

Marek Petrik

CONTACT	Business Analytics and Mathematical Sciences IBM T.J. Watson Research Center Yorktown Heights, NY	Tel: (+1)-413-230-7479 Email: marekpetrik@gmail.com Web: http://marek.petrik.us
RESEARCH INTERESTS	Machine learning, mathematical optimization, robust and risk-averse optimization, reinforcement learning and approximate dynamic programming, precision agriculture, resource management.	
EDUCATION	<ul style="list-style-type: none">◇ University of Massachusetts Amherst, Amherst, MA, USA. (2005 – 2010) Ph.D. in Computer Science: September 1, 2010, GPA: 4.0/4.0 Advisor: Shlomo Zilberstein Thesis: Optimization-based Approximate Dynamic Programming Committee: Shlomo Zilberstein, Andrew Barto, Sridhar Mahadevan, Ana Muriel, Ronald Parr◇ University of Massachusetts Amherst, Amherst, MA, USA. (2005 – 2008) M.Sc. in Computer Science, May 2008, GPA: 4.0/4.0◇ Univerzita Komenského, Bratislava, Slovakia. (2000 – 2005) B.Sc. in Computer Science, graduated: June 2005 Major in <i>Artificial Intelligence and Parallel Algorithms</i> GPA: 3.84/4.0 Graduation thesis: <i>Learning Parallel Portfolios of Algorithms</i>	
JOURNAL ARTICLES	<ul style="list-style-type: none">◇ Dan Iancu, Marek Petrik, Dharmashankar Subramanian, <i>Tight approximations of dynamic risk measures</i>, Mathematics of Operations Research 40(3), 2015.◇ Amit Dhurandhar, Marek Petrik, <i>Efficient and accurate methods for updating generalized linear models with multiple feature additions</i>, Journal of Machine Learning Research 15:2607–2627, 2014.◇ Markus Ettl, Prateek Jain, Ronny Luss, Marek Petrik, Rajesh Ravi, Chitra Venkatramani, <i>Combining social media and customer behavior analytics for personalized customer engagements</i>, IBM Journal of Research and Development 58(5/6):7:1-7:12, 2014.◇ Marek Petrik and Shlomo Zilberstein, <i>Robust approximate bilinear programming for value function approximation</i>, Journal of Machine Learning Research 12:3027–3063, 2011◇ Marek Petrik, <i>Optimization-based Approximate Dynamic Programming</i>, Ph.D. Dissertation 2010, University of Massachusetts Amherst.◇ Marek Petrik and Shlomo Zilberstein, <i>A bilinear programming approach for multiagent systems</i>, Journal of Artificial Intelligence Research 35:235–274, 2009.◇ Jeff Johns, Marek Petrik, and Sridhar Mahadevan, <i>Hybrid Least-Squares Algorithms for Approximate Policy Evaluation</i>, Machine Learning 76(2):243–256 and European Conference on Machine Learning (ECML), 2009.◇ Marek Petrik and Shlomo Zilberstein, <i>Learning parallel portfolios of algorithms</i>, Annals of Mathematics and Artificial Intelligence, 48(1-2):85–106, 2006.	

REFEREED
CONFERENCE
PUBLICATIONS

- ◇ Bo Liu, Ji Liu, Mohammad Ghavamzadeh, Sridhar Mahadevan, Marek Petrik, *Finite-Sample Analysis of Proximal Gradient TD Algorithms*, Uncertainty in Artificial Intelligence (UAI), 2015, (Best Student Paper Award) (Acceptance rate: 25 %)
- ◇ Marek Petrik, Xiaojian Wu, *Optimal Threshold Control for Energy Arbitrage with Degradable Battery Storage*, Uncertainty in Artificial Intelligence (UAI), 2015, (Acceptance rate: 25 %)
- ◇ Marek Petrik, Dharmashankar Subramanian, *RAAM: The benefits of robustness in approximating aggregated MDPs in reinforcement learning*, Neural Information Processing Systems (NIPS), 2014. (Acceptance rate: spotlight 4.8%)
- ◇ Francisco Barahona, Markus Ettl, Marek Petrik, Peter Rimshnick, *Optimizing deliveries in agile supply chains with demand shocks*, Winter Simulation Conference, 2013.
- ◇ Janusz Marecki, Marek Petrik, Dharmashankar Subramanian, *Solution methods for constrained Markov decision process with continuous probability modulation*, Conference on Uncertainty in Artificial Intelligence (UAI), 2013. (Acceptance rate: 31%)
- ◇ Marek Petrik and Dharmashankar Subramanian, *An approximate solution method for large risk-averse Markov decision processes*, Conference on Uncertainty in Artificial Intelligence (UAI), 2012. (Acceptance rate: 31%)
- ◇ Marek Petrik, *Approximate dynamic programming by minimizing distributionally robust bounds*, International Conference on Machine Learning (ICML), 2012. (Acceptance rate: 27%)
- ◇ Marek Petrik and Shlomo Zilberstein, *Resource management using point-based dynamic programming*, Proceedings of the 25th Conference on Artificial Intelligence (AAAI), 2011. (Acceptance rate 24.8%)
- ◇ Marek Petrik, Gavin Taylor, Ron Parr, and Shlomo Zilberstein, *Feature selection using regularization in approximate linear programs for Markov decision processes*, Proceedings of the International Conference on Machine Learning (ICML) 27, 2010. (Acceptance rate: 26%)
- ◇ Marek Petrik and Shlomo Zilberstein, *Robust value function approximation using bilinear programming*, Proceedings of the Advances in Neural Information Processing Systems (NIPS) 22, 2009. (Acceptance rate — spotlight: 8%)
- ◇ Marek Petrik and Shlomo Zilberstein, *Constraint relaxation in approximate linear programs*, Proceedings of the International Conference on Machine Learning (ICML), 2009. (Acceptance rate 26%)
- ◇ Marek Petrik and Bruno Scherrer, *Biasing approximate dynamic programming with a lower discount factor*, Proceedings of the Advances in Neural Information Processing Systems (NIPS) 21, 2008. (Acceptance rate 27%)
- ◇ Marek Petrik and Shlomo Zilberstein, *Learning heuristic functions through approximate linear programming*, Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2008. (Acceptance rate 34%)
- ◇ Martin Allen, Marek Petrik, and Shlomo Zilberstein, *Interaction structure and dimensionality in decentralized problem solving*, Proceedings of the Conference on Artificial Intelligence (AAAI) (Short Paper), 2008. (Acceptance rate 26%)

- ◇ Marek Petrik and Shlomo Zilberstein, *Anytime coordination using separable bilinear programs*, Proceedings of the Conference on Artificial Intelligence (AAAI), 2007. (Acceptance rate 27%)
 - ◇ Marek Petrik *An analysis of Laplacian methods for value function approximation in MDPs*, Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI), 2007 (Acceptance rate 16%)
 - ◇ Marek Petrik and Shlomo Zilberstein, *Average-reward decentralized Markov decision processes*, Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI), 2007 (Acceptance rate 16%)
- PEER-REVIEWED SYMPOSIA
- ◇ Marek Petrik, Dharmashankar Subramanian, *RAAM: The Benefits of Robustness in Approximating Aggregated MDPs in Reinforcement Learning*, From Bad Models to Good Policies (Sequential Decision Making under Uncertainty), NIPS Workshop, 2014.
 - ◇ Marek Petrik, *Distributionally Robust Approach to Approximate Dynamic Programming*, European Workshop on Reinforcement Learning, 2012.
 - ◇ Brenda Dietrich, Markus Ettl, Roger D. Lederman, Marek Petrik, *Optimizing the end-to-end value chain through demand shaping and advanced customer analytics*, 11th International Symposium on Process Systems Engineering, 2012.
 - ◇ Marek Petrik, *Robust Approximate Optimization for Large Scale Planning Problems*. AAAI Doctoral Consortium, Pasadena, CA, 2009.
 - ◇ Marek Petrik and Shlomo Zilberstein, *A Successive approximation algorithm for coordination problems*. In Proceedings of the International Symposium on Artificial Intelligence and Mathematics, Fort Lauderdale, FL, 2008
 - ◇ Marek Petrik and Shlomo Zilberstein, *Learning static parallel portfolios of algorithms*. In Proceedings of the International Symposium on Artificial Intelligence and Mathematics, Fort Lauderdale, FL, 2006.
 - ◇ Marek Petrik, *Statistically optimal combination of algorithms*. In Proceedings of the International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM), 2005.
- BOOK CHAPTERS
- ◇ Marek Petrik and Shlomo Zilberstein, *Learning Feature-Based Heuristic Functions*. In Y. Hamadi, E. Monfroy, and F. Saubion (Eds.), *Autonomous Search*, Springer, June, 2011.
- INVITED TALKS & PRESENTATIONS
- ◇ Stephen Becker, Marek Petrik, Ban Kawas, Karthikeyan N. Ramamurthy, *Robust Compressed Least Squares Regression*, Out of the Box: Robustness in High Dimension, NIPS Workshop, 2014
 - ◇ Marek Petrik, Dharmashankar Subramanian, *Using Robustness in Approximate Dynamic Programming*, INFORMS Annual Meeting, 2014
 - ◇ Marek Petrik, *Using Robust Optimization for Solving Large Data-driven Problems*, CS Colloquium, University of Colorado, Boulder, 2014.
 - ◇ Marek Petrik, *Using Robustness in Value Function Approximation*, Modeling and Optimization: Theory and Applications (MOPTA), 2014

- ◇ Marek Petrik, *Distributionally Robust Approach to Approximate Dynamic Programming*, OR & OM Seminar, Tepper School of Business, Carnegie Mellon University, 2012
- ◇ Marek Petrik, Dharmashankar Subramanian, *Feature Selection in Linear Dynamical Systems*, INFORMS Annual Meeting, 2012
- ◇ Marek Petrik, *Distributionally Robust Approach to Approximate Dynamic Programming*, INFORMS Annual Meeting, 2011
- ◇ Marek Petrik, Dharmashankar Subramanian, *Risk Sensitive Resource Management in Dynamic Settings*, INFORMS Annual Meeting, 2011
- ◇ Dan Iancu, Marek Petrik, Dharmashankar Subramanian, Pu Huang, *The Price of Dynamic Inconsistency for Distortion Risk Measures*, INFORMS Annual Meeting 2011
- ◇ Marek Petrik, *Optimization-based Methods for Approximate Dynamic Programming*, INFORMS Annual Meeting, 2010.
- ◇ Marek Petrik, *Approximate Dynamic Programming for Resource Management*, IBM T.J. Watson Research Center, 2010
- ◇ Marek Petrik, *Approximate Dynamic Programming for Resource Management*, Robotics Institute, Carnegie-Mellon University, 2010
- ◇ Marek Petrik and Shlomo Zilberstein, *Value Function Approximation for Reservoir Management*, 2nd International Conference on Computational Sustainability, 2010
- ◇ Marek Petrik and Shlomo Zilberstein, *Blood Inventory Management Using Approximate Linear Programming* Marek Petrik and Shlomo Zilberstein. Presented at INFORMS Computing Society Meeting, Charleston, SC, 2009
- ◇ Marek Petrik and Shlomo Zilberstein, *Constraint Relaxation in Approximate Linear Programs*. Dagstuhl Seminar 09181: “Sampling-based Optimization”, Dagstuhl, Germany, 2009
- ◇ Marek Petrik, *Aggregation in MDPs: Policy iteration and linear programming*. Presented at New England Student Colloquium on Artificial Intelligence, 2007.
- ◇ Marek Petrik, Shlomo Zilberstein, *Coordination in multi-agent systems*. Presented at MAIA research group in INRIA 2007.
- ◇ Marek Petrik *Basis construction using Krylov method*. Presented at TAM 2006, Bratislava, Slovakia.
- ◇ Marek Petrik, *Knowledge representation for expert systems*. Presented at International Conference for Undergraduate and Graduate Students of Applied Mathematics 2004.

TECHNICAL REPORTS

- ◇ Pu Huang, Dan Iancu, Marek Petrik, Dharmashankar Subramanian, *The Price of Dynamic Inconsistency for Distortion Risk Measures*, arXiv 2011.
- ◇ Marek Petrik and Shlomo Zilberstein, *Global Optimization for Value Function Approximation*, arXiv 2010.
- ◇ Marek Petrik, Gavin Taylor, Ron Parr, and Shlomo Zilberstein, *Feature selection using regularization in approximate linear programs for Markov decision processes*, arXiv 1005.1860.
- ◇ Marek Petrik and Shlomo Zilberstein, *Robust Value Function Approximation Using Bilinear Programming*. University of Massachusetts Technical Report UM-CS-2009-052, 2009.

- ◇ Martin Allen, Marek Petrik, and Shlomo Zilberstein, *Interaction Structure and Dimensionality Reduction in Decentralized MDPs*. University of Massachusetts Technical Report UM-CS-2008-11, 2008.
- GRANTS
- ◇ Co-authored a funded AFOSR grant “Adaptive Optimization Techniques for Large-Scale Stochastic Planning”, FA9550-08-1-0171
 - ◇ Took a class on writing grant proposals: “The Grant Process: From Solicitation to Award ”
- AWARDS
- ◇ Awarded Graduate School Fellowship, University of Massachusetts Amherst, 2008-2009
 - ◇ Passed portfolio (Ph.D. candidacy exam) with distinction, University of Massachusetts Amherst 2008
 - ◇ Received: “Outstanding Synthesis Project” award for “A linear programming approach to bounds and basis construction for Markov decision processes”, 2007-2008
 - ◇ 2nd Place in Tetris Domain in Reinforcement Learning Competition 2008 (with Jeff Johns and Colin Barringer)
 - ◇ Invited to Dagstuhl seminar 09181: “Sampling-based Optimization”
 - ◇ Final Round of Microsoft Fellowship 2007/2008
 - ◇ AAAI Doctoral Consortium 2009
- EMPLOYMENT
- ◇ **Research Staff Member**, IBM T.J. Watson Research Center, Yorktown, NY (December 2011 – present)
Department of Business Analytics and Mathematical Sciences
 - Supply chain optimization
 - Revenue and demand management
 - Dynamic recommender systems
 - Portfolio / resource management
 - Dynamic optimization for precision agriculture
 - Machine learning for environmental monitoring
 - ◇ **Postdoctoral Researcher**, IBM T.J. Watson Research Center, Yorktown, NY (July 2010 – November 2011)
Department of Business Analytics and Mathematical Sciences
 - Supply chain optimization and disaster response
 - Revenue and demand management
 - ◇ **Research/Teaching Assistant**, University of Massachusetts Amherst (September 2005 – June 2010)
Resource bounded reasoning lab
 - ◇ **Researcher and Developer**, Whitestein Technologies (October 2003 – August 2005)
Optimization of large-scale production and transport processes.

- Research on Multi-agent systems and optimization
- Combinatorial optimization for production planning and vehicle routing
- Constraint programming, Mozart, Prolog, Java
- ◇ **Programmer**, OneTwoTech (June 2001 – June 2003)
Design, implementation and evaluation of new technologies for a web-application server, using: Advanced .NET Framework, COM+, MS SQL Server, Web Services
- ◇ **Programmer** SWTeam (July 2000 – July 2001) Implementation of high performance components for client-side data management for multi-dimensional (OLAP) databases using: C++, MS SQL.

PROGRAMMING EXPERIENCE ◇ Python, C/C++, F#, Java, Scala, C#, Matlab, R, SQL, MongoDB, GDAL

- TEACHING EXPERIENCE
- ◇ Guest lecture: “Abstraction and Hierarchical Search”, Artificial Intelligence class, Fall 2009
 - ◇ Attended a pedagogy class on: “Scientific Teaching”, Spring 2009
 - ◇ Teaching assistant: “Artificial Intelligence”, Spring 2008
 - ◇ Organized and taught a study group on: “Linear Programming and Mathematical Optimization”, Fall 2007

- PROFESSIONAL SERVICE
- ◇ **Journal Reviewing**
 - Mathematics of Operations Research, 2012–2015
 - Operations Research, 2013–2015
 - Journal of Artificial Intelligence Research 2008–2015
 - Journal of Machine Learning Research 2008–2015
 - AdHoc Networks Journal 2015
 - A Quarterly Journal of Operations Research 2015
 - Information Processing Letters 2011
 - International Journal of Approximate Reasoning 2011
 - Journal of Autonomous Agents and Multi-Agent Systems 2007–2010
 - IEEE Transactions on Automatic Control 2009–2010
 - Annals of Mathematics and Artificial Intelligence 2006, 2010
 - Applied Stochastic Models in Business and Industry 2015
 - ◇ **Program Committee of Conferences**
 - International Conference on Machine Learning (ICML), 2011–2015
 - Conference on Artificial Intelligence (AAAI) 2008, 2012–2015
 - Advances in Neural Information Processing Systems (NIPS), 2011–2015
 - Uncertainty in Artificial Intelligence (UAI) 2010, 2013–2015
 - Artificial Intelligence and Statistics (AI-STATS), 2011, 2012
 - International Symposium on Artificial Intelligence and Mathematics 2011

- International Joint Conference on Artificial Intelligence (IJCAI) 2009, 2011, 2013
- Autonomous Agents and Multiagent Systems (AAMAS) 2010
- ◇ **Other Organizing**
 - Local co-chair of ICML 2016
- ◇ **Conference Reviewing**
 - North-East Student Colloquium on Artificial Intelligence (NESCAI) 2010
 - International Conference on Automated Planning and Scheduling (ICAPS) 2007–2009
 - National Conference on Artificial Intelligence (AAAI) 2006
 - International Symposium on Artificial Intelligence and Mathematics 2006
- ◇ **Other Reviewing**
 - Judge for SIAM Moody’s Mega Math Challenge 2014, 2015

REFERENCES

- ◇ **Shlomo Zilberstein** Professor of Computer Science
 Department of Computer Science *Tel:* (+1) 413-545-4189
 University of Massachusetts *Email:* shlomo@cs.umass.edu
 Amherst, MA 01003 USA *Web:* <http://cs.umass.edu/~shlomo>
- ◇ **Ronald Parr** Professor of Computer Science and Department Chair
 Department of Computer Science *Tel:* (+1) 919-660-6537
 Duke University *Email:* parr@cs.duke.edu
 Durham, NC 27708 USA *Web:* <http://cs.duke.edu/~parr>
- ◇ **Csaba Szepesvari** Professor of Computer Science
 Department of Computer Science *Tel:* (+1) 780-492-8581
 University of Alberta *Email:* szepesva@cs.ualberta.ca
 Edmonton, Alberta, Canada *Web:* <http://www.ualberta.ca/~szepesva/>
- ◇ **Dan A. Iancu** Assistant Professor of Operations, Information and Technology
 Graduate School of Business *Tel:* (+1) 650-724-6642
 Stanford University *Email:* daniiancu@stanford.edu
 Stanford, CA 94305 *Web:* <http://www.stanford.edu/~daniiancu>