/01/3320.html)

Boaz Golany, Noam Goldberg, and Uriel G. Rothblum, “*Allocating Multiple Defensive Resources: a Nonzero-sum Game*”, working paper, 2012.

## Unpublished manuscripts or technical reports

Noam Goldberg and Jonathan Eckstein, “*Tightened  $L_0$ -relaxation penalties for classification*”, RUTCOR Research Report (RRR) #23-2009.

Noam Goldberg, Tamara G. Kolda and Ann Yoshimura, “*Concurrent Optimization with DUET: DIRECT Using External Trial Points*”, Sandia National Labs, Technical Report #SAND2008-5844.

## Presentations

“*A New Perspective on Sparse and Robust Support Vector Machines*”, INFORMS Annual Meeting, Phoenix AZ, 2012.

“*Cover inequalities for nearly monotone quadratic MINLPs*”, ISMP, Berlin Germany, 2012 (organized an invited session: “Structured MINLP and applications”).

“*Cover inequalities for nearly monotone quadratic MINLPs*”, INFORMS Annual Meeting, Charlotte NC, 2011

“*Multiple defensive resource allocation games*”, INFORMS Annual Meeting, Austin TX, November 2010

“*Boosting classifiers with tightend  $L_0$ -relaxation penalties*”, ICML 2010, Haifa, June 2010

“*Bilinear defensive resource allocation games and extensions*”, ORSIS, Nir Etzion, Israel, May 2010

“*Tightened  $L_0$ -relaxation penalties for classification*”, INFORMS Annual Meeting, San Diego CA, October 2009 (invited).

“*Tightened  $L_0$ -relaxation penalties for classification*”, INFORMS NJ Chapter, September 2009.

“*Tightened  $L_0$ -relaxation penalties for classification*”, ISMP, Chicago IL, August 2009.

“*An Improved Branch-and-Bound Method for Maximum Monomial Agreement*”, DIMACS - RUTCOR Workshop on Boolean and Pseudo-Boolean Functions in Memory of Peter L. Hammer, January 2009.

“*An Improved Branch-and-Bound Method for Maximum Monomial Agreement*”, NIPS Workshop in Optimization for Machine Learning, Whistler BC, Canada, December 2008.

“*Dynamic Programming for Efficient Container Inspection Policies*”, INFORMS Annual Meeting, Washington DC, October, 2008.

“*Dynamic Programming for Enumeration of Efficient Container Inspection Policies*”, DHS University Network Summit, Student Day, March 2008.

“*Boosting Optimal Logical Patterns Using Noisy Data*”, SDM 2007, Minneapolis MN, May 2007.

## Seminar Presentations

Argonne National Laboratory, Mathematics and Computer Science Division Seminar, January 2011, September 2011.

Haifa University, Statistics Department, April 2011

Hebrew University, Statistics Department, November 2010

Industrial Engineering and Management Interdisciplinary Seminar, Technion, Israel

Institute of Technology, November 2010.

Yale/Technion Rose Homeland Security and Counter-Terrorism Seminar, Yale SOM, September, 2010.

Industrial Engineering Seminar, Tel Aviv University, December 2009, January 2011.

Industrial Engineering & Management Seminar, Ben Gurion University, December 2009

Operations Research Seminar, Technion, Israel Institute of Technology, January 2008, December 2009.

Sandia National Laboratories, July 2008, August 2008.

Brown Bag Seminar, RUTCOR, Rutgers University, April 2007.

## Patents and Technical Publications:

Eitan Yehuda and Noam Goldberg. US Patent #20050185643: “*Fast Rerouting of Traffic in a Circuit Switched Mesh Network*”. Assignee ECI Telecom.Ltd.

Noam Goldberg, Idan Kaspit and Igor Balter. US Patent #7,551,571: “*Technology for Improving Spanning Tree Protocols in Ethernet Networks Supporting VLANs*”. Assignee ECI Telecom Ltd.

Contributions incorporated in the TeleManagement Forum Multi-Technology Network Management documents #513, #608 and #814.

## Awards

- Winner of the INFORMS NJ Chapter student research contest, 2009
- DIMACS graduate student award given for a proposed research project, December 2008
- SIAM Student Travel Award, SDM 2007
- DIMACS travel grant, 2006
- Rutgers University Graduate School, pre-dissertation and special study opportunity award, 2006, 2008
- NATO Advanced Studies Institute travel grant for the Summer School in Combinatorial Optimization, Montreal 2006
- ECI Telecom, awarded funding of (part-time) Master's studies, 2000-2003
- ECI Telecom, Business Unit CEO award, 1999.
- University of Toronto Dean's List, 1998
- York University Continuing Education Scholarship, 1997

## Technical Skills

- Software: S-PLUS, R, MATLAB, Maple
- Programming: C++, C, JAVA, MATLAB, AMPL, MOSEL
- Optimization C++ libraries: CPLEX, GLPK, ACRO-PICO, COIN-OR: CLP, LEMON, OSI, CBC

## Other Work Experience

### **Operations Research Intern, Health Products Research, Strategic Planning Department, Whitehouse, NJ, Summer 2005.**

- Extended continuous optimization formulations for marketing strategy and call plan optimization application (C++, CPLEX).
- Studied and fine tuned the performance of a MIP formulations for a call plan problem in CPLEX.

### **System Engineer, ECI Telecom, Petach Tikva, Israel, 2000 – 2004**

- Defined and specified functional and software requirements for operation of provider bridge (Ethernet over optical) equipment.
- Represented the company at an international forum and a standardization body.

### **Software Engineer, ECI Telecom, Petach Tikva, Israel, 1998 – 2000**

- Designed and implemented Network and Element Management System functionality in C++.

## Other

- Refereeing for Journal of Computer and System Sciences, Operations Research, INFORMS Journal on Computing, Annals of Operations Research, European Journal of Operations Research, IEEE ISI
- Dual American and Israeli citizenship

## References

Professor Jonathan Eckstein  
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Dr. Sven Leyffer, Computational Mathematician,  
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