Curriculum Vitae

Shaul Markovitch

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Academic Degrees

1989	Ph.D.	Electrical Engineering and Computer Science	University of Michigan
1985	M.Sc.	Electrical Engineering and Computer Science	University of Michigan
1982	B.Sc.	Computer Science and Mathematics	Hebrew University, Jerusalem

Academic Appointments

2014 –	Professor	Department of Computer Science	Technion
2007 –	Associate professor	Department of Computer Science	Technion
1995 – 2007	Senior Lecturer	Department of Computer Science	Technion
1990 – 1995	Lecturer	Department of Computer Science	Technion

Professional Experience

2009 – 2010	Visiting Scientist	Google
2003, 2006	Consultant	Samsung
2002 – 2003	Consultant	Exceedo
2000 – 2001	Consultant	Zapper
1989 – 1990	Senior Research Engineer	Center for Machine Intelligence, General Motors
1987 – 1989	Research Engineer	Center for Machine Intelligence, General Motors
1986	Research Engineer	General Motors Research Laboratories
1985	Research Engineer	Artificial Intelligence Systems, Xerox

Research Interests

Artificial Intelligence, Machine Learning, Natural Language Semantics, Feature Generation, Speedup Learning, Anytime Learning, Active Learning, Selective Learning, Information retrieval, Multi-agent Sys-

tems, Adversary search, Opponent Modeling, Search, Resource-bounded reasoning, Anytime Learning, Cost-sensitive Learning

Teaching Experience

Introduction to Artificial Intelligence	undergraduate and graduate
Machine Leaning	undergraduate and graduate
Operating systems	undergraduate
Projects in artificial intelligence	undergraduate and graduate
Projects in machine learning	undergraduate and graduate
Projects in intelligent systems	undergraduate and graduate

Technion Activities

2010 – : Senate representative
2003 – 2004 : Technion Web Committee

Departmental Activities

2013 – 2019	Vice Dean for undergraduate studies
2002 – 2019	Academic manager of department web site
1996 – 2000, 2006 – 2012	Graduate committee
2001 – 2012	Committee for industrial connections
2002 – 2005	Computing committee
2000 – 2002	Curriculum committee
2000 – 2001	Head of Computing Committee

Public Professional Activities

Leadership roles:

- Editor-in-Chief, Journal of Artificial Intelligence Research (JAIR) 2019 –
- Program co-Chair, AAAI 2017

Senior roles:

- Advisory Board Member, IJCAI 2019
- Area Chair, IJCAI 2018
- Senior Program Committee, AAAI 2016
- Senior Program Committee, AAAI 2015

- Associate Editor, The AI Access Books, 2009–2015.
- Associate Editor, The Journal of Artificial Intelligence Research (JAIR), 2009–2015.
- Area Chair, The Twenty-Sixth Conference on Artificial Intelligence (AAAI 2012).
- Area Chair, The Twenty-Fifth Conference on Artificial Intelligence (AAAI 2011).
- Senior Program committee, The Twenty-Second International Conference on Artificial Intelligence (IJCAI 2011).
- Senior Program committee, The Twenty Second National Conference on Artificial Intelligence (AAAI 2007).
- Senior Program committee, The Sixth International Joint Conference on Autonomous Agents and Multi Agents Systems (AAMAS 2007).
- Editorial Board, Journal of Artificial Intelligence Research, 2007–2009.
- Program co-chair, Advances in Recommender Systems Workshop, 2005.
- Chair of the Israeli Association for Artificial Intelligence, 1998 – 2002.
- Program chair, the 11th Israeli Symposium on Artificial Intelligence. 1998.

Other roles:

- Program committee, NIPS 2013.
- Program committee, ICML 2013.
- Program committee, AAAI 2013.
- Program committee, ICAPS 2011.
- Program committee, The Twenty-Seventh International Conference on Machine Learning (ICML 2010)
- Program Committee, The Twenty-first International Joint Conference on Artificial Intelligence (IJCAI-09).
- Program committee, The Twenty-Sixth International Conference on Machine Learning (ICML 2009)
- Program committee, The 8th International Joint Conference on Autonomous Agents and Multi Agents Systems (AAMAS 2009).
- Program committee, AAAI 2008 Workshop on Wikipedia And Artificial Intelligence: An Evolving Synergy.
- Program committee, The Twenty First Second National Conference on Artificial Intelligence (AAAI 2008).
- Program committee, The Seventh International Joint Conference on Autonomous Agents and Multi Agents Systems (AAMAS 2008).
- Program committee, The Twenty-First National Conference on Artificial Intelligence (AAAI 2006).
- Program committee, The Fifth International Joint Conference on Autonomous Agents and Multi Agents Systems (AAMAS 2006).
- Program committee, The 17th European Conference on Artificial Intelligence (ECAI 2006).
- Program committee, The Fifth International Conference on Computers and Games (CG 2006).
- Program committee, ICML 2005 Workshop on Machine Learning Techniques for Processing Multimedia Content.
- Program committee, The AAAI 2005 Workshop on Multiagent Learning.

- Program committee, The twentieth National Conference on Artificial Intelligence (AAAI 2005).
- Program committee, The Fourth International Joint Conference on Autonomous Agents and Multi Agents Systems (AAMAS05).
- Program committee, The Twenty-First International Conference on Machine Learning (ICML 2004)
- Program committee, The Third International Joint Conference on Autonomous Agents and Multi Agents Systems (AAMAS04).
- Program committee, The Fourth International Conference on Computers and Games (CG 2004).
- Program committee, The Fourteenth International Conference on Automated Planning and Scheduling (ICAPS-2004).
- Program committee, The nineteenth National Conference on Artificial Intelligence (AAAI 2004).
- Program Committee, The symposium on *Man versus Machine: the Experiment*, Caesarea Rothschild Institute, University of Haifa, October 15-16, 2002.
- Program committee, The Eighteenth National Conference on Artificial Intelligence (AAAI 2002).
- Program committee, The Second International Conference on Computers and Games (CG 2000).
- Program committee The Fifteenth National Conference on Artificial Intelligence (AAAI 98). Madison, Wisconsin, 1998.
- Program committee, The First International Conference on Computers and Games (CG 98). Tsukuba Japan, 1998.
- Program committee, The 6th Bar-Ilan Symposium on Artificial Intelligence (BIFSAI 1999).
- Program committee, the 13th Israeli Symposium on Artificial Intelligence.
- Organizing chair, The first and the second Seminar Artzi on Artificial Intelligence, 1998.
- Reviewer for: IJCAI 97, AAAI 98, IJCAI 99, IJCAI 2003, Journal for Artificial Intelligence Research, ICCA Journal, Journal for Games and Economic Behavior, Computational Intelligence journal, Autonomous Agents and Multiagent Systems.
- Popular lectures in many occasions (the open day of the Technion, new students welcome, "Mahar 98" project, high school science days, television shows etc.)

Membership in Professional Societies

American Association for Artificial Intelligence

Honors

- 1995 – Muriel and David Jacknow Award for Excellence in Teaching.
- 2006 – Best PC member nomination, Fifth International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS 2006)
- 2009 – Ray and Miriam Klein Research Prize.
- 2014 – IJCAI-JAIR Best Paper Prize: Awarded to an outstanding paper published in the Journal of Artificial Intelligence Research in the preceding five calendar years.
- 2019 – The World 2nd Most Influential Scholar in the field of Artificial Intelligence, The AMiner rating.

- 2019 – Cooper Award for Excellence in Research
- 2019 – EurAI Fellow
- 2020 – Yanai Prize for Excellence in Academic Education

Graduate Students

Served as primary supervisor unless specified otherwise

Completed Thesis

Ph.D.

1. David Carmel, 1998 (Principal Research Scientist at Yahoo!). Add. supervisor: Jeff Rosenschain.
2. Lev Finkelstein, 2005 (Research Scientist at Google). Add. supervisor: Ehud Rivlin.
3. Evgeniy Gabrilovich, 2006 (Senior staff research scientist at Google.)
4. Saher Esmeir, 2008 (Research scientist, DRW Trading Group.)
5. Erez Karpas, 2012 (Postdoc at MIT.) Primary supervisor: Carmel Domshlak.
6. Kira Radinsky, 2013 (Lead Research Scientist at eBay. Listed by MIT Tech Review as one of 35 inventors under 35 for 2013.) Add. supervisor: Nir Ailon.
7. Assaf Glazer, 2014 (CEO and Co-Founder, Nanit. Add. supervisor: Michael Lindenbaum).

M.Sc.

1. Lev Finkelstein, 1993 (Research Scientist at Google).
2. Shaul Marcus,1993 (Software Engineer at Intel).
3. Yaron Sella, 1993 (Security expert at NDS).
4. David Carmel, 1993 (Principal Research Scientist at Yahoo!)
5. David Lorenz, 1994 (Associate Professor, The Open University)
6. Irit Rosdeutscher, 1994 (Senior developer, ICAP).
7. Oleg Ledeniov, 1998 (Senior Software Engineer at GE Healthcare)
8. Rivka Matosevich, 1998 (XIV architect at IBM).
9. Dan Rosenstein, 1998 (Software Group Manager at OpTier).
10. Dmitry Rusakov, 1999. Add. supervisor: Michael Lindenbaum
11. Tzach Livyatan, 2001 (Director, Product Management at Oracle).
12. Shlomi Livne, 2001 (Senior Director, Software Engineering at Oracle). Add. supervisor: Orna Grumberg.
13. Ronit Reger, 2001 (Program Manager at Microsoft).
14. Assaf Shatil, 2002 (Software Engineer at LitePort).
15. Dmitry Davidov, 2003 (Ph.D. at Hebrew University).
16. Asaf Amit, 2004 (Computer software at Israel Bridge Federation).
17. Oren Shnitzer, 2005 (CEO Re-Sec Technologies Ltd).
18. Nela Gurevich, 2006 (Senior Engineer at Qualcomm). Add. supervisor: Ehud Rivlin.

19. Ofer Egozi, 2010 (Product Manager at Sears Israel).
20. Sonya Liberman, 2010 (Senior Researcher and Algorithm Developer at Contextin).
21. Anat Hashavit, 2011 (Software Engineer and Researcher at IBM).
22. Ariel Raviv, 2012 (Research Engineer at Yahoo!).
23. Omer Levy, 2012 (Ph.D. student at Bar Ilan).
24. Haggai Toledano, 2012.
25. Omer Geiger, 2016.
26. Sarai Duek, 2017.
27. Lior Friedman, 2017
28. Yotam Eshel, 2018
29. Yonathan Zerizki, 2018
30. Nurit Dvir, 2019
31. Michal Badian, 2019

Thesis in Progress

1. Guy Kushileviz, M. Sc., 2019–.

Research Grants

- 1997-1999, *Using Learning Techniques for Automated Test Generation*, Intel, $40,000.
- 1999, *Infrastructure for Intelligent Internet Applications*, STL, $20,000.
- 1998-2001, *Interactive Multimedia over Broad-Band Communication Channels*, Ministry of Science, $ 1,050,000 (Consortium of three Universities).
- 1999-2001, *Integerated System for Discovery of Knowledge in Digital Libraries*, Ministry of Science, 430,000 I.S. for the first year. 250,000 I.S. for the second year.
- 2000, *Machine Learning for BDD ordering*, with Prof. Orna Grumberg, Intel, $15,000.
- 2002-2003, *Feature Generation for Document Classification*, STL, $40,000.
- 2003, *Feature Generation for Information Filtering*, Anti Terror Grant, $10,000.
- 2004, *Multimedia Understanding through Semantics, Computation and Learning*, Network of Excellence of the European Community, with Michael Lindenbaum, about 112,000 Euro for 4 years.
- 2005, *Exploring Novel Decision Tree Induction Algorithms for Developing a Decision Support Tool to Treat Septic Febrile Neutropenic Patients*, with Haim Bitterman, M. D., and Yaron Denekamp, M. D., $12,000
- 2005-2010, *MAGNET: IMG4 - Fourth generation of imaging machines*, with Michael Lindenbaum, 355,000 I.S. for first year, 453,000 I.S. for the second year.
- 2008-2011, *The knowledgeable computer: Using web-based knowledge repositories for semantic text analysis.*, The Israeli Internet Association. $65,000 for 3 years.
- 2008-2010, *MAGNET: VOLCAN - Computerized Analysis of Video Content*, with Michael Lindenbaum, 280,000 I.S.
- 2012-2015, *Open Source Indicators*, IARPA as a subcontractor of Rytheon BBN, $80,000

- 2014-2015, *Aspect-based Semantic Distance with Application to Customers and Products*, Microsoft, $30,000

Publications

Theses

Shaul Markovitch. *Information Filtering: Selection Mechanisms in Learning Systems*. PhD thesis, EECS Department, University of Michigan, 1989

Refereed papers in professional journals

Published papers

1. Shaul Markovitch and Paul D. Scott. Information filtering: Selection mechanisms in learning systems. *Machine Learning*, 10(2):113–151, 1993.
2. Paul D. Scott and Shaul Markovitch. Experience selection and problem choice in an exploratory learning system. *Machine Learning*, 12:49–67, 1993.
3. Ido Dagan, Shaul Marcus, and Shaul Markovitch. Contextual word similarity and estimation from sparse data. *Computer Speech and Language*, 9:123–152, 1995.
4. Shaul Markovitch and Yaron Sella. Learning of resource allocation strategies for game playing. *Computational Intelligence*, 12(1):88–105, 1996.
5. David Carmel and Shaul Markovitch. Pruning algorithms for multi-model adversary search. *Artificial Intelligence*, 99(2):325–355, 1998.
6. David Carmel and Shaul Markovitch. Model-based learning of interaction strategies in multi-agent systems. *Journal of Experimental and Theoretical Artificial Intelligence*, 10(3):309–332, 1998.
7. Lev Finkelstein and Shaul Markovitch. A selective macro-learning algorithm and its application to the nxn sliding-tile puzzle. *Journal of Artificial Intelligence Research*, 8:223–263, 1998.
8. Lev Finkelstein and Shaul Markovitch. Learning to play chess selectively by acquiring move patterns. *ICCA Journal*, 21(2):100–119, 1998.
9. Oleg Ledeniov and Shaul Markovitch. The divide-and-conquer subgoal-ordering algorithm for speeding up logic inference. *Journal of Artificial Intelligence Research*, 9:37–97, 1998.
10. David Carmel and Shaul Markovitch. Exploration strategies for model-based learning in multiagent systems. *Autonomous Agents and Multi-agent Systems*, 2(2):141–172, 1999
11. Lev Finkelstein and Shaul Markovitch. Optimal schedules for monitoring anytime algorithms. *Artificial Intelligence*, 126:63–108, 2001.
12. Shaul Markovitch and Danny Rosenstein. Feature generation using general constructor functions. *Machine Learning*, 49:59–98, 2002.
13. Orna Grumberg, Shlomi Livne, and Shaul Markovitch. Learning to order BDD variables in verification. *Journal of Artificial Intelligence Research*, 18:83–116, 2003.
14. Shaul Markovitch and Asaf Shatil. Speedup learning for repair-based search by identifying redundant steps. *Journal of Machine Learning Research*, 4:649–682, 2003.

15. Lev Finkelstein, Shaul Markovitch, and Ehud Rivlin. Optimal schedules for parallelizing anytime algorithms: The case of shared resources. *Journal of Artificial Intelligence Research*, 19:73–138, 2003.
16. Michael Lindenbaum, Shaul Markovitch, and Dmitry Rusakov. Selective sampling for nearest neighbor classifiers. *Machine Learning*, 54(2):125–152, 2004.
17. Shaul Markovitch and Ronit Reger. Learning and exploiting relative weaknesses of opponent agents. *Autonomous Agents and Multi-agent Systems*, 10(2):103–130, March 2005.
18. Asaf Amit and Shaul Markovitch. Learning to bid in bridge. *Machine Learning*, 63(3):287–327, 2006.
19. Dmitry Davidov and Shaul Markovitch. Multiple-goal heuristic search. *Journal of Artificial Intelligence Research*, 26:417–451, 2006.
20. Saher Esmeir and Shaul Markovitch. Anytime learning of decision trees. *Journal of Machine Learning Research*, 8:891–933, May 2007.
21. Evgeniy Gabrilovich and Shaul Markovitch. Harnessing the expertise of 70,000 human editors: Knowledge-based feature generation for text categorization. *Journal of Machine Learning Research*, 8:2297–2345, Oct 2007.
22. Saher Esmeir and Shaul Markovitch. Anytime induction of low-cost, low-error classifiers: a sampling-based approach. *Journal of Artificial Intelligence Research*, 33:1–31, 2008.
23. Evgeniy Gabrilovich and Shaul Markovitch. Wikipedia-based semantic interpretation for natural language processing. *Journal of Artificial Intelligence Research*, 34:443–498, 2009.
24. Ofer Egozi, Shaul Markovitch, and Evgeniy Gabrilovich. Concept-based information retrieval using explicit semantic analysis. *ACM Transactions on Information Systems*, 29(2):8:1–8:34, 2011.
25. Saher Esmeir and Shaul Markovitch. Anytime learning of anycost classifiers. *Machine Learning*, 82(3):445–473, 2011.
26. Carmel Domshlak, Erez Karpas, and Shaul Markovitch. Online speedup learning for optimal planning. *Journal of Artificial Intelligence Research*, 44:709–755, 2012.
27. Kira Radinsky, Sagie Davidovich, and Shaul Markovitch. Learning to predict from textual data. *Journal of Artificial Intelligence Research*, 45:641–684, 2012.

Refereed Papers in Refereed Conference Proceedings

1. Shaul Markovitch and Paul D. Scott. The role of forgetting in learning. In *Proceedings of The Fifth International Conference on Machine Learning (ICML-1988)*, pages 459–465, Ann Arbor, MI, 1988. Morgan Kaufmann.
2. Paul D. Scott and Shaul Markovitch. Learning novel domains through curiosity and conjecture. In *Proceedings of International Joint Conference for Artificial Intelligence (IJCAI-1989)*, pages 669–674, Detroit, Michigan, 1989.
3. Paul D. Scott and Shaul Markovitch. Uncertainty based selection of learning experiences. In *Proceedings of The Sixth International Workshop on Machine Learning (ICML-1989)*, pages 358–361, Ithaca, New York, 1989. Morgan Kaufmann.
4. Shaul Markovitch and Paul D. Scott. Automatic ordering of subgoals — a machine learning approach. In Ewing L. Lusk and Ross A. Overbeek, editors, *Proceedings of the North American*

Conference on Logic Programming (NACLP-1989), pages 224–242, Cleveland, Ohio, USA, 1989.

5. Shaul Markovitch and Paul D. Scott. Information filters and their implementation in the SYLLOG system. In *Proceedings of The Sixth International Workshop on Machine Learning (ICML-1989)*, pages 404–407, Ithaca, New York, 1989. Morgan Kaufmann.
6. Shaul Markovitch and Paul D. Scott. Utilization filtering: a method for reducing the inherent harmfulness of deductively learned knowledge. In *Proceedings of The Eleventh International Joint Conference for Artificial Intelligence (IJCAI-1989)*, pages 738–743, Detroit, Michigan, 1989.
7. Marcial Losada and Shaul Markovitch. Groupanalyzer: A system for dynamic analysis of group interaction. In *Proceedings of 23rd Hawaii International Conference for System Sciences*, pages 101–110, Kailua-Kona,Hawaii, 1990.
8. Paul D. Scott and Shaul Markovitch. Knowledge considered harmful. In *Proceedings of IEEE Colloquium on Knowledge Engineering*, London, 1990.
9. Reuven A. Hasson, Shaul Markovitch, and Yaron Sella. Using filters to improve efficiency of game-playing learning procedures. In *Proceedings of Eleventh International Conference of the Chilean Computer Science Society*, pages 125–137, Santiago, Chile, 1991.
10. Shaul Markovitch and Irit Rosdeutscher. Systematic experimentation with deductive learning: Satisficing vs. optimizing search. In *Proceedings of the Knowledge Compilation and Speedup Learning Workshop*, Aberdeen, Scotland, 1992.
11. David Lorenz and Shaul Markovitch. Derivative evaluation function learning using genetic operators. In *Proceedings of The AAAI Fall Symposium on Games: Planing and Learning*, pages 106–114, New Carolina, 1993.
12. David Carmel and Shaul Markovitch. Learning models of the opponent's strategy in game playing. In *Proceedings of The AAAI Fall Symposium on Games: Planing and Learning*, pages 140–147, North Carolina, 1993.
13. Shaul Markovitch and Yaron Sella. Learning of resource allocation strategies for game playing. In *Proceedings of The Thirteenth International Joint Conference for Artificial Intelligence (IJCAI-1993)*, pages 974–979, Chambery, France, 1993.
14. Ido Dagan, Shaul Marcus, and Shaul Markovitch. Contextual word similarity and estimation from sparse data. In *Proceedings of the 31st Annual Meeting of the Association for Computational Linguistics (ACL-1993)*, pages 164–171, Ohio State University, 1993.
15. David Carmel and Shaul Markovitch. Learning models of intelligent agents. In *Proceedings of the Thirteenth National Conference on Artificial Intelligence (AAAI-1996)*, pages 62–67, Portland, Oregon, 1996.
16. David Carmel and Shaul Markovitch. Incorporating opponent models into adversary search. In *Proceedings of the Thirteenth National Conference on Artificial Intelligence (AAAI-1996)*, pages 120–125, Portland, Oregon, 1996.
17. David Carmel and Shaul Markovitch. Exploration and adaptation in multiagent systems: A model-based approach. In *Proceedings of The Fifteenth International Joint Conference for Artificial Intelligence (IJCAI-1997)*, pages 606–611, Nagoya, Japan, 1997.
18. David Carmel and Shaul Markovitch. How to explore your opponent's strategy (almost) optimally. In *Proceedings of the Third International Conference on Multi-Agent Systems (AAMAS-1998)*, pages 64–71, Paris, France, 1998.

19. Oleg Ledeniov and Shaul Markovitch. Learning investment functions for controlling the utility of control knowledge. In *Proceedings of the Fifteenth National Conference on Artificial Intelligence (AAAI-1998)*, pages 463–468, Madison, Wisconsin, 1998.
20. Michael Lindenbaum, Shaul Markovitch, and Dmitry Rusakov. Selective sampling for nearest neighbor classifiers. In *The Proceedings of the Sixteenth National Confernce on Artificial Intelligence (AAAI-1999)*, pages 366–371, Orlando, Florida, 1999.
21. Lev Finkelstein, Shaul Markovitch, and Ehud Rivlin. Optimal schedules for parallelizing anytime algorithms: The case of independent processes. In *Proceedings of the Eighteenth National Conference on Artificial Intelligence (AAAI-2002)*, pages 719–724, Edmonton, Alberta, Canada, 2002.
22. Dmitry Davidov and Shaul Markovitch. Multiple-goal search algorithms and their application to web crawling. In *Proceedings of the Eighteenth National Conference on Artificial Intelligence (AAAI-2002)*, pages 713–718, Edmonton, Alberta, Canada, 2002.
23. Evgeniy Gabrilovich and Shaul Markovitch. Text categorization with many redundant features: Using aggressive feature selection to make svms competitive with c4.5. In *Proceedings of The Twenty-First International Conference on Machine Learning (ICML-2004)*, pages 321–328, Banff, Alberta, Canada, 2004. Morgan Kaufmann.
24. Dmitry Davidov, Evgeniy Gabrilovich, and Shaul Markovitch. Parameterized generation of labeled datasets for text categorization based on a hierarchical directory. In *Proceedings of The 27th Annual International ACM SIGIR Conference (SIGIR-2004)*, pages 250–257, Sheffield, UK, 2004. ACM Press.
25. Saher Esmeir and Shaul Markovitch. Lookahead-based algorithms for anytime induction of decision trees. In *Proceedings of The Twenty-First International Conference on Machine Learning (ICML-2004)*, pages 257–264, Banff, Alberta, Canada, 2004. Morgan Kaufmann.
26. Evgeniy Gabrilovich and Shaul Markovitch. Feature generation for text categorization using world knowledge. In *Proceedings of The Nineteenth International Joint Conference for Artificial Intelligence (IJCAI-2005)*, pages 1048–1053, Edinburgh, Scotland, 2005.
27. Yaniv Hamo and Shaul Markovitch. The compset algorithm for subset selection. In *Proceedings of The Nineteenth International Joint Conference for Artificial Intelligence (IJCAI-2005)*, pages 728–733, Edinburgh, Scotland, 2005.
28. Saher Esmeir and Shaul Markovitch. Interruptible anytime algorithms for iterative improvement of decision trees. In *Proceedings of the 1st international workshop on Utility-based data mining*, pages 78–85, Chicago, Illinois, 2005.
29. Evgeniy Gabrilovich and Shaul Markovitch. Overcoming the brittleness bottleneck using wikipedia: Enhancing text categorization with encyclopedic knowledge. In *Proceedings of the Twenty-First National Conference on Artificial Intelligence (AAAI-2006)*, pages 1301–1306, Boston, MA, 2006.
30. Nela Gurevich, Shaul Markovitch, and Ehud Rivlin. Active learning with near misses. In *Proceedings of the Twenty-First National Conference on Artificial Intelligence (AAAI-2006)*, pages 362–367, Boston, MA, 2006.
31. Saher Esmeir and Shaul Markovitch. Anytime induction of decision trees: an iterative improvement approach. In *Proceedings of the Twenty-First National Conference on Artificial Intelligence (AAAI-2006)*, pages 348–355, Boston, MA, 2006.
32. Saher Esmeir and Shaul Markovitch. When a decision tree learner has plenty of time. In *Proceedings*

of the Twenty-First National Conference on Artificial Intelligence (AAAI-2006), pages 1597–1600, Boston, MA, 2006.

33. Evgeniy Gabrilovich and Shaul Markovitch. Computing semantic relatedness using wikipedia-based explicit semantic analysis. In *Proceedings of The Twentieth International Joint Conference for Artificial Intelligence (IJCAI-2007)*, pages 1606–1611, Hyderabad, India, 2007. As of February 2018, this paper, with over 2000 citations, is the highest cited paper in the IJCAI conferences in the last 20 years.
34. Saher Esmeir and Shaul Markovitch. Occam's razor just got sharper. In *Proceedings of The Twentieth International Joint Conference for Artificial Intelligence (IJCAI-2007)*, pages 768–773, Hyderabad, India, 2007.
35. Saher Esmeir and Shaul Markovitch. Anytime induction of cost-sensitive trees. In *Proceedings of The 21st Conference on Neural Information Processing Systems (NIPS-2007)*, Vancouver, Canada, 2007.
36. Ofer Egozi, Evgeniy Gabrilovich, and Shaul Markovitch. Concept-based feature generation and selection for information retrieval. In *Proceedings of the Twenty-Third AAAI Conference on Artificial Intelligence (AAAI-2008)*, pages 1132–1137, Chicago, IL, 2008.
37. Kira Radinsky, Sagie Davidovich, and Shaul Markovitch. Predicting the news of tomorrow using patterns in web search queries. In *Proceedings of the 2008 IEEE/WIC/ACM International Conference on Web Intelligence (WI-2008)*, pages 363–367, Sydney, Australia, 2008.
38. Sonya Liberman and Shaul Markovitch. Compact hierarchical explicit semantic representation. In *Proceedings of the IJCAI 2009 Workshop on User-Contributed Knowledge and Artificial Intelligence: An Evolving Synergy (WikiAI09)*, Pasadena, CA, 2009.
39. Carmel Domshlak, Erez Karpas, and Shaul Markovitch. To max or not to max: Online learning for speeding up optimal planning. In *Proceedings of the Twenty-Fourth AAAI Conference on Artificial Intelligence (AAAI-2010)*, pages 1071–1076, Atlanta, Georgia, 2010.
40. Kira Radinsky, Eugene Agichtein, Evgeniy Gabrilovich, and Shaul Markovitch. A word at a time: Computing word relatedness using temporal semantic analysis. In *Proceedings of the 20th International World Wide Web Conference (WWW-2011)*, pages 337–346, Hyderabad, India, March 2011.
41. Erez Karpas, Michael Katz, and Shaul Markovitch. When optimal is just not good enough: Fast near-optimal action cost-partitioning. In *Proceedings of the 21st International Conference on Automated Planning and Scheduling (ICAPS-2011)*, pages 122–129, Freiburg, Germany, 2011.
42. Anat Hashavit and Shaul Markovitch. Max-prob: An unbiased rational decision making procedure for multiple-adversary environments. In *Proceedings of the 22nd International Joint Conference on Artificial Intelligence (IJCAI-2011)*, pages 222–227, Barcelona, Spain, 2011.
43. Kira Radinsky, Sagie Davidovich, and Shaul Markovitch. Learning causality from textual data. In *Proceedings of the IJCAI Workshop on Learning by Reading and its Applications in Intelligent Question-Answering*, pages 363–367, Barcelona, Spain, 2011.
44. Ariel Raviv and Shaul Markovitch. Concept-based approach to word-sense disambiguation. In *Proceedings of the Twenty-Sixth AAAI Conference on Artificial Intelligence (AAAI-2012)*, pages 807–813, Toronto, Canada, 2012.
45. Omer Levy and Shaul Markovitch. Teaching machines to learn by metaphors. In *Proceedings of the Twenty-Sixth AAAI Conference on Artificial Intelligence (AAAI-2012)*, pages 991–997, Toronto,

Canada, 2012.

46. Kira Radinsky, Sagie Davidovich, and Shaul Markovitch. Learning causality for news events prediction. In *Proceedings of the 21st International World Wide Web Conference (WWW-2012)*, pages 909–918, Lyon, France, 2012.
47. Assaf Glazer, Michael Lindenbaum, and Shaul Markovitch. Feature shift detection. In *21st International Conference on Pattern Recognition (ICPR-2012)*, Tsukuba, Japan, 2012.
48. Assaf Glazer, Michael Lindenbaum, and Shaul Markovitch. One-class background model. In *The 11th Asian Conference on Computer Vision (ACCV-2012)*, Daejeon, Korea, 2012.
49. Assaf Glazer, Michael Lindenbaum, and Shaul Markovitch. Learning high-density regions for a generalized kolmogorov-smirnov test in high-dimensional data. In *Proceedings of The 26th Conference on Neural Information Processing Systems (NIPS-2012)*, Lake Tahoe, Nevada, 2012.
50. Tamar Avraham, Ilya Gurvich, Michael Lindenbaum, and Shaul Markovitch. Learning implicit transfer for person re-identification. In *Proceedings of 1st International Workshop on Re-Identification, ECCV 2012*, pages 381–390, 2012.
51. Assaf Glazer, Michael Lindenbaum, and Shaul Markovitch. q-ocsvm: A q-quantile estimator for high-dimensional distributions. In *Proceedings of The 27th Conference on Neural Information Processing Systems (NIPS-2013)*, Lake Tahoe, Nevada, 2013.
52. Assaf Glazer, Omer Weissbrod, Michael Lindenbaum, and Shaul Markovitch. Approximating hierarchical mv-sets for hierarchical clustering. In *NIPS*, pages 999–1007, 2014.
53. Omer Geiger and Shaul Markovitch. Algorithmic exam generation. In *Proceedings of the Twenty-Fourth International Joint Conference on Artificial Intelligence, IJCAI 2015, Buenos Aires, Argentina, July 25-31, 2015*, pages 1149–1155, 2015.
54. Yotam Eshel, Noam Cohen, Kira Radinsky, Shaul Markovitch, Ikuya Yamada, and Omer Levy. Named entity disambiguation for noisy text. In *Proceedings of the 21st Conference on Computational Natural Language Learning (CoNLL 2017), Vancouver, Canada, August 3-4, 2017*, pages 58–68, 2017.
55. Nurit Dvir, Orna Grumberg, Shaul Markovitch, and Gabi Nakibly. Topology-agnostic runtime detection of ospf routing attacks. In *Proceedings of the 2019 IEEE Conference on Communications and Network Security (CNS)*, 2019.
56. Guy Kushilevitz, Shaul Markovitch, and Yoav Goldberg. A two-stage masked LM method for term set expansion. In *Proceedings of ACL 2020*, 2020.
57. Jonathan Zarecki and Shaul Markovitch. Textual membership queries. In *Proceedings of IJCAI 2020*, 2020.

Patents

1. European Patent No. 2041669, *Text Categorization Using External Knowledge*, issued on 11/08/2011, co-authored with Evgeniy Gabrilovich.
2. US Patent No. 8108204, *Text categorization Using External Knowledge*, issued on 31/01/2012, co-authored with Evgeniy Gabrilovich)

Research Reports and arXiv Papers

1. Uri Keidar, Shaul Markovitch, and Erez Webman. Utilization filtering of macros based on goal similarity. Technical Report CIS9608, Technion, 1996.
2. David Carmel and Shaul Markovitch. Learning and using opponent models in adversary search. Technical Report CIS9609, Technion, 1996.
3. Shaul Markovitch and Oren Shnitzer. Self-consistent batch-classification. Technical report CIS-2005-04, Technion, 2005.
4. Lior Friedman and Shaul Markovitch. Recursive feature generation for knowledge-based learning. *CoRR*, abs/1802.00050, 2018.
5. Sarai Duek and Shaul Markovitch. Automatic generation of language-independent features for cross-lingual classification. *CoRR*, abs/1802.04028, 2018.
6. Jonathan Zarecki and Shaul Markovitch. Textual membership queries. *CoRR*, abs/1805.04609, 2018.

Edited Books

1. Satinder P. Singh and Shaul Markovitch, editors. *Proceedings of the Thirty-First AAAI Conference on Artificial Intelligence, February 4-9, 2017, San Francisco, California, USA*. AAAI Press, 2017

Book Chapters

1. Paul D. Scott and Shaul Markovitch. Representation generation in an exploratory learning system. In D. Fisher and M. Pazzani, editors, *Concept Formation: Knowledge and Experience in Unsupervised Learning*. Morgan Kaufmann, 1991.
2. David Carmel and Shaul Markovitch. Opponent modeling in multi-agent systems. In Gerhard Weiss and Sandip Sen, editors, *Adaption And Learning In Multi-Agent Systems*, volume 1042 of *Lecture Notes in Artificial Intelligence*. Springer-Verlag, 1996.

Conferences

Plenary, Keynote or Invited Talks

Comment: Almost all the papers published in conference proceedings involved contributed talks. Some of the talks were given by my students, some of them by myself.

1. Keynote Lecture – The 13th Bar-Ilan Symposium on the Foundations of Artificial Intelligence, Ramat Gan, 2015.
2. Invited Lecture – The Sixth SIDEER Symposium: Exploring Real World Networks: From Genes to Ecosystems, Sde Boker, 2014.
3. Invited Lecture – Computer Science Colloquium, University of Michigan, 2012.
4. Invited Lecture – Cognitive Science Colloquium, University of Haifa, 2012.

5. Invited Lecture – The Dual Taiwan-Israel Research Symposium on Artificial Intelligence and Learning Algorithms, Tainan, 2012.
6. Invited Lecture – The Dual Taiwan-Israel Research Symposium on Artificial Intelligence and Learning Algorithms, Haifa, 2011.
7. Invited Lecture – Annual Database Summit, Haifa, 2010.
8. Invited Lecture – IBM Leadership Seminar on Information Retrieval, 2010.
9. Invited Lecture – Machine learning Workshop at Technion EE, Haifa, 2010.
10. Invited Lecture – Google Research Lab, Tel Aviv, 2009.
11. Invited Lecture – University of Haifa Workshop on Machine learning, 2009.
12. Invited Lecture – Summer School at University of Illinois at Urbana-Champaign, 2008.
13. Invited Lecture – IBM Leadership Seminar on Machine Learning, Haifa, 2007.
14. Keynote Lecture – ICML 2005 workshop on Machine Learning Techniques for Processing Multimedia Content, Bonn, 2005.
15. The Integrated Systems for Homeland Security Workshop, University of Massachusetts, Amherst, 2004.
16. Keynote speaker at the workshop on *Opponent Models in Games*, University of Maastricht, December 4, 2003.
17. Keynote speaker at The Italian-Israeli Forum on Computer Science: research and Applications of Artificial Intelligence, University of haifa, June 18, 2003.
18. The symposium on *Man versus Machine: the Experiment*, Caesarea Rothschild Institute, University of Haifa, October 15-16, 2002.
19. ICML-2000 Workshop on Multi-Agent Learning: Theory and Practice. Palo Alto, 2000.
20. The Israeli-Italian Symposium on Artificial Intelligence. Venice, Italy, 1996.
21. The 9th Israeli Symposium on Artificial Intelligence. Ramat-Gan, Israel, 1992.
22. The Symposium for Concept Formation. Palo Alto, 1990.