

# Marek Petrik

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| CONTACT            | Department of Computer Science<br>University of New Hampshire<br>Durham, NH   | <i>Tel:</i> (+1)-603-862-2682<br><i>Email:</i> mpetrik@cs.unh.edu<br><i>Web:</i> <a href="http://cs.unh.edu/~mpetrik">http://cs.unh.edu/~mpetrik</a> |
| RESEARCH INTERESTS | Reinforcement learning, robust and risk-averse optimization, machine learning, natural resource management, pest management.  |  |
| EMPLOYMENT         | <ul style="list-style-type: none"><li>◇ <b>Assistant Professor</b>, Computer Science Department, University of New Hampshire, Durham, NH<br/>(August 2016 – present)</li><li>◇ <b>Research Staff Member</b>, IBM T.J. Watson Research Center, Yorktown, NY<br/>(December 2011 – August 2016)<br/><i>(Business Analytics/Solutions) and Mathematical Sciences</i><ul style="list-style-type: none"><li>· Precision agriculture, forecasting and optimization</li><li>· Online recommender and personalization system</li><li>· Robust supply chain optimization, revenue management, customer models</li></ul></li><li>◇ <b>Postdoctoral Researcher</b>, IBM T.J. Watson Research Center, Yorktown, NY<br/>(July 2010 – November 2011)<br/><i>Department of Business Analytics and Mathematical Sciences</i><ul style="list-style-type: none"><li>· Supply chain optimization and disaster response <i>Department of Business Analytics and Mathematical Sciences</i></li></ul></li><li>◇ <b>Research/Teaching Assistant</b>, University of Massachusetts Amherst<br/>(September 2005 – June 2010)<br/>Resource bounded reasoning lab</li><li>◇ <b>Researcher and Developer</b>, Whitestein Technologies<br/>(October 2003 – August 2005)<br/>Optimization of large-scale production and transport processes.<ul style="list-style-type: none"><li>· Research on Multi-agent systems and optimization</li><li>· Combinatorial optimization for production planning and vehicle routing</li></ul></li><li>◇ <b>Programmer</b>, OneTwoTech (June 2001 – June 2003)<br/>Design, implementation and evaluation of new technologies for a web-application server, using: Advanced .NET Framework, COM+, MS SQL Server, Web Services</li><li>◇ <b>Programmer</b> SWTeam (July 2000 – July 2001) Implementation of high performance components for client-side data management for multi-dimensional (OLAP) databases using: C++, MS SQL.</li></ul> |  |
| EDUCATION          | <ul style="list-style-type: none"><li>◇ <b>University of Massachusetts Amherst</b>, Amherst, MA, USA. (2005 – 2010)<br/>Ph.D. in Computer Science: September 1, 2010, GPA: 4.0/4.0<br/><i>Advisor:</i> Shlomo Zilberstein<br/><i>Thesis:</i> Optimization-based Approximate Dynamic Programming<br/><i>Committee:</i> Shlomo Zilberstein, Andrew Barto, Sridhar Mahadevan, Ana Muriel, Ronald Parr</li></ul>  |  |

- ◇ **University of Massachusetts Amherst**, Amherst, MA, USA. (2005 – 2008)  
M.Sc. in Computer Science, May 2008, GPA: 4.0/4.0
- ◇ **Univerzita Komenskeho**, Bratislava, Slovakia. (2000 – 2005)  
B.Sc. in Computer Science, graduated: June 2005  
Major in *Artificial Intelligence and Parallel Algorithms*  
GPA: 3.84/4.0 Graduation thesis: *Learning Parallel Portfolios of Algorithms*

JOURNAL  
ARTICLES

- ◇ Bo Liu, Mohammad Ghavamzadeh, Ian Gemp, Mohammad Ghavamzadeh, Ji Liu, Sridhar Mahadevan, Marek Petrik, *Proximal Gradient Temporal Difference Learning: Stable Reinforcement Learning with Polynomial Sample Complexity*, Journal of Artificial Intelligence Research (63):462-493, 2018.
- ◇ Dan Iancu, Marek Petrik, Dharmashankar Subramanian, *Tight approximations of dynamic risk measures*, Mathematics of Operations Research 40(3), 2015.
- ◇ Amit Dhurandhar, Marek Petrik, *Efficient and accurate methods for updating generalized linear models with multiple feature additions*, Journal of Machine Learning Research 15:2607–2627, 2014.
- ◇ Markus Ettl, Prateek Jain, Ronny Luss, Marek Petrik, Rajesh Ravi, Chitra Venkatramani, *Combining social media and customer behavior analytics for personalized customer engagements*, IBM Journal of Research and Development 58(5/6):7:1-7:12, 2014.
- ◇ Marek Petrik and Shlomo Zilberstein, *Robust approximate bilinear programming for value function approximation*, Journal of Machine Learning Research 12:3027–3063, 2011
- ◇ Marek Petrik, *Optimization-based Approximate Dynamic Programming*, Ph.D. Dissertation 2010, University of Massachusetts Amherst.
- ◇ Marek Petrik and Shlomo Zilberstein, *A bilinear programming approach for multiagent systems*, Journal of Artificial Intelligence Research 35:235–274, 2009.
- ◇ Jeff Johns, Marek Petrik, and Sridhar Mahadevan, *Hybrid Least-Squares Algorithms for Approximate Policy Evaluation*, Machine Learning 76(2):243–256 and European Conference on Machine Learning (ECML), 2009.
- ◇ Marek Petrik and Shlomo Zilberstein, *Learning parallel portfolios of algorithms*, Annals of Mathematics and Artificial Intelligence, 48(1-2):85–106, 2006.

REFEREED  
CONFERENCE  
PUBLICATIONS

- ◇ Andrea Tirinzoni, Xiangli Chen, Marek Petrik and Brian Ziebart, *Policy-Conditioned Uncertainty Sets for Robust Markov Decision Processes*, Neural Information Processing Systems (NIPS), 2018, (Acceptance rate: 20%, spotlight 3%)
- ◇ Ching Pang Ho, Marek Petrik, Wolfram Wiesemann, *Fast Bellman Updates for Robust MDPs*, International Conference on Machine Learning (ICML), 2018, (Acceptance rate: 24%)
- ◇ Bence Cserna, Marek Petrik, Reazul Hasan Russel, Wheeler Ruml, *Value Directed Exploration in Multi-Armed Bandits with Structured Priors*, Uncertainty in Artificial Intelligence (UAI), 2017. (Acceptance rate: 31%)
- ◇ Adam N. Elmachtoub, Ryan McNellis, Marek Petrik, *A Practical Method for Solving Contextual Bandit Problems Using Decision Trees*, Uncertainty in Artificial Intelligence (UAI), 2017. (Plenary presentation, Acceptance rate: 31%)

- ◇ Stephen Becker, Ban Kawas, Karthikeyan N. Ramamurthy, Marek Petrik, *Robust Partially-Compressed Least-Squares*, National Conference of AAAI, 2017 (Acceptance rate: 25%)
- ◇ Marek Petrik, Yinlam Chow, Mohammad Ghavamzadeh, *Safe Policy Improvement by Minimizing Robust Baseline Regret*, Advances in Neural Information Processing Systems (NIPS) 2016, (Acceptance rate: 22%)
- ◇ Marek Petrik, Ronny Luss, *Interpretable Policies for Dynamic Product Recommendations*, Uncertainty in Artificial Intelligence (UAI) 2016, (Acceptance rate: 31%).
- ◇ 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%)
- ◇ Reazul Hasan Russel, Marek Petrik, *Tight Bayesian Ambiguity Sets for Robust MDPs*, Infer2Control NIPS Workshop, 2018.
- ◇ Bahram Behzadian, Marek Petrik, *Feature Selection by Singular Value Decomposition for Reinforcement Learning*, Prediction and Generative Modeling in Reinforcement Learning Workshop, IJCAI/ICML 2018.
- ◇ Andrea Tirinzoni, Xiangli Chen, Marek Petrik and Brian Ziebart, *Policy-Conditioned Uncertainty Sets for Robust Markov Decision Processes*, Planning and Learning Workshop, IJCAI/ICML 2018.
- ◇ Andreas Lydakis, Jenica Allen, Marek Petrik, Tim Szewczyk, *Computing Robust Strategies for Managing Invasive Plants*, AI for Wildlife Conservation Workshop at IJCAI/ICML, 2018.
- ◇ Talha Siddique, Shadi S. Atallah, Marek Petrik, *Farm spatial configurations for increased pest resistance*, Northeastern Agricultural and Resource Economics Association, 2018.
- ◇ Talha Siddique, Shadi S. Atallah, Marek Petrik, *Optimal farm spatial configurations for increased pest resistance: a bio-economic application to apple orchards*, Southern Economic Alliance meeting, 2018.
- ◇ Bahram Behzadian, Marek Petrik, *Low-rank Feature Selection for Reinforcement Learning*, International Symposium on Artificial Intelligence and Mathematics, 2018.
- ◇ Amit Dhurandhar, Sechan Oh, Marek Petrik, *Building an Interpretable Recommender via Loss-Preserving Transformation*, ICML Workshop on Human Interpretability in Machine Learning (WHI 2016), 2016.
- ◇ Marek Petrik, Yinlam Chow, Mohammad Ghavamzadeh, *Safe Policy Improvement by Minimizing Robust Baseline Regret*, ICML Workshop on Reliable Machine Learning in the Wild, 2016.
- ◇ 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.

PEER-  
REVIEWED  
SYMPOSIA

- ◇ 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

- ◇ Marek Petrik, *Using Prior Knowledge in Reinforcement Learning*, Imperial College, 2018.
- ◇ Marek Petrik, *Robust Reinforcement Learning*, Oracle Research, 2017.
- ◇ Marek Petrik, *Robust Reinforcement Learning*, Lehigh University, 2017.
- ◇ Marek Petrik, Mohammad Ghavamzadeh, Yinlam Chow, *Computing Safe Policies with Inaccurate Models*, SIAM Conference on Optimization, 2017.
- ◇ Marek Petrik, Mohammad Ghavamzadeh, Yinlam Chow, *Computing Safe Policies with Inaccurate Models*, Data Learning and Inference (DALI), 2016.
- ◇ Marek Petrik, Ronny Luss, Rajesh Ravi, Markus Ettl, *Strategic Interpretable Online Recommendations*, NIPS eCommerce workshop 2015.
- ◇ Marek Petrik, *Threshold Policies for Energy Arbitrage*, INFORMS Annual Meeting, 2015.
- ◇ Marek Petrik, *Robust Approximate Dynamic Programming*, INFORMS Annual Meeting, 2015.
- ◇ Marek Petrik, *Benefits of Robust Optimization*, University of Massachusetts, Amherst, 2015.
- ◇ 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

- ◇ Stephen Becker, Ban Kawas, Marek Petrik, Karthikeyan N. Ramamurthy, *Robust Partially-Compressed Least-Squares*, arXiv:1510.04905, 2015.
- ◇ Yinlam Chow, Marek Petrik, Mohammad Ghavamzadeh, *Robust Policy Optimization with Baseline Guarantees*, arXiv:1506.04514, 2015.
- ◇ 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.

#### FUNDING

- ◇ NSF RI 1815275: *Robust Reinforcement Learning Using Bayesian Models*, 2018–2021, \$437, 753. (PI)
- ◇ NSF III 1717368: *Robust Reinforcement Learning for Invasive Species Management*, 2017–2020, \$497, 335. (PI, co-PI: Jenica Allen)
- ◇ IBM Faculty Award 2017, \$30, 000
- ◇ Served on 2 NSF CISE panels, 2017
- ◇ Co-authored a funded AFOSR proposal “Adaptive Optimization Techniques for Large-Scale Stochastic Planning”, FA9550-08-1-0171

#### AWARDS

- ◇ IBM Faculty Award, 2017
- ◇ (Co-author) Best Student Paper Award, UAI 2015
- ◇ IBM Research Division Award, “DataCenter Risk Resiliency Rationalization Analysis”, 2013
- ◇ IBM First Patent Application Invention Achievement Award, “Robust Inventory Management in Multi-Stage Inventory Networks with Demand Shocks”, 2012
- ◇ 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

#### PROGRAMMING EXPERIENCE

- ◇ Python, C/C++ , R, F#, Java, Scala, C#, Matlab, SQL, GDAL, Stan, WinBugs

#### PROFESSIONAL SERVICE

- ◇ **Local (co)chair of ICML 2016**

◇ **Journal Reviewing**

- SIAM Journal on Optimization 2016, 2017
- Machine Learning 2016, 2017
- Mathematics of Operations Research 2012–2016
- Operations Research 2013–2018
- Journal of Artificial Intelligence Research 2008–2018
- Artificial Intelligence 2017
- Journal of Machine Learning Research 2010–2016
- European Journal of Operations Research 2017
- Computational Optimization and Applications 2017
- 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, 2016–2017
- Annals of Mathematics and Artificial Intelligence 2006, 2010
- Applied Stochastic Models in Business and Industry 2015

◇ **Senior Program Committee of Conferences**

- International Joint Conference on Artificial Intelligence (IJCAI) 2018
- Conference on Artificial Intelligence (AAAI) 2019

◇ **Program Committee of Conferences**

- International Conference on Machine Learning (ICML) 2011–2015, 2017, 2018
- Advances in Neural Information Processing Systems (NIPS) 2011–2017
- Conference on Artificial Intelligence (AAAI) 2008, 2012–2018
- International Conference on Automated Planning and Scheduling (ICAPS) 2017, 2018
- Uncertainty in Artificial Intelligence (UAI) 2010, 2013–2016
- Conference on Knowledge Discovery and Data Mining (KDD) 2016
- International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2016
- Artificial Intelligence and Statistics (AI-STATS) 2011, 2012, 2016, 2017, 2018, 2019
- International Symposium on Artificial Intelligence and Mathematics 2011
- International Joint Conference on Artificial Intelligence (IJCAI) 2009, 2011, 2013, 2016, 2018
- Autonomous Agents and Multiagent Systems (AAMAS) 2010, 2016, 2017

◇ **Conference Reviewing**



- Neural Information Processing Systems (NIPS) 2018
- 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
- ◇ **Panels and Reviewing**
  - NSF CISE 2017
  - NSF CISE 2017
  - UNH Core 2018
- ◇ **Other Reviewing**
  - Judge for SIAM Moody’s Mega Math Challenge 2014, 2015