Marcin Szubert

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in mszubert

Research Interests

machine learning, evolutionary computation, genetic programming
reinforcement learning, coevolutionary algorithms, combinatorial optimization

Academic Experience

2015–present **Postdoctoral Research Associate**, *Morphology, Evolution and Cognition Laboratory (headed by professor Josh Bongard), Department of Computer Science, University of Vermont*, Burlington, VT, USA.

2014–2015 **Assistant Professor**, *Laboratory of Intelligent Decision Support Systems (headed by professor Roman Słowiński), Institute of Computing Science, Poznan University of Technology*, Poznań, Poland.

2009–2014 **Teaching Assistant**, *Poznan University of Technology*, Poznań, Poland.

Engineering Experience

2013–2014 **Senior Software Engineer**, *MLabs*, Poznań, Poland.

2008–2012 **Software Engineer**, *Mobile Systems Research Labs, Poznan University of Technology*, Poznań, Poland.

2007 **Software Engineering Intern**, *Motorola Software Group*, Kraków, Poland.

Education

2009–2014 **Ph.D. with honors in Computer Science**, *Poznan University of Technology*.
- Thesis: *Coevolutionary Shaping for Reinforcement Learning*
- Supervisor: Krzysztof Krawiec, Ph.D. Dr. Habil.
- Co-supervisor: Wojciech Jaśkowski, Ph. D.

2008–2009 **M.Sc. in Computer Science**, *Poznan University of Technology*.
- Thesis: *Coevolutionary Reinforcement Learning and its Application to Othello*
- Supervisor: Krzysztof Krawiec, Ph.D. Dr. Habil.
- Cumulative GPA: 4.99 / 5.00

2004–2008 **B.Sc. in Computer Science**, *Poznan University of Technology*.
- Thesis: *Distributed Computing Platform Based on the ProActive Library*
- Supervisor: Cezary Sobaniec, Ph.D.
- Cumulative GPA: 4.89 / 5.00

Achievements and Awards

2015 **Polish Artificial Intelligence Society Award for the Best Ph.D. Dissertation in Artificial Intelligence (Edition 2014)**.
- Received from Polish Artificial Intelligence Society, a member of ECCAI.

2012 **1st place in Google ROADEF/EURO Machine Reassignment Challenge (junior category, 3rd place overall)**.
- A prestigious combinatorial optimization competition held since 1999.
- Organized by Google, European Operational Research Society (EURO) and French Operational Research and Decision Support Society (ROADEF).
- Participants: 82 teams from universities and research institutions all around the world including MIT and Microsoft Research.

2009 **2nd prize in the XXVI National Competition for the Best Master's Thesis in Computer Sciences**.
- Received from Polish Information Processing Society.
- Thesis: *Coevolutionary Reinforcement Learning and its Application to Othello*

2009 **1st prize in the III nationwide competition for the best diploma thesis related to Java technologies organized by the e-point company**.
- B.Sc. Thesis: *Distributed Computing Platform Based on the ProActive Library*

2007 **1st prize in IV Grid Plugtests Flowshop Contest**, Beijing, China.
- Distributed programming challenge focused on the permutation flowshop scheduling problem.
- Organized by The Institute for Research in Computer Science and Control (INRIA), European Research Consortium for Informatics and Mathematics (ERCIM), The European Telecommunications Standards Institute (ETSI)

Scholarships and Grants

2013–2015 **Research grant from the Polish National Science Centre**.
- Title: *Evolutionary Shaping Algorithms for Reinforcement Learning.*

2014–2015 **Research grant for young scientists awarded by the Faculty of Computing, Poznan University of Technology**.
- Title: *Behavioral Diversity in Evolutionary Reinforcement Learning.*

2010–2014 **Scholarship for the best Ph.D. students awarded by the Rector of the Poznan University of Technology**.

2008 **Scholarship of the Polish Minister of Science and Higher Education for exceptional achievements in the field of science**.

2007 **Polish Talents Scholarship**.
- Nationwide scholarship program addressed to the most talented technical students in Poland.
- Organized by the the Polish telecom – TP S.A., Education-Enterprise Foundation and Polish-American Fulbright Commission.

Publications

The following publications are available for download at:
http://mszubert.github.io/publications.html

Journal Publications

1 Jaśkowski, W., Szubert, M., and Gawron, P. **A Hybrid MIP-based Large Neighborhood Search Heuristic for Solving the Machine Reassignment Problem**. *Annals of Operations Research 242*, 1 (2016), 33–62.

2 Jaśkowski, W., Liskowski, P., Szubert, M., and Krawiec, K. **The Performance Profile: A Multi-Criteria Performance Evaluation Method for Test-Based Problems**. *International Journal of Applied Mathematics and Computer Science 26*, 1 (2016), 215–229.

3 Jaśkowski, W., and Szubert, M. **Coevolutionary CMA-ES for Knowledge-Free Learning of Game Position Evaluation**. *IEEE Transactions on Computational Intelligence and AI in Games* (2016), to appear.

4 Szubert, M., Jaśkowski, W., and Krawiec, K. **On Scalability, Generalization, and Hybridization of Coevolutionary Learning: A Case Study for Othello**. *IEEE Transactions on Computational Intelligence and AI in Games 5*, 3 (2013), 214–226.

5 Krawiec, K., Jaśkowski, W., and Szubert, M. **Evolving Small-board Go Players Using Coevolutionary Temporal Difference Learning with Archives**. *International Journal of Applied Mathematics and Computer Science 21*, 4 (2011), 717–731.

6 Szubert, M., Jaśkowski, W., and Krawiec, K. **Learning Board Evaluation Function for Othello by Hybridizing Coevolution with Temporal Difference Learning.** *Control & Cybernetics 40*, 3 (2011), 805–831.

Refereed Conference Publications

7 Szubert, M., Kodali, A., Ganguly, S., Das, K., and Bongard, J. **Reducing Antagonism between Behavioral Diversity and Fitness in Semantic Genetic Programming**. In *Proceedings of the 18th Annual Conference on Genetic and Evolutionary Computation - GECCO 2016* (Denver, USA, 2016), ACM, pp. 797–804.

8 Szubert, M., Kodali, A., Ganguly, S., Das, K., and Bongard, J. C. **Semantic Forward Propagation for Symbolic Regression**. In *Proceedings of the 14th International Conference on Parallel Problem Solving from Nature - PPSN XIV* (2016), Lecture Notes in Computer Science, Springer, p. to appear.

9 Kriegman, S., Szubert, M., Bongard, J., and Skalka, C. **Evolving Spatially Aggregated Features From Satellite Imagery for Regional Modeling**. In *Proceedings of the 14th International Conference on Parallel Problem Solving from Nature - PPSN XIV* (2016), Lecture Notes in Computer Science, Springer, p. to appear.

10 Jaśkowski, W., Szubert, M., Liskowski, P., and Krawiec, K. **High-Dimensional Function Approximation for Knowledge-Free Reinforcement Learning: A Case Study in SZ-Tetris**. In *Proceedings of the 17th Annual Conference on Genetic and Evolutionary Computation - GECCO 2015* (2015), GECCO '15, ACM, pp. 567–573.

11 SZUBERT, M., JAŚKOWSKI, W., LISKOWSKI, P., AND KRAWIEC, K. **The Role of Behavioral Diversity and Difficulty of Opponents in Coevolving Game-Playing Agents**. In *Proceedings of the 18th European Conference on Applications of Evolutionary Computation - EvoApplications 2015* (2015), vol. 9028 of *Lecture Notes in Computer Science*, Springer, pp. 394–405.

12 SZUBERT, M., AND JAŚKOWSKI, W. **Temporal Difference Learning of N-Tuple Networks for the Game 2048**. In *Proceedings of the 2014 Conference on Computational Intelligence and Games - CIG 2014* (2014), CIG 2014, IEEE, pp. 373–380.

13 JAŚKOWSKI, W., SZUBERT, M., AND LISKOWSKI, P. **Multi-Criteria Comparison of Coevolution and Temporal Difference Learning on Othello**. In *Proceedings of the 17th European Conference on Applications of Evolutionary Computation - EvoApplications 2014* (2014), vol. 8602 of *Lecture Notes in Computer Science*, Springer, pp. 301–312.

14 SZUBERT, M., JAŚKOWSKI, W., LISKOWSKI, P., AND KRAWIEC, K. **Shaping Fitness Function for Evolutionary Learning of Game Strategies**. In *Proceedings of the 15th Annual Conference on Genetic and Evolutionary Computation - GECCO 2013* (New York, NY, USA, 2013), GECCO '13, ACM, pp. 1149–1156.

15 JAŚKOWSKI, W., LISKOWSKI, P., SZUBERT, M., AND KRAWIEC, K. **Improving Coevolution by Random Sampling**. In *Proceedings of the 15th Annual Conference on Genetic and Evolutionary Computation - GECCO 2013* (New York, NY, USA, 2013), GECCO '13, ACM, pp. 1141–1148.

16 SZUBERT, M., AND KRAWIEC, K. **Autonomous Shaping via Coevolutionary Selection of Training Experience**. In *Proceedings of the 12th International Conference on Parallel Problem Solving from Nature - PPSN XII* (Berlin, Heidelberg, 2012), vol. 7492 of *Lecture Notes in Computer Science*, Springer, pp. 215–224.

17 KRAWIEC, K., AND SZUBERT, M. **Learning N-tuple Networks for Othello by Coevolutionary Gradient Search**. In *Proceedings of the 13th Annual Conference on Genetic and Evolutionary Computation - GECCO 2011* (New York, NY, USA, 2011), GECCO '11, ACM, pp. 355–362.

18 KRAWIEC, K., AND SZUBERT, M. **Coevolutionary Temporal Difference Learning for Small-Board Go**. In *Proceedings of the IEEE Congress on Evolutionary Computation - CEC 2010* (Barcelona, 2010), IEEE, pp. 18–23.

19 SZUBERT, M., JAŚKOWSKI, W., AND KRAWIEC, K. **Coevolutionary Temporal Difference Learning for Othello**. In *Proceedings of the 5th International Conference on Computational Intelligence and Games - CIG 2009* (2009), CIG'09, IEEE Press, pp. 104–111.

Theses

20 SZUBERT, M. *Coevolutionary Shaping for Reinforcement Learning.* PhD thesis, Poznan University of Technology, 2014.

21 SZUBERT, M. *Coevolutionary Reinforcement Learning and its Application to Othello.* Master's thesis, Poznan University of Technology, 2009.