

Curriculum Vitae – Frank Hutter

(last update: December 2015)

GENERAL INFORMATION

Current Position	Emmy Noether Research Group Lead (eq. Asst. Prof.) Department of Computer Science, University of Freiburg, Germany
Contact Information	Department of Computer Science, University of Freiburg Georges-Köhler-Allee 74, 79110 Freiburg, Germany Phone: +49 761 203-67740 Email: fh@cs.uni-freiburg.de Homepage: http://aad.informatik.uni-freiburg.de/people/hutter
Citizenship	German; permanent resident of Canada

EDUCATION

2004-2009	<i>PhD</i> in Computer Science, University of British Columbia, Department of Computer Science. Completed October 2009. Supervisors: Profs. Holger Hoos, Kevin Leyton-Brown & Kevin Murphy Thesis title: Automated Configuration of Algorithms for Solving Hard Computational Problems 2010 CAIAC Doctoral Dissertation Award for the best thesis in Artificial Intelligence completed at a Canadian University in 2009.
2002-2004	<i>Hauptdiplom</i> (equivalent to MSc) in Computer Science, Darmstadt University of Technology. Completed September 2004. Supervisors: Profs. Thomas Stütze & Holger Hoos Thesis title: Stochastic Local Search for Solving the Most Probable Explanation Problem in Bayesian Networks Ranking: 1st of 82 students
2001-2002	<i>Visiting graduate studies</i> , University of British Columbia. Average: A+
1998-2001	<i>Vordiplom</i> (comparable to BSc) in Commercial Information Technology, Darmstadt University of Technology. Ranking: 2nd of 100 students
1998-2000	<i>Vordiplom</i> (comparable to BSc) in Computer Science, Darmstadt University of Technology. Ranking: 2nd of 296 students

EMPLOYMENT

- Since 03/2013 *Emmy Noether Junior Research Group Lead (eq. Asst. Prof.)*
Department of Computer Science, University of Freiburg
- Since 09/2014 *Part-time Machine Learning Consultant*
Zynga Inc., San Francisco, CA, USA
- 09/2009–02/2013 *Postdoctoral Research Fellow*, Dept. of Computer Science, University of British Columbia. Advisors: Prof. Holger H. Hoos & Prof. Kevin Leyton-Brown (stayed at UBC for postdoc after Ph.D. due to 2-body problem)
- 01/2009–12/2009 *Part-time Postdoctoral Fellow for Course Development*, Dept. of Computer Science, University of British Columbia. Advisor: Prof. Kevin Leyton-Brown
- 09/2004–08/2009 *Research Assistant*, Dept. of Computer Science, University of British Columbia. Advisors: Profs. Holger Hoos, Kevin Leyton-Brown & Kevin Murphy
- 06/2005–08/2005 *Summer research intern*, Microsoft Research Cambridge, UK
Advisor: Dr. Youssef Hamadi
- 07/2003–09/2003 *Summer research intern*, NASA Ames Research Center, Mountain View, CA, USA. Advisor: Dr. Richard Dearden
- 06/2002–08/2002 *Summer research intern*, NASA Ames Research Center, Mountain View, CA, USA. Advisor: Dr. Richard Dearden

RESEARCH AND TEACHING AWARDS

- 08/2013 **IJCAI 2013 distinguished paper award** for the paper *Bayesian Optimization in High Dimensions via Random Embeddings*, jointly with Ziyu Wang, Masrour Zoghi, David Matheson, and Nando de Freitas. IJCAI is the most prestigious AI conference; **the paper was selected out of 1473 submissions**
- 01/2011 Best paper award (second prize) at Learning and Intelligent Optimization (LION-5), Rome, Italy (2nd best of 99 submissions)
- 07/2010 2010 **IJCAI/JAIR Best Paper Prize** for the 2008 JAIR article *SATzilla: Portfolio-based Algorithm Selection for SAT*, jointly with Lin Xu, Holger Hoos, and Kevin Leyton-Brown. Together with AIJ, JAIR is the most prestigious AI journal; **all JAIR papers published 2005–2009 were eligible for this award**
- 06/2010 2010 CAIAC **Doctoral Dissertation Award** for the best thesis in Artificial Intelligence at a Canadian University completed in 2009

- 01/2010 Runner-up best paper award at Learning and Intelligent Optimization (LION-4), Venice, Italy (2nd best of 57 submissions)
- 09/2007 Best poster award at the Doctoral Symposium of the 2007 International Workshop on Engineering Stochastic Local Search Algorithms
- 04/2000 **Best Teaching Assistant Award**, Darmstadt University of Technology, 2000

AWARDS IN INTERNATIONAL COMPETITIONS

- 11/2015 ChaLearn Automatic Machine Learning (AutoML) competition
Phase 3: Third prize in the human track, based on our AutoML system auto-sklearn, against 155 teams of human experts. Jointly with my group's AutoML team¹
- 09/2015 ChaLearn **Automatic Machine Learning (AutoML)** competition
Phase 2: Second prize in the auto-track and **first prize in the human track**, based on our AutoML system auto-sklearn, **against 125 teams of human experts**. Jointly with my group's AutoML team¹
- 07/2015 **First 3 prizes** in the ICON Challenge on **Algorithm Selection**. Jointly with Chris Cameron, Alex Frechette, Holger Hoos, Marius Lindauer, and Kevin Leyton-Brown
- 07/2015 **Wind Farm Layout Optimization Competition**: Second prize. Together with Ilya Loshchilov; we used no domain knowledge, whereas the winner was a large team including domain experts
- 03/2015 ChaLearn **Automatic Machine Learning (AutoML)** competition
Phase 1: **First prize in the auto-track** and third prize in the human track, based on our AutoML system auto-sklearn, against 67 teams of human experts. Jointly with my group's AutoML team¹
- 09/2014 **Five awards at the IPC 2014 Planning and Learning Track**, with two planners. *Fast Downward Cedalion*: **best learner award** and second prize for overall best quality. *Fast Downward SMAC*: **best basic solver award** and third prize in the categories overall best quality and best learner. Jointly with Jendrik Seipp and Silvan Sievers
- 06/2012 **Seven awards in the international SAT Challenge 2012**: Three first places, three second places, and one third place, in the 4 sequential categories, with the SAT solver SATzilla. Jointly with Lin Xu, Jonathan Shen, Holger Hoos, and Kevin Leyton-Brown

¹My group's AutoML team included: Matthias Feurer, Katharina Eggensperger, Aaron Klein, Stefan Falkner (not second phase), Marius Lindauer (only third phase), Farooq Zuberi (only first phase), Manuel Blum, and Jost Tobias Springenberg

- 07/2009 **Five awards in the 2009 international SAT Competition:** Three first and two second prizes in 5 of the 9 categories for the SAT solver SATzilla. Jointly with Lin Xu, Holger Hoos, and Kevin Leyton-Brown
- 07/2007 **First prize in the 2007 international SMT Competition** (SMT = Satisfiability Modulo Theories), in the quantifier-free bit-vector arithmetic category (the solver was built by Domagoj Babić and configured in our joint work with Holger Hoos, and Alan Hu)
- 06/2007 **Five awards in the 2007 SAT Competition:** Three first prizes, one second and one third prize in 5 of the 9 categories for the SAT solver SATzilla. Jointly with Lin Xu, Holger Hoos, and Kevin Leyton-Brown
- 05/2004 Two second places in the international **2004 SAT Competition** for the SAT solver SAPS; jointly with Dave Tompkins and Holger Hoos
- 11/1999 7th place (best German team) in **Northwestern European Regional Programming** Contest of the ACM, Netherlands, 1999; jointly with Stephan Pochmann and Thomas Strohmann

SCHOLARSHIPS

- 2010–2012 Post-doctoral Research Fellowship from the German Research Foundation (DFG)
- 2009–2010 Post-doctoral Research Fellowship from the Canadian Bureau of International Education
- 2006–2008 Doctoral Fellowship by the **German National Academic Foundation** (“Studienstiftung des deutschen Volkes”). Most prestigious fellowship for German doctoral students, **held by less than 0.5% of doctoral students**
- 2005–2007 University Graduate Fellowship, University of British Columbia (superseded by above fellowship after 1 year)
- 2004–2005 Foreign Exchange Scholarship from the German National Academic Foundation. Most prestigious fellowship for German doctoral students going abroad, held by less than 0.5% of doctoral students
- 2003–2004 Scholarship from the German National Academic Foundation. Most prestigious fellowship for pre-doctoral students in Germany, held by less than 0.5% of the student population
- 2001–2002 Foreign Exchange Scholarship from the German Academic Exchange Service

PUBLICATIONS

Theses

1. **Hutter, F.** (2009). Automated Configuration of Algorithms for Solving Hard Computational Problems. PhD thesis, University of British Columbia, Vancouver, Canada; October 2009.
2010 CAIAC Doctoral Dissertation Award.
2. **Hutter, F.** (2004). Stochastic Local Search for Solving the Most Probable Explanation Problem in Bayesian Networks. MSc thesis, Darmstadt University of Technology, Darmstadt, Germany; September 2004.

Refereed Journal Publications

3. **Hutter, F.**, Lindauer, M., Balint, A., Bayless, S., Hoos, H. H., Leyton-Brown, K. (2015). The Configurable SAT Solver Challenge (CSSC). Accepted for publication in *Artificial Intelligence Journal*, competition section.
4. Wang, Z., **Hutter, F.**, Zoghi, M., Matheson, D., de Freitas, N. (2015). Bayesian Optimization in a Billion Dimensions via Random Embeddings. Accepted for publication in *Journal of Artificial Intelligence Research*
5. Bischl, B., Kerschke, P., Kotthoff, L., Lindauer, M., Malitsky, Y., and Frechéte, A., Hoos, H. H., **Hutter, F.**, Leyton-Brown, K., Tierney, K., and Vanschoren, J. (2015). ASlib: A Benchmark Library for Algorithm Selection. Accepted for publication in *Artificial Intelligence Journal*, competition section.
6. **Hutter, F.**, Lücke, J., Schmidt-Thieme, L. (2015). Beyond Manual Tuning of Hyperparameters. *Künstliche Intelligenz*, 29(4): 329-337.
7. Lindauer, M., Hoos, H. H., **Hutter, F.**, Schaub, T. (2015). AutoFolio: An Automatically Configured Algorithm Selector. *Journal of Artificial Intelligence Research*, 53: 745-778.
8. **Hutter, F.**, Xu, L., Hoos, H. H., and Leyton-Brown, K. (2014). Algorithm Runtime Prediction: Methods & Evaluation. *Artificial Intelligence Journal*, 206: 79-111
9. Leyton-Brown, K., Hoos, H. H., **Hutter, F.**, and Xu, L. (2014). Understanding the empirical hardness of NP-complete problems. *Communications of the ACM*, 57(5): 98-107
10. **Hutter, F.**, Hoos, H. H., and Leyton-Brown, K. (2010). Tradeoffs in the Empirical Evaluation of Competing Algorithm Designs. *Annals of Mathematics and Artificial Intelligence*, 60(1-2): 65–89. Special Issue on Learning and Intelligent Optimization
11. **Hutter, F.**, Hoos, H. H., and Leyton-Brown, K., and Stützle, T. (2009). ParamILS: An Automatic Algorithm Configuration Framework. *Journal of Artificial Intelligence Research*, 36(1):267–306

12. Xu, L., **Hutter, F.**, Hoos H. H., and Leyton-Brown, K. (2008). SATzilla: Portfolio-based Algorithm Selection for SAT. *Journal of Artificial Intelligence Research*, 32(1):565–606.
2010 IJCAI/JAIR Best Paper Prize
13. Andronescu, M., Fejes, A. P., **Hutter, F.**, Hoos, H. H., and Condon, A. (2004). A New Algorithm for RNA Secondary Structure Design. *Journal of Molecular Biology*, 336(3):607–624
14. de Freitas, N., Dearden, R., **Hutter, F.**, Morales-Menendez, R., Mutch, J., and Poole, D. (2004). Diagnosis by a Waiter and a Mars Explorer. *Proceedings of the IEEE, Special Issue on Sequential State Estimation*, 92(3):455–468

Refereed Conference Publications

I list acceptance rates for conferences in this section, where available, as “AR: ⟨papers accepted⟩/⟨papers submitted⟩ = ⟨percentage⟩”.

15. Feurer, M., Klein, A., Eggenberger, K., Springenberg, T., Blum, M., **Hutter, F.** (2015). Efficient and Robust Automated Machine Learning. *Proceedings of the Neural Information Processing Systems Conference (NIPS 2015)*. (AR: 403/1838 = 22%)
16. Falkner, S., Lindauer, M., **Hutter, F.** (2015). SpySMAC: Automated Configuration and Performance Analysis of SAT Solvers *Proceedings of the International Conference on Satisfiability Solving (SAT 2015)*
17. Vallati, M. and **Hutter, F.**, Chrapa, L., McCluskey, T. (2015). On the Effective Configuration of Planning Domain Models *Proceedings of the 24th International Joint Conference on Artificial Intelligence (IJCAI 2015)*. (AR: 575/1996 = 29%)
18. Domhan, T., Springenberg, T., **Hutter, F.** (2015). Speeding up Automatic Hyperparameter Optimization of Deep Neural Networks by Extrapolation of Learning Curves *Proceedings of the 24th International Joint Conference on Artificial Intelligence (IJCAI 2015)*. (AR: 575/1996 = 29%)
19. **Hutter, F.**, Xu, L., Hoos, H. H., Leyton-Brown, K. (2015). Algorithm runtime prediction: Methods & evaluation (extended abstract). *Proceedings of the Journal Track of the 24th International Joint Conference on Artificial Intelligence (IJCAI 2015)*
20. Seipp, J., Sievers, S., Helmert, M., **Hutter, F.** (2015) Automatic Configuration of Sequential Planning Portfolios. *Proceedings of the Twenty-Ninth AAAI Conference on Artificial Intelligence (AAAI 2015)*. (AR: 531/1991 = 27%)
21. Eggenberger, K., **Hutter, F.**, Hoos, H. H., Leyton-Brown, K. (2015). Efficient Benchmarking of Hyperparameter Optimizers via Surrogates. Twenty-Ninth Conference on Artificial Intelligence (AAAI 2015). (AR: 531/1991 = 27%)
22. Feurer, M., Springenberg, T., **Hutter, F.** (2015). Initializing Bayesian Hyperparameter Optimization via Meta-Learning. *Proceedings of the Twenty-Ninth AAAI Conference on Artificial Intelligence (AAAI 2015)*. (AR: 531/1991 = 27%)
23. Lindauer, M., Hoos, H. H., **Hutter, F.** (2015). From Sequential Algorithm Selection to Parallel Portfolio Selection *Proceedings of the Learning and Intelligent Optimization Conference (LION 9)*

24. Improved Features for Runtime Prediction of Domain-Independent Planners. Fawcett, C., Vallati, M. **Hutter, F.**, Hoffmann, J. Hoos, H. H., Leyton-Brown, K. (2014). *Twenty-fourth International Conference on Automated Planning and Scheduling (ICAPS 2014)*. (AR: 62/164= 38%)
25. **Hutter, F.**, Hoos H. H., and Leyton-Brown, K. (2014). An Efficient Approach for Assessing Hyperparameter Importance. *31st International Conference on Machine Learning (ICML 2014)* (AR 125/726=17%)
26. Geschwender, D., **Hutter, F.**, Kotthoff, L., Malitsky, Y., Hoos, H. H., Leyton-Brown, K. (2014). Algorithm Configuration in the Cloud: A Feasibility Study. *Proceedings of the Learning and Intelligent Optimization Conference (LION-8)*
27. **Hutter, F.**, López-Ibáñez, Fawcett, C., Lindauer, M., Hoos, H. H., Leyton-Brown, K., Stützle, T. (2014) AClib: a Benchmark Library for Algorithm Configuration. *Proceedings of the Learning and Intelligent Optimization Conference (LION-8)*
28. Thornton, C., **Hutter, F.**, Hoos H. H., and Leyton-Brown, K. (2013). Auto-WEKA: Combined Selection and Hyper-Parameter Optimization of Classification Algorithms. *19th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2013)*. (AR 125/726=17%)
29. Wang, Z., Zhogi, M., **Hutter, F.**, Matheson, D., and de Freitas, N. (2013). Bayesian Optimization in High Dimensions via Random Embeddings. *23rd International Joint Conference on Artificial Intelligence (IJCAI 2013)*
IJCAI 2013 Distinguished Paper Award. (AR: 413/1473=28%)
30. **Hutter, F.**, Hoos H. H., and Leyton-Brown, K. (2013). Identifying Key Algorithm Parameters and Instance Features using Forward Selection. *Learning and Intelligent Optimization (LION-7)*. (AR 21/74=28%)
31. Xu, L., **Hutter, F.**, Hoos H. H., and Leyton-Brown, K. (2012). Evaluating Component Solver Contributions in Portfolio-based Algorithm Selectors. *15th International Conference on Theory and Applications of Satisfiability Testing (SAT 2012)*, 228–241. (AR 29/88=33%)
32. **Hutter, F.**, Hoos, H. H., Leyton-Brown, K. (2012). Parallel Algorithm Configuration. *Learning and Intelligent Optimization (LION-6)*. (AR 24/77=31%)
33. **Hutter, F.**, Hoos, H. H., Leyton-Brown, K. (2011). Sequential Model-Based Optimization for General Algorithm Configuration. *Learning and Intelligent Optimization (LION-5)*. (AR 49/99 = 49%). **Best Paper Award (second prize).**
34. **Hutter, F.**, Hoos, H. H., and Leyton-Brown, K. (2010) Automated Configuration of Mixed Integer Programming Solvers. *International Conference on Integration of Artificial Intelligence (AI) and Operations Research (OR) techniques in Constraint Programming (CPAIOR 2010)*, 186–202. (AR 18/39=46%)
35. **Hutter, F.**, Hoos, H. H., Leyton-Brown, K. and Murphy, K. (2010). Time-Bounded Sequential Parameter Optimization. *Learning and Intelligent Optimization (LION-4)*, 281–298. (AR 19/57 = 33%). **Runner-up Best Paper Award.**

36. **Hutter, F.**, Hoos, H. H., Leyton-Brown, K., and Murphy, K. (2009). An Experimental Investigation of Model-Based Parameter Optimisation: SPO and Beyond. In *ACM Genetic and Evolutionary Computation Conference (GECCO 2009)*. (AR: 220/531 = 41,4%)
37. **Hutter, F.**, Babić, D., Hoos, H. H., and Hu, A. (2007). Boosting Verification by Automatic Tuning of Decision Procedures. *Formal Methods in Computer Aided Design (FMCAD 2007)*, 27–34. (AR: 23/65 = 35%)
38. Xu, L., **Hutter, F.**, Hoos H. H., and Leyton-Brown, K. (2007). SATzilla-07: The Design and Analysis of an Algorithm Portfolio for SAT. *13th International Conference on Principles and Practice of Constraint Programming (CP 2007)*, 712–727. (AR: 43/143 = 30%)
39. **Hutter, F.**, Hoos, H. H., and Stützle, T. (2007). Automatic Algorithm Configuration based on Local Search. *22nd National Conference on Artificial Intelligence (AAAI 2007)*, 1152–1157. (AR: 253/921 = 27.5%)
40. **Hutter, F.**, Hamadi, Y., Hoos, H. H., and Leyton-Brown, K. (2006). Performance Prediction and Automated Tuning of Randomized and Parametric Algorithms. *12th International Conference on Principles and Practice of Constraint Programming (CP 2006)*, 213–228. (AR: 42/142 = 30%)
41. **Hutter, F.**, Hoos, H. H., and Stützle, T. (2005). Efficient SLS for MPE Solving. *Proc. of the 19th International Joint Conference on Artificial Intelligence (IJCAI 2005)*, 169–174. (AR: 240/1329 = 18%)
42. Dearden, R., **Hutter, F.**, Simmons, R., Thrun, S. Verma, V., and Willeke, T. (2004). Real-time Fault Detection and Situational Awareness for Rovers: Report on the Mars Technology Program Task. *IEEE Aerospace Conference*
43. **Hutter, F.** and Dearden, R. (2003). The Gaussian Particle Filter for Diagnosis of Non-Linear Systems. *14th International Conference on Principles of Diagnosis (DX 2003)*, 65–70.
44. **Hutter, F.** and Dearden, R. (2003): Efficient On-line Fault Diagnosis for Non-Linear Systems. *Proc. of the 7th International Symposium on Artificial Intelligence and Robotics in Space (i-SAIRAS 2003)*.
45. **Hutter, F.**, Tompkins, D. D. A. and Hoos, H. H. (2002). Scaling and Probabilistic Smoothing: Efficient Dynamic Local Search for SAT. *Proc. of the 8th International Conference on Principles and Practice of Constraint Programming (CP 2002)*, 233–248. (AR: 44/146 = 30%)

Book Chapters

46. **Hutter, F.**, Bartz-Beielstein, T., Hoos, H. H., Leyton-Brown, K, and Murphy, K. (2010). Sequential Model-Based Parameter Optimisation: an Experimental Investigation of Automated and Interactive Approaches. Chapter 15 in *Empirical Methods for the Analysis of Optimization Algorithms*, pages 361–411.

Refereed Workshop Publications

47. Klein, A., Bartels, S., Falkner, S., Hennig, P., **Hutter, F.** (2015). Towards efficient Bayesian Optimization for Big Data. *NIPS 2015 workshop on Bayesian Optimization (BayesOpt 2015)*.
48. Feurer, M., Klein, A., Eggenberger, K., Springenberg, T. and Blum, M., **Hutter, F.** (2015). Methods for Improving Bayesian Optimization for AutoML. *ICML 2015 workshop on AutoML (AutoML 2015)*
49. Lindauer, M. and Hoos, H. H., **Hutter, F.**, and Schaub, T. AutoFolio: Algorithm Configuration for Algorithm Selection *AAAI 2015 workshop on Algorithm Configuration (AlgoConf 2015)*
50. Eggenberger, K., **Hutter, F.**, Holger H.H., Leyton-Brown, K..Surrogate Benchmarks for Hyperparameter Optimization *ECAI 2014 workshop on Metalearning and Algorithm Selection (MetaSel 2014)*
51. Feurer, M., Springenberg, T., Hutter, F. Using Meta-Learning to Initialize Bayesian Optimization of Hyperparameters. *ECAI 2014 workshop on Metalearning and Algorithm Selection (MetaSel 2014)*
52. Domhan, T., Springenberg, T, **Hutter, F.** Extrapolating Learning Curves of Deep Neural Networks. *ICML 2014 workshop on AutoML (AutoML 2014)*
53. **Hutter, F.**, Hoos, H. H., Leyton-Brown, K. An Efficient Approach for Assessing Parameter Importance in Bayesian Optimization. *NIPS 2013 workshop on Bayesian Optimization in Theory and Practice (BayesOpt 2013)*.
54. Eggenberger, K., Feurer, M., Bergstra, J., Snoek, J., Hoos, H. H., **Hutter, F.**, Leyton-Brown, K. Towards an Empirical Foundation for Assessing Bayesian Optimization of Hyperparameters. *NIPS 2013 workshop on Bayesian Optimization in Theory and Practice (BayesOpt 2013)*.
55. Swersky, S., Duvenaud, D. Snoek, J., **Hutter, F.**, Osborne, M. Raiders of the Lost Architecture: Kernels for Bayesian Optimization in Conditional Parameter Spaces *NIPS 2013 workshop on Bayesian Optimization in Theory and Practice (BayesOpt 2013)*.
56. **Hutter, F.**, Hoos, H. H., Leyton-Brown, K. (2013). An Evaluation of Sequential Model-Based Optimization for Expensive Blackbox Functions *GECCO 2013 workshop on Blackbox Optimization Benchmarking (BBOB'13)*
57. **Hutter, F.**, Hoos, H. H., Leyton-Brown, K. Bayesian Optimization With Censored Response Data. *NIPS 2011 workshop on Bayesian Optimization, Experimental Design, and Bandits (BayesOpt 2011)*.
58. Xu, L., **Hutter, F.**, Hoos H. H., and Leyton-Brown, K. Hydra-MIP: Automated Algorithm Configuration and Selection for Mixed Integer Programming. *IJCAI 2011 workshop on Experimental Evaluation of Algorithms for Solving Problems with Combinatorial Explosion (RCRA 2011)*.

59. **Hutter, F.** (2007). On the Potential of Automatic Algorithm Configuration. *Doctoral Symposium on Engineering Stochastic Local Search Algorithms (SLS-DS 2007)*. **Best Poster Award.**
60. **Hutter, F.**, Hamadi, Y., Hoos, H. H., and Leyton-Brown, K. (2006). Performance Prediction and Automated Tuning of Randomized and Parametric Algorithms: An Initial Investigation. *AAAI 2006 Workshop on Learning for Search (LFS 2006)*

Edited Proceedings

61. **Hutter, F.**, Lindauer, M., Malitsky, Y., editors, (2015). *Algorithm Configuration: Papers from the AAAI Workshop*. AAAI Press Technical Report WS-15-01.
62. **Hutter, F.** and de Oca, Marco A. Montes, editors (2009). *SLS-DS 2009: Doctoral Symposium on Engineering Stochastic Local Search Algorithms* Technical Report 2009-024, IRIDIA, Université Libre de Bruxelles, Brussels, Belgium, 89 pp.
63. Ruml, W. and **Hutter, F.**, editors, (2006). *Learning for Search: Papers from the AAAI Workshop*. AAAI Press Technical Report WS-06-11, 154 pp.

PRESENTATIONS

Invited or Competitively-Selected Tutorials

- 07/2016 *IJCAI 2016 Tutorial*. Programming by Optimization: A Practical Paradigm for Computer-Aided Algorithm Design. Jointly with Holger Hoos and Kevin Leyton-Brown
- 02/2016 *AAAI 2016 Tutorial*. Algorithm Configuration: A Hands-on Tutorial. Jointly with Marius Lindauer
- 07/2014 *AAAI 2014 Tutorial*. Programming by Optimization: A Practical Paradigm for Computer-Aided Algorithm Design. Jointly with Holger Hoos and Kevin Leyton-Brown
- 05/2014 *CPAIOR 2014 Master Class*. Machine Learning for Optimization: Automated Parameter Tuning and Beyond
- 08/2013 *IJCAI 2013 Tutorial*. Programming by Optimization: A Practical Paradigm for Computer-Aided Algorithm Design. Jointly with Holger Hoos and Kevin Leyton-Brown
- 07/2013 *AAAI 2013 Tutorial*. Automatically improving empirical performance: algorithm configuration and selection. Jointly with Lars Kotthoff, Yuri Malitsky, Barry O’Sullivan, and Lin Xu.

Invited Presentations at Workshops

- 12/2015 NIPS 2015 workshop on Bayesian Optimization (BayesOpt 2015). *Flexible and Scalable Bayesian Optimization for Algorithm Configuration*

- 12/2015 NIPS 2015 workshop on Challenges in Machine Learning (CiML 2015). *Automated Machine Learning: Successes & Challenges*
- 11/2015 AutoML workshop, Jena 2015. *Advances in Hyperparameter Optimization of (Deep) Machine Learning Pipelines*
- 09/2015 BrainLinks-BrainTools workshop, Freiburg 2015. *Automated Learning of Deep Representations and Hyperparameters*
- 03/2015 OpenAnalytics workshop, Paris 2015. *Automatic Machine Learning*
- 10/2014 Schloß Dagstuhl, Germany. *Modelling and Optimization of Empirical Algorithm Performance*
- 08/2014 ECAI 2014 workshop on Metalearning and Algorithm Selection. *Bayesian Optimization for More Automatic Machine Learning*
- 05/2013 CPAIOR 2013 workshop on algorithm selection (AlgoSel 2013). *Model-based Algorithm Configuration*
- 05/2010 Graduate Student Symposium of the Canadian Artificial Intelligence conference (AI 2010). *Doing a PhD in AI: a case study*

Invited Presentations at Universities & Public Research Institutes

- 09/2014 University of British Columbia, Canada. *Advances in Algorithm Configuration and Automated Machine Learning*
- 05/2014 University of Stuttgart. *Extensions of Bayesian Optimization for More Automatic Machine Learning*
- 04/2014 Max Planck Institute Tübingen. *Practical Bayesian Optimization for More Automatic Machine Learning*
- 04/2014 University of Oxford. *Bayesian Optimization for More Automatic Machine Learning*
- 08/2013 Karlsruhe Institute of Technology. *Modelling and Optimization of Empirical Algorithm Performance*
- 08/2013 *Programming by Optimization A Practical Paradigm for Computer-Aided Algorithm Design*. University of British Columbia, Vancouver. Jointly with Holger Hoos and Kevin Leyton-Brown
- 06/2013 University of Freiburg. *Modelling and Optimization of Empirical Algorithm Performance*

- 05/2013 University of Groningen. *Modelling and Optimization of Empirical Algorithm Performance*
- 09/2012 University of Basel. *Helping Domain Experts Build Better Algorithms: Automated Performance Modelling, Tuning, Configuration and Selection*
- 09/2012 University of Freiburg. *Helping Domain Experts Build Better Algorithms: Automated Performance Modelling, Tuning, Configuration and Selection*
- 09/2012 University of Potsdam. *Helping Domain Experts Build Better Algorithms: Automated Performance Modelling, Tuning, Configuration and Selection*
- 02/2011 Simon Fraser University, *Automated Algorithm Configuration and Selection: Enabling Technologies for Building Better Algorithms*
- 12/2010 University of Freiburg, *Automated Algorithm Configuration and Selection: Enabling Technologies for Building Better Algorithms*
- 12/2010 University of Potsdam, *Automated Algorithm Configuration and Selection: Enabling Technologies for Building Better Algorithms*
- 12/2010 University of New Hampshire, *Automated Algorithm Configuration and Selection: Enabling Technologies for Building Better Algorithms*
- 12/2010 Massachusetts Institute of Technology (MIT), *Automated Algorithm Configuration and Selection: Enabling Technologies for Building Better Algorithms*
- 05/2010 Cologne University of Applied Sciences, COSA Colloquium. *Automated Configuration of Algorithms for Solving Hard Computational Problems*
- 05/2008 Darmstadt University, Germany. *Automated algorithm configuration: boosting performance while reducing development time*

Invited Presentations at Industrial Labs

- 05/2013 IBM Research New York. *Modelling and Optimization of Empirical Algorithm Performance*
- 07/2012 IBM Research Dublin. *Helping Domain Experts Build Better Algorithms: Automated Performance Modelling, Tuning, Configuration and Selection*
- 08/2011 Google (tech talk). *Helping Domain Experts Build Better Algorithms: Automated Performance Modelling, Tuning, Configuration and Selection*
- 07/2012 Microsoft Research, Redmond. *Extending Bayesian Optimization for Real-World Applications*

- 05/2008 First Search & Biology day at the INRIA/MSR joint lab, Paris, France. *Automated algorithm configuration: boosting performance while reducing development time*
- 07/2005 Cork Constraint Computation Centre, University College Cork, Ireland. *Automated Parameter Setting Based on Runtime Prediction: Towards an Instance-Aware Problem Solver*
- 07/2005 Microsoft Research Cambridge, UK. *Automated Parameter Setting Based on Runtime Prediction: Towards an Instance-Aware Problem Solver*

Conference Presentations

- 07/2015 International Joint Conference on Artificial Intelligence (IJCAI 2015), Buenos Aires, Argentina. *Algorithm Runtime Prediction: Methods & Evaluation*
- 07/2014 International Conference on Theory and Applications of Satisfiability Testing (SAT 2014), Vienna, Austria. *The Configurable SAT Solver Challenge*
- 01/2014 Learning and Intelligent Optimization Conference (LION-8), Gainesville, Florida, USA. *AClib: a Benchmark Library for Algorithm Configuration*
- 01/2012 Learning and Intelligent Optimization Conference (LION-6), Paris, France. *Parallel Algorithm Configuration*
- 01/2011 Learning and Intelligent Optimization Conference (LION-7), Rome, Italy. *Sequential Model-Based Optimization for General Algorithm Configuration*
- 06/2010 International Conference on Integration of AI and OR Techniques in Constraint Programming (CPAIOR-10), Bologna, Italy. *Automated Configuration of Mixed Integer Programming Solvers*
- 01/2010 Learning and Intelligent Optimization Conference (LION-4), Venice, Italy. *Time-Bounded Sequential Parameter Optimization.*
- 06/2009 ACM Genetic and Evolutionary Computation Conference (GECCO-09), Montreal, Canada. *An Experimental Investigation of Model-Based Parameter Optimisation: SPO and Beyond*
- 07/2007 AAAI Conference on Artificial Intelligence (AAAI 2007), Vancouver, Canada. *Automatic Algorithm Configuration based on Local Search*
- 09/2006 International Conference on Principles and Practice of Constraint Programming (CP 2006), Nantes, France. *Performance Prediction and Automated Tuning of Randomized and Parametric Algorithms*

- 08/2005 International Joint Conference on Artificial Intelligence (IJCAI 2005), Edinburgh, Scotland. *Efficient Stochastic Local Search for MPE Solving*
- 09/2002 International Conference on Principles and Practice of Constraint Programming (CP 2002), Ithaca, USA. *Scaling and Probabilistic Smoothing: Efficient Dynamic Local Search for SAT*

Workshop Presentations

- 06/2014 ICML 2014 workshop on AutoML (AutoML 2014), Beijing, China. *Extrapolating Learning Curves of Deep Neural Networks*
- 12/2013 NIPS 2013 workshop on Bayesian Optimization in Theory and Practice (BayesOpt 2013), Lake Tahoe, USA. *An Efficient Approach for Assessing Parameter Importance in Bayesian Optimization*
- 12/2013 NIPS 2013 workshop on Bayesian Optimization in Theory and Practice (BayesOpt 2013), Lake Tahoe, USA. *Towards an Empirical Foundation for Assessing Bayesian Optimization of Hyperparameters*
- 12/2013 AAI 2013 workshop on Combining Constraint Solving, Mining, and Learning (Cocomile), Bellevue, USA. *Advances in Algorithm Runtime Prediction*
- 12/2011 NIPS 2011 workshop on Bayesian Optimization, Experimental Design, and Bandits (BayesOpt 2011), Vancouver, Canada. *Bayesian Optimization With Censored Response Data*
- 09/2007 Doctoral Symposium on Engineering Stochastic Local Search Algorithms (SLS-DS'07), Brussels, Belgium. *On the Potential of Automatic Algorithm Configuration*
- 05/2006 AAI-06 Workshop on Learning for Search, Chicago, USA. *Performance Prediction and Automated Tuning of Randomized and Parametric Algorithms: An Initial Investigation*

TEACHING

Teaching Experience at the University of Freiburg

- 10/2015–
02/2016 **Graduate course** *Machine Learning and Optimization for Algorithm Design* (with my postdoc Marius Lindauer)
- 10/2015–
02/2016 **Lab course** *Automated Machine Learning for Kaggle Competitions* (with my PhD student Matthias Feurer)

- 04/2015–
08/2015 **Lab course** *Bayesian Optimization* (with my postdoc Stefan Falkner)
- 10/2014–
02/2015 **Seminar** *AI for Automated Algorithm Design* (with my postdoc Marius Lindauer)
- 07/2014–
07/2014 1 module of **graduate course** *Machine learning* (module *Hyperparameter Optimization*, consisting of 3 lectures; the rest of the course was taught by Prof. Riedmiller)
- 04/2014–
08/2014 **Seminar** *Automated Parameter Tuning and Algorithm Configuration* (with my postdoc Marius Lindauer)
- 04/2013–
08/2013 **Seminar** *Automated Parameter Tuning and Algorithm Configuration*

Teaching Experience at the University of British Columbia

- 01/2011–
04/2011 **Undergraduate course** *Introduction to Artificial Intelligence* (CPSC 322); sole responsibility for the course with 78 registered students and 3 TAs
- 01/2009–
12/2009 **Course Development** under the Science Education Initiative of Nobel Laureate Carl Wieman. Improved the courses *Introduction to Artificial Intelligence* (CPSC 322; together with Prof. Leyton-Brown) & *Intelligent Systems* (CPSC 422; together with Prof. Conati)

Teaching Experience, as Teaching Assistant

- 09/2005–
12/2005 **Graduate course** *Probabilistic Machine Learning* (CPSC 540), University of British Columbia; taught by Prof. Murphy
- 01/2005–
04/2005 **Undergraduate course** *Intelligent Systems* (CPSC 422), University of British Columbia; taught by Prof. Poole
- 04/2003–
09/2003 **Graduate course** *Knowledge Representation*, Darmstadt University of Technology; taught by Prof. Bibel
- 04/2001–
09/2001 **Undergraduate course** *Computer Science 4* (formal languages, automata and complexity theory), Darmstadt University of Technology; taught by Prof. Brandt
- 10/2000–
03/2001 **Undergraduate course** *Computer Science 3* (graph theory and data structures), Darmstadt University of Technology; taught by Prof. Waldschmidt

10/1999–
03/2000 **Undergraduate course** *Computer Science I* (object orientation, abstract data types, and verification), Darmstadt University of Technology; taught by Prof. Henhapl

STUDENT SUPERVISION

Supervisor of PhD students, University of Freiburg

02/2015–
current Aaron Klein; together with Prof. Brox

08/2014–
current Matthias Feurer

08/2014–
current Katharina Eggensperger

Supervisor of MSc theses, University of Freiburg

12/2015–
current Hector Mendoza
Off-the-Shelf Deep Learning by Automated Joint Structure Search and Hyperparameter Optimization

11/2015–
current Tulio Paiva
Effective Freeze-Thaw Bayesian Optimization for Speeding Up Hyperparameter Optimization of Deep Neural Networks

07/2015–
current Joel Kaiser
Information Gain Approaches for Best Arm Identification in Multi-Armed Bandits

06/2015–
12/2015 Martin Goth
Algorithm Configuration in the Cloud: A Ready-to-Use Framework and Best Practices for the Cloud Providers Amazon Web Services and Microsoft Azure

06/2014–
02/2015 Aaron Klein
Automatic construction of deep convolutional neural network ensembles

11/2013–
07/2014 Matthias Feurer
Using Meta-Learning to Initialize Bayesian Optimization of Hyperparameters

11/2013–
07/2014 Katharina Eggensperger
Surrogates for Expensive Hyperparameter Optimization Problems

11/2013– Tobias Donham
07/2014 *Extrapolation of Learning Curves to Speed Up Hyperparameter Optimization of Deep Neural Networks*

Supervisor of BSc theses, University of Freiburg

04/2015– Rolf-David Bergdoll.
09/2015 *Instance-Specific Algorithm Scheduling*

Second reader of MSc theses, University of Freiburg

12/2015 José Luis Licón Saláiz. Chair: Prof. Backofen
09/2015 Parastou Kohvaei. Chair: Prof. Backofen
09/2015 Fabian Girrbaach. Chair: Prof. Arras
08/2015 Teresa Müller. Chair: Prof. Backofen
06/2015 Sarah Alfear. Chair: Prof. Backofen
05/2015 Simon Bartels. Chair: Dr. Boedeker
02/2015 Marc Eisenbarth. Chair: Prof. Riedmiller
11/2014 Sven Wehner. Chair: Prof. Arras
09/2014 Julian Schmid. Chair: Prof. Riedmiller
06/2014 Manuel Watter. Chair: Prof. Riedmiller

Supervisor of MSc projects, University of Freiburg

03/2015– Tulio Paiva
09/2015 *Learning Curve Prediction for Deep Neural Networks*

09/2014– Joel Kaiser and José Luis Licón Saláiz
03/2015 *RoBO: a Framework for Robust Bayesian Optimization*

11/2013– Aaron Klein & Simon Bartels
07/2014 *Effective Bayesian Optimization on Large Data Sets*

04/2013– Matthias Feurer & Katharina Eggensperger
10/2013 *Towards an Empirical Foundation for Assessing Bayesian Optimization of Hyperparameters*

Student Supervision, University of British Columbia

Note: during my PhD and postdoc at UBC (2004–2013) I often played the role of a senior collaborator of MSc and PhD students, but these roles are not formally recognized at UBC; thus, I am only listing formal relationships that I had with undergraduate students during that

time.

- 01/2012–08/2012 Primary supervisor for full-time research programmer Steve Ramage. Project: *Java Implementation of Sequential Model-based Algorithm Configuration*. Secondary supervisors: Profs. Hoos and Leyton-Brown
- 05/2011–08/2011 Primary supervisor for full-time undergraduate Co-op student Jonathan Shen. Project: *Java Implementation of Efficient Operations in Random Forests*. Secondary supervisors: Profs. Hoos and Leyton-Brown
- 01/2011–08/2011 Primary supervisor for full-time undergraduate Co-op student Maverick Chan. Project: *HAL Support for Sequential Model-based Algorithm Configuration and Surrogate Configuration Scenarios*. Secondary supervisors: Profs. Hoos and Leyton-Brown
- 05/2010–08/2010 Primary supervisor for full-time undergraduate summer student Vincent Chu. Project: *HAL Support for Sequential Model-based Algorithm Configuration*. Secondary supervisors: Profs. Hoos and Leyton-Brown

PROFESSIONAL SERVICE

Journal Reviewing

I reviewed for the following journals in the years indicated; in the case of multiple reviews for a journal in a given year X , I write $X (k \times)$ to denote k reviews in that year.

- *Journal of Artificial Intelligence Research (JAIR)*
 - Editorial board member since 2013
 - Reviews: 2015 (6 \times), 2014 (8 \times), 2013, 2011, 2010, 2008, 2007
- *Journal of Machine Learning Research (JMLR)*: 2015 (4 \times), 2014, 2013, 2011
- *Artificial Intelligence (AIJ)*: 2014 (5 \times), 2013, 2008, 2007
- *Machine Learning Journal (MLJ)*: 2013
- *INFORMS Journal of Computing (JOC)*: 2014, 2013, 2007
- *Annals of Mathematics and Artificial Intelligence (AMAI)*: 2015, 2014, 2012, 2010, 2006
- *Artificial Intelligence Communications (AI Com)*: 2014
- *New Generation Computing*: 2014
- *Data Mining and Knowledge Discovery*: 2014
- *International Journal of Advanced Robotic Systems (IJARS)*: 2013
- *Journal of Heuristics (JHeur)*: 2013
- *Logic Journal of the IGPL*: 2012
- *Industrial & Engineering Chemistry Research (IECR)*: 2011, 2010
- *The Computer Journal (COMPJ)*: 2011
- *Journal of Satisfiability (JSAT)*: 2010, 2008, 2007
- *Journal of Scheduling (JoSh)*: 2008, 2007
- *IEEE Journal of Oceanic Engineering (IEEE-JOE)*: 2007
- *IEEE Transactions on Signal Processing (IEEE-T-SP)*: 2006
- *Annals of Operations Research (ANOR)*: 2005

- *Automatica*: 2004

Program Committee Memberships at Conferences

- *Neural Information Processing Systems (NIPS)*
 - Area chair: 2016
 - Program committee member: 2014, 2010
- *International Conference on Machine Learning (ICML)*
 - Program committee member: 2016
- *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)*
 - Program committee member: 2016, 2015
 - Reviewer: 2013, 2012
- *International Joint Conference on Artificial Intelligence (IJCAI)*
 - Senior program committee member: 2016, 2015, 2013
 - Program committee member: 2011, 2009, 2007, 2005
- *AAAI Conference on Artificial Intelligence (AAAI)*
 - Program committee member: 2016, 2015, 2014, 2012
 - Program committee member (Computational Sustainability Track): 2013, 2012
 - Reviewer: 2005, 2004
- *International Conference on Learning Representations (ICLR)*
 - Program committee member: 2016
- *International Conference on Theory and Applications of Satisfiability Testing (SAT)*
 - Program committee member: 2016
 - Reviewer: 2015, 2008, 2006
- *European Conference on Artificial Intelligence (ECAI)*
 - Program committee member: 2014
- *Learning and Intelligent Optimization (LION)*
 - Program committee member: every year since 2009
- *Canadian Conference on Artificial Intelligence (AI)*
 - Program committee member: every year since 2011
- *Genetic and Evolutionary Computation Conference (GECCO)*
 - Program committee member: every year since 2011
- *International Conference on Integration of AI and OR Techniques in Constraint Programming (CPAIOR)*
 - Program committee member: 2014, 2013
 - Reviewer: 2010
- *International Conference on Constraint Programming (CP)*
 - Reviewer: 2012, 2009, 2008, 2003
- *International Conference on Computational Sustainability (CompSust)*
 - Reviewer: 2012
- *International Symposium on Combinatorial Search (SoCS)*
 - Reviewer: 2013
- *International Conference on Logic Programming and Non-monotonic Reasoning (LPNMR)*
 - Reviewer: 2013

- *MetaHeuristics International Conference (MIC)*
– Reviewer: 2011

Workshop Organization

- *Co-chair, 2015 ICML workshop on Automated Machine Learning*
- *Co-chair, 2015 AAI workshop on Algorithm Configuration*
- *Co-chair, 2014 ICML workshop on Automated Machine Learning*
- *Co-chair, 2014 COSEAL workshop on Algorithm Configuration & Selection*
- *Co-chair, 2012 NIPS workshop on Bayesian Optimization and Decision Making*
- *Co-chair, 2011 NIPS workshop on Bayesian Optimization, Experimental Design, and Bandits*
- *Co-chair, 2009 Doctoral Symposium on Engineering Stochastic Local Search Algorithms (SLS-DS-09)*
- *Co-chair, 2007 AAI Workshop on Learning for Search*

Program Committee Member at Workshops

- *NIPS workshop on Bayesian Optimization (BayesOpt): 2015, 2014, 2013*
- *NIPS workshop on Challenges in Machine Learning (CiML): 2015*
- *ECML workshop on Meta-Learning and Algorithm Selection: 2015*
- *SAT workshop on Pragmatics of SAT solving (PoS): 2015*
- *ECAI workshop on Meta-Learning and Algorithm Selection: 2014*
- *Combining Constraint solving with Mining and Learning (CoCoMile): 2013, 2012*
- *Workshop on Ant Colony Optimization and Swarm Intelligence (ANTS): 2010, 2006*
- *Workshop on Engineering Stochastic Local Search Algorithms (SLS): 2011, 2009, 2007*
- *Workshop on Experimental Algorithms (WEA): 2007*

University Committees (UBC)

- Computer science faculty recruiting committee, 2006 & 2008–2010
- Computer science postdoc liaison, 2008–2010
- Computer science faculty affairs committee, 2007
- Computer science graduate affairs committee, 2005–2007
- Graduate student society councillor, 2005
- Institute for Computing, Information & Cognitive Systems social committee, 2006–2008

University Committees (University of Freiburg)

- Computer science graduate admission committee: since 2013

RESEARCH GRANTS

Research Grants Currently Under Review

- 2016–2021 ERC Starting Grant. Project “Data-Driven Methods for Modelling and Optimizing the Empirical Performance of Deep Neural Networks”. **1 495 000€**
- 2016–2017 Google Faculty Research Award. Project “BigBO: Scaling up Bayesian Optimization of Convolutional Neural Networks to Large Datasets”. **US \$71 800**

Research Grants as Principal Investigator

- 03/2015–
02/2018 **EU Horizon 2020 ICT**, RIA action. Project “RobDREAM”, with a consortium of 7 participating institutions. My funding share: **277 752€** (of a total of 5 401 911€ for the entire consortium)
- 12/2014–
11/2017 DFG (German Research Foundation) grant in **Priority Programme Autonomous Learning**. Project: “Auto-Tune: Structural Optimization of Machine Learning Frameworks for Large Datasets” Co-PIs: Philipp Hennig and Thomas Brox. My funding share: **430 300€** (of a total of 737 600€ for the entire grant)
- 03/2012–
02/2017 DFG (German Research Foundation) **Emmy Noether grant** for an independent junior research group in Germany. Project: “Advanced Methods for Automated Optimization and Modeling of the Empirical Performance of Highly Parameterized Heuristic Algorithms”. **1 282 800€**
- 03/2015–
02/2017 DFG (German Research Foundation) grant in Excellence Cluster **BrainLinks-BrainTools**. Project “Automated Learning of Deep Representations and Hyperparameters” . **123 221€**. Co-PIs (without a funding share): Tonio Ball, Wolfram Burgard, Martin Riedmiller, Michael Tangermann
- 07/2015–
06/2015 Amazon Web Services grant for cloud resources valued at **10 000€**. Co-PI: Marius Lindauer
- 03/2014–
12/2015 Microsoft Azure grant for cloud resources valued at **40 000€**. Co-PIs: Holger Hoos, Youssef Hamadi, Christoph Wintersteiger
- 09/2014–
03/2015 DFG (German Research Foundation) grant in Excellence Cluster **BrainLinks-BrainTools**. Project title: “Automated Learning of Deep Representations and Hyperparameters” **108 950€**. Co-PIs (without a funding share): Tonio Ball, Wolfram Burgard, Martin Riedmiller

11/2010– DFG (German Research Foundation) grant in the “Research Fellowship”
10/2012 program. Project: “Model-based Configuration of Algorithms for Solving
Hard Computational Problems”. 73 392€

Research Grants as Proposal Contributor

01/2013– Compute Canada project proposal for compute resources (600 CPU years)
12/2013 valued at CAD \$210 000. Substantial involvement in design and drafting of
the proposal. PI: Holger Hoos, co-PI: Kevin Leyton-Brown.

01/2012– Compute Canada project proposal for compute resources (400 CPU years)
12/2012 valued at CAD \$140 000. Substantial involvement in design and drafting of
the proposal. PI: Holger Hoos, co-PI: Kevin Leyton-Brown.

01/2012– Compute Canada project proposal for compute resources (400 CPU years)
12/2011 valued at CAD \$140 000. Substantial involvement in design and drafting of
the proposal. PI: Holger Hoos, co-PI: Kevin Leyton-Brown.

01/2008– MITACS² project “Automated Design of Heuristic Algorithms from Com-
12/2010 ponents”, CAD \$74 624/year, for 3 years. Substantial involvement in design
and drafting of the proposal. PI: Holger Hoos, co-PI: Kevin Leyton-Brown.

²Mathematics of Information Technology and Complex Systems