Michael Katz

Curriculum Vitae

PERSONAL DETAILS

Mailing Address:	11 West Meadow Rd Goldens Bridge, NY 10526, USA
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ACADEMIC DEGREES

Ph.D. 2010, IS, Faculty of Industrial Engineering and Management, Technion, Israel.

M.Sc. 2007, IS, Faculty of Industrial Engineering and Management, Technion, Israel.

B.A. 2002, Math and Computer Science, Faculty of Mathematics, Technion, Israel.

RESEARCH INTERESTS

Autonomous systems and automated decision making, general (domain independent) problem solving, automated planning and heuristic search, planning complexity, domain dependent problem solving, constraint satisfaction and optimization, combinatorics and graph algorithms, accessibility of optimization and combinatorial problems modeling and solving to domain experts in problems domains (e.g., software developers), connections between automated planning and reinforcement learning

TEACHING EXPERIENCE

- *Introduction to Automated Planning*, Haifa University, Spring 2017
- *Heuristic Search Algorithms Seminar*, Saarland University, Winter 2012
- *Automatic Planning*, Saarland University, Winter 2012 (TA)
- *Automated Planning*, Technion (096208), Spring 2008, Spring 2009 (TA)
- *Introduction to Artificial Intelligence*, Technion (096210), Winter 2010 (TA)

PUBLICATIONS

Thesis

- M. Katz, *Implicit Abstraction Heuristics for Cost-Optimal Planning*, PhD Thesis, Faculty of Industrial Engineering and Management, Technion, Israel Institute of Technology, Technion City, Haifa, Israel.
  Summary published in AI Communications Journal, 2011, Volume 24, Number 4, pages 343-345.

Journal Papers

- S. Sohrabi, M. Katz, O. Hassanzadeh, O. Udrea, M. Feblowitz, A. Riabov, *IBM Scenario Planning Advisor: Plan recognition as AI planning in practice*, AI Communications Journal, 2019, Volume 32, pages 1-13.

- C. Domshlak, J. Hoffmann, M. Katz*, *Red-black planning: a new systematic approach to partial delete relaxation*, Artificial Intelligence Journal (AIJ), 2015, Volume 221, pages 73–114.

- C. Domshlak, M. Katz*, S. Lefler, *Landmark-Enhanced Abstraction Heuristics*, Artificial Intelligence Journal (AIJ), 2012, Volume 189, pages 48-68.

- M. Katz, C. Domshlak, *Implicit Abstraction Heuristics*, Journal of Artificial Intelligence Research (JAIR), 2010, Volume 39, pages 51-126.

- M. Katz, C. Domshlak, *Optimal Admissible Composition of Abstraction Heuristics*, Artificial Intelligence Journal (AIJ), 2010, Volume 174, pages 767-798.

- M. Katz, C. Domshlak, *New Islands of Tractability of Cost-Optimal Planning*, Journal of Artificial Intelligence Research (JAIR), 2008, Volume 32, pages 203-288.

Conference Papers

- M. Katz, P. Ram, S. Sohrabi, O. Udrea *Exploring Context-Free Languages via Planning: The Case for Automating Machine Learning*, The 30th International Conference on Automated Planning and Scheduling (ICAPS), 2020, Nancy, France.

- M. Katz, S. Sohrabi, O. Udrea, *Top-Quality Planning: Finding Practically Useful Sets of Best Plans*, The 34th AAAI Conference on Artificial Intelligence (AAAI), 2020, New York, NY, USA.

*Authors are ordered alphabetically

- T. Ma, P. Ferber, S. Huo, J. Chen, M. Katz, *Online Planner Selection with Graph Neural Networks and Adaptive Scheduling*, The 34th AAAI Conference on Artificial Intelligence (AAAI), 2020, New York, NY, USA.

- M. Vukovic, S. Gerard, R. Hull, M. Katz, L. Shwartz, S. Sohrabi, C. Muise, J. Rofrano, A. Kalia, J. Hwang, D. Yabin, M. Jie, J. Zhuoxuan, *Towards Automated Planning for Enterprise Services: Opportunities and Challenges*, International Conference on Service-Oriented Computing (ICSOC), 2019, Toulouse, France.

- O. Hassanzadeh, D. Bhattacharjya, M. Feblowitz, K. Srinivas, M. Perrone, S. Sohrabi, M. Katz, *Answering binary causal questions through large-scale text mining: An evaluation using cause-effect pairs from human experts*, 28th International Joint Conference on Artificial Intelligence (IJCAI), 2019, Macao, China.

- M. Katz, *Red-Black Heuristics for Planning Tasks with Conditional Effects*, The 33rd AAAI Conference on Artificial Intelligence (AAAI), 2019, Honolulu, HI.

- S. Sievers, M. Katz, S. Sohrabi, H. Samulowitz, P. Ferber, *Deep learning for cost-optimal planning: Task-dependent planner selection*, The 33rd AAAI Conference on Artificial Intelligence (AAAI), 2019, Honolulu, HI, USA.

- M. Katz, E. Keyder, D. Winterer, F. Pommerening, *Oversubscription Planning as Classical Planning with Multiple Cost Functions*, The 29th International Conference on Automated Planning and Scheduling (ICAPS), 2019, Berkeley, CA, USA.

- S. Sievers, G. Roeger, M. Wehrle, M. Katz, *Theoretical foundations for structural symmetries of lifted pddl tasks*, The 29th International Conference on Automated Planning and Scheduling (ICAPS), 2019, Berkeley, CA, USA.

- G. Roeger, S. Sievers, M. Katz, *A Symmetry-based Task Reduction for Relaxed Reachability Analysis*, The 28th International Conference on Automated Planning and Scheduling (ICAPS), 2018, Delft, Netherlands.

- M. Katz, S. Sohrabi, O. Udrea, D. Winterer, *A Novel Iterative Approach to Top-k Planning*, The 28th International Conference on Automated Planning and Scheduling (ICAPS), 2018, Delft, Netherlands.

- S. Sohrabi, A. Riabov, M. Katz, O. Udrea, *An AI Planning Solution to Scenario Generation for Enterprise Risk Management*, The 32nd AAAI Conference on Artificial Intelligence (AAAI), 2018, New Orleans, LA, USA.

- M. Katz, D. Moshkovich, E. Karpas, *Semi-Black Box: Rapid Development of Planning Based Solutions*, The 32nd AAAI Conference on Artificial Intelligence (AAAI), 2018, New Orleans, LA, USA.

- S. Sievers, M. Wehrle, M. Helmert, M. Katz, *Strengthening Canonical Pattern Databases with Structural Symmetries*, The 10th Annual Symposium on Combinatorial Search (SoCS), 2017, Pittsburgh, PA, USA.

- D. Winterer, Y. Alkhazraji, M. Katz, M. Wehrle, *Stubborn Sets for Fully Observable Nondeterministic Planning*, The International Conference on Automated Planning and Scheduling (ICAPS), 2017, Pittsburgh, PA, USA.

- M. Katz, N. Lipovetzky, D. Moshkovich, A. Tuisov, *Adapting Novelty to Classical Planning as Heuristic Search*, The International Conference on Automated Planning and Scheduling (ICAPS), 2017, Pittsburgh, PA, USA.

- M. Katz, V. Mirkis, *In Search of Tractability for Partial Satisfaction Planning*, 25th International Joint Conference on Artificial Intelligence (IJCAI), 2016, New York, NY, USA.

- D. Winterer, M. Wehrle, M. Katz, *Structural Symmetries for Fully Observable Nondeterministic Planning*, 25th International Joint Conference on Artificial Intelligence (IJCAI), 2016, New York, NY, USA.

- A. Shleyfman, M. Katz, M. Helmert, S. Sievers, M. Wehrle, *Heuristics and Symmetries in Classical Planning*, 29th AAAI Conference on Artificial Intelligence (AAAI), 2015, Austin, TX, USA.

- S. Sievers, M. Wehrle, M. Helmert, A. Shleyfman, M. Katz, *Factored symmetries for merge-and-shrink abstractions*, 29th AAAI Conference on Artificial Intelligence (AAAI), 2015, Austin, TX, USA.

- S. Sievers, M. Wehrle, M. Helmert, M. Katz, *An Empirical Case Study on Symmetry Handling in Cost-Optimal Planning as Heuristic Search*, 38th German Conference on Artificial Intelligence (KI), 2015, Dresden, Germany.

- M. Wehrle, M. Helmert, A. Shleyfman, M. Katz, *Integrating Partial Order Reduction and Symmetry Elimination for Cost-Optimal Classical Planning*, 24th International Joint Conference on Artificial Intelligence (IJCAI), 2015, Buenos Aires, Argentina.

- M. Katz, J. Hoffmann, *Red-Black Relaxed Plan Heuristics Reloaded*, The Sixth Annual Symposium on Combinatorial Search (SoCS), 2013, Leavenworth, WA, USA.

- M. Katz, J. Hoffmann, C. Domshlak, *Red-Black Relaxed Plan Heuristics*, 27th AAAI Conference on Artificial Intelligence (AAAI), 2013, Bellevue, WA, USA.

- M. Katz, J. Hoffmann, C. Domshlak, *Who Said we Need to Relax All Variables?*, The International Conference on Automated Planning and Scheduling (ICAPS), 2013, Rome, Italy.

- C. Domshlak, M. Katz*, A. Shleyfman, *Symmetry Breaking: Satisficing Planning and Landmark Heuristic*, The International Conference on Automated Planning and Scheduling (ICAPS), 2013, Rome, Italy.

- M. Katz, E. Keyder, *Structural Patterns Beyond Forks: Extending the Complexity Boundaries of Classical Planning*, 26th AAAI Conference on Artificial Intelligence (AAAI), 2012, Toronto, Canada.

- M. Katz, J. Hoffmann, M. Helmert, *How to Relax a Bisimulation?*, The International Conference on Automated Planning and Scheduling (ICAPS), 2012, Sao Paulo, Brazil.

- C. Domshlak, M. Katz*, A. Shleyfman, *Enhanced Symmetry Breaking in Cost-Optimal Planning as Forward Search*, The International Conference on Automated Planning and Scheduling (ICAPS), 2012, Sao Paulo, Brazil.

- E. Karpas, M. Katz*, S. Markovitch, *When Optimal is Just Not Good Enough: Learning Fast Informative Action Cost-Partitioning*, The International Conference on Automated Planning and Scheduling (ICAPS), 2011, Frieburg, Germany.

- C. Domshlak, M. Katz*, S. Lefler, *When Abstractions Met Landmarks*, The International Conference on Automated Planning and Scheduling (ICAPS), 2010, Toronto, Canada.

- M. Katz, C. Domshlak, *Structural-Pattern Databases*, The International Conference on Automated Planning and Scheduling (ICAPS), 2009, Thessaloniki, Greece.

- M. Katz, C. Domshlak, *Structural Patterns Heuristics via Fork Decomposition*, The International Conference on Automated Planning and Scheduling (ICAPS), 2008, Sydney, Australia.

- M. Katz, C. Domshlak, *Optimal Additive Composition of Abstraction-based Admissible Heuristics*, The International Conference on Automated Planning and Scheduling (ICAPS), 2008, Sydney, Australia.

- M. Katz, C. Domshlak, *Structural patterns of tractable sequentially-optimal planning*, The International Conference on Automated Planning and Scheduling (ICAPS), 2007, Providence, RI, USA.

Workshop & DC Papers (Non-archival)

- P. Ferber, T. Ma, S. Huo, J. Chen, M. Katz, *IPC: A Benchmark Data Set for Learning with Graph-Structured Data*, ICML Workshop on Learning and Reasoning with Graph-Structured Data, 2019, Long Beach, CA, USA.

- M. Katz, E. Keyder, *A* Search and Bound-Sensitive Heuristics for Oversubscription Planning*, ICAPS Workshop on Heuristics and Search for Domain-independent Planning (HSDIP), 2019, Berkeley, CA, USA.

- M. Katz, S. Sohrabi, O. Udrea, *Top-Quality: Finding Practically Useful Sets of Best Plans*, ICAPS Workshop on Heuristics and Search for Domain-independent Planning (HSDIP), 2019, Berkeley, CA, USA.

- M. Katz, S. Sohrabi, *Reshaping Diverse Planning: Let There Be Light!*, ICAPS Workshop on Heuristics and Search for Domain-independent Planning (HSDIP), 2019, Berkeley, CA, USA.
- M. Katz, S. Sievers, *Democratizing Usage of Planning Systems by Facilitating Research in Algorithm Selection for Planning*, ICAPS Workshop on The International Planning Competition (WIPC), 2019, Berkeley, CA, USA.
- M. Katz, S. Sievers, *The Role of IPC in Setting Standards for Experimental Evaluation in Planning Research*, ICAPS Workshop on The International Planning Competition (WIPC), 2019, Berkeley, CA, USA.
- M. Katz, V. Mirkis, F. Pommerening, D. Winterer, *Reformulating Oversubscription Planning Tasks*, ICAPS Workshop on Heuristics and Search for Domain-independent Planning (HSDIP), 2018, Delft, Netherlands.
- S. Sievers, G. Roeger, M. Wehrle, M. Katz, *Structural Symmetries of the Lifted Representation of Classical Planning Tasks*, ICAPS Workshop on Heuristics and Search for Domain-independent Planning (HSDIP), 2017, Pittsburgh, PA, USA.
- M. Katz, D. Moshkovich, E. Karpas, *Lifting Delete Relaxation Heuristics To Successor Generator Planning*, ICAPS Workshop on Heuristics and Search for Domain-independent Planning (HSDIP), 2016, London, UK.
- M. Katz, J. Hoffmann, *Pushing the Limits of Partial Delete Relaxation: Red-Black DAG Heuristics*, ICAPS Workshop on Heuristics and Search for Domain-independent Planning (HSDIP), 2014, Portsmouth, NH, USA.
- M. Steinmetz, J. Hoffmann, M. Katz, *Catching Label Subsets for Relaxed Bisimulation: An Abstraction Refinement Approach*, ICAPS Workshop on Heuristics and Search for Domain-independent Planning (HSDIP), 2013, Rome, Italy.
- M. Katz, E. Keyder, *Structural Patterns Beyond Forks: Extending the Complexity Boundaries of Classical Planning*, ICAPS Workshop on Heuristics and Search for Domain-independent Planning (HSDIP), 2012, Sao Paulo, Brazil.
- R. Bahumi, C. Domshlak, M. Katz, *On Satisficing Planning with Admissible Heuristics*, ICAPS Workshop on Heuristics for Domain-independent Planning (HDIP), 2011, Frieburg, Germany.
- C. Domshlak, M. Katz, S. Lefler, *Abstractions += Landmarks*, ICAPS Workshop on Heuristics for Domain-independent Planning (HDIP), 2009, Thessaloniki, Greece.
- M. Katz, C. Domshlak, *Structural Patterns Heuristics: Basic Idea and Concrete Instance*, ICAPS Workshop on Heuristics for Domain-independent Planning: Progress, Ideas, Limitations, Challenges (HDIP), 2007, Providence, RI, USA.
- M. Katz, *Towards Structural-Patterns Admissible Heuristics*, ICAPS Doctoral Consortium, 2007, Providence, RI, USA.

PUBLIC PROFESSIONAL ACTIVITIES

- Publicity Chair and Video Chair at ICAPS'15.
- Co-Chair of the Workshop on Heuristics and Search for Domain-independent Planning (HSDIP) at ICAPS'11, ICAPS'13, ICAPS'14, ICAPS'15, ICAPS'16, ICAPS'18.
- Co-Chair of the Workshop on Bridging the Gap Between AI Planning and Reinforcement Learning (PRL) at ICAPS'20.
- Lecturer at the ICAPS 2013 Summer School.
- Member of the Senior Program Committee, IJCAI'19, AAAI'20, ICAPS'20, IJCAI'20.
- Member of the Program Committee of ICAPS'11, IJCAI'11, AAAI'11, ICAPS'12, CP4PS'12, HSDIP'12, ICAPS'13, IJCAI'13, ICAPS'14, ICAPS'15, IJCAI'15, ICAPS'16, AAAI'17, ICAPS'17, AAAI'18, ICAPS'18, IJCAI'18, AAAI'19, ICAPS'19.
- Reviewer for the AIJ, JAIR, AI Communications journals.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- Association for the Advancement of Artificial Intelligence (AAAI)
- Israel Association for Artificial Intelligence (IAAI)

AWARDS AND PRIZES

- Winner of the Deterministic Sequential Optimal track 2018, The Ninth International Planning Competition (IPC'18).
- Runner-up of the Deterministic Sequential Satisficing track 2014, The Eighth International Planning Competition (IPC'14).
- Innovative Planner Award 2014, The Eighth International Planning Competition (IPC'14).
- ICAPS Best Dissertation Award 2011.
- Department Recognition Award, Intel 2007.

PROFESSIONAL EXPERIENCE

1. IBM Research T.J. Watson Center, Yorktown Heights, NY, USA
   Research Staff Member: June, 2017 - present.
   - Research in the field of AI Planning

2. Haifa University, Haifa, Israel
Lecturer: March, 2017 - June, 2017

    - Teaching an introductory level course on Automated Planning

3. IBM Watson Health, Haifa, Israel
Watson Health Scientist: March, 2016 - June, 2017

    - Automated decision making for Healthcare, focusing on Diabetes
    - Developing decision support system for T1D patients
    - Developing mobile solutions for T1D patients

4. IBM Haifa Research Lab, Haifa, Israel
Research Staff Member: October, 2013 - March, 2016.

    - Automated decision making for mobile analytics
    - Development of a *Semi-Black-Box* planner for spatio-temporal planning problems
    - Modeling various spatio-temporal planning problems

5. Department of Computer Science, Saarland University, Germany
Postdoctoral Fellow: May, 2012 - September, 2013. Host: Prof. Jörg Hoffmann.

    - Delete relaxation based heuristics for satisficing planning
    - Abstraction based heuristics for cost-optimal planning
    - Project leading:
        - Development of the "Bisimulator" – abstraction based optimal planner
        - Development of the "Red-Black" – delete relaxation based satisficing planner
        - Development of the "DKS-sat" – symmetry pruning based satisficing planner

6. Institut national de recherche en informatique et en automatique (INRIA), France
Postdoctoral Fellow: September, 2011 - May, 2012. Host: Prof. Jörg Hoffmann.

    - Abstraction based heuristics for cost-optimal planning
    - Project leading:
        - Development of the "Bisimulator" – abstraction based optimal planner
        - Development of the "DKS-opt" – symmetry pruning based optimal planner

7. Faculty of Industrial Engineering and Management, Technion, Haifa
Postdoctoral Fellow: September, 2010 - August, 2011. Host: Prof. Avigdor Gal.

- Solving schema matching and other real life problems with planning
- Project development:
  - NisB Project: Development of the overall architecture, optimization solutions.

8. Artificial Intelligence Research Group – IE&M, Technion, Haifa
   Researcher: September, 2010 - August, 2011

   - Implicit Abstraction Heuristics
   - Project leading:
     - Development of the "ForkInit" – abstraction based optimal planner
     - Development of the "IForkInit" – abstraction based optimal planner
     - Development of the "LMFork" – abstraction based optimal planner
     - Development of the "ForkUniform" – abstraction based satisficing planner

9. Artificial Intelligence Research Group – IE&M, Technion, Haifa
   PhD candidate: September, 2007 - August, 2010. Advisor: Prof. Carmel Domshlak.

   - Implicit Abstraction Heuristics
   - Project leading:
     - Development of the "ForkInit" – abstraction based optimal planner
     - Development of the "IForkInit" – abstraction based optimal planner

10. Intel Development Center (IDC) — Haifa, Israel
    Software Engineer: February, 2006 - September, 2007

    - Developing Online User Requirements Gathering System
    - Developing CAD tools

11. GL urban systems planning ltd — Tel Aviv, Israel
    Algorithm Developer: February, 2004 - February, 2006

    - Developing algorithms for public transportation needs.
    - Developing various applications for non-professional users.
    - Developing installers for non-professional users.