

CURRICULUM VITAE

Personal information

Name: Henrik Boström
Born: 1965
Address: Stockholm University
Dept. of Computer and Systems Sciences
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Education

1993 PhD, Computer and Systems Sciences, Dept. of Computer and Systems Sciences, Stockholm University, Sweden.
1990 PhLic, Computer and Systems Sciences, Dept. of Computer and Systems Sciences, Stockholm University, Sweden.
1988 BSc, Computer and Systems Sciences, Dept. of Computer and Systems Sciences, Stockholm University, Sweden.
1984 Upper secondary school, Natural Sciences, Hersby skola, Lidingö

Employments

2008 - Professor, Stockholm University
2007- Professor, University of Skövde, Sweden
2002 - 2006 Head of research and development, Compumine AB
2000 - 2002 Senior scientist, Virtual Genetics AB
1999 - 2008 Docent (associate professor), Stockholm University, Sweden
1996 - 2008 Senior Lecturer, Stockholm University, Sweden
1994 - 1996 Senior Lecturer (*non-permanent*), Stockholm University, Sweden
1990 - 1994 Graduate student position (*doktorandtjänst*), Stockholm University, Sweden
1988 - 1990 Assistant professor (part-time 50%, *non-permanent*), Research assistant (part-time 50%, *non-permanent*), Stockholm University, Sweden

Military service

1984 - 1985 Informationsassistent, Värnpliktskontoret, Solna

Supervision experience¹

Doctoral degree

- 2000 - 2006 Main and primary supervisor for Tony Lindgren, *Methods of solving conflicts among induced rules*, Dept. of Computer and Systems Sciences, Stockholm University, Sweden.
- 1998 - 2002 Main and primary supervisor for Martin Eineborg, *Inductive logic programming for part of speech tagging*, Dept. of Computer and Systems Sciences, Stockholm University, Sweden.

Licentiate degree

- 2004 - 2009 Main and primary supervisor for Sampath Deegalla, *Towards Improving Performance of Nearest Neighbor Classification in High Dimensions*, Dept. of Computer and Systems Sciences, Stockholm University, Sweden.
- 2007 - 2009 Main and primary supervisor for Tuve Löfström. *Utilizing Diversity and Performance Measures for Ensemble Creation*, School of Science and Technology at Örebro University, Sweden.
- 2004 - 2007 Main and primary supervisor for Thashmee Karunaratne, *Graph Propositionalization for Learning from Structured Data*, Dept. of Computer and Systems Sciences, Stockholm University, Sweden.
- 2000 - 2003 Main and primary supervisor for Tony Lindgren, *Rule Conflicts - New Methods of Resolution*, Dept. of Computer and Systems Sciences, Stockholm University, Sweden.

Current PhD students

- 2010 - Main and primary supervisor for Cecilia Sönströd, enrolled at Stockholm University, Sweden.
- 2007 - Main and primary supervisor for Catarina Dudas, enrolled at Stockholm University, Sweden.
- 2007 - Main and primary supervisor for Tuve Löfström, enrolled at Örebro University, Sweden.
- 2004 - Main and primary supervisor for Thashmee Karunaratne, enrolled at Stockholm University, Sweden.
- 2004 - Main and primary supervisor for Sampath Deegalla, enrolled at Stockholm University, Sweden.

Supervision training

- 2009 *PhD student supervision – theory and practice*, course at Stockholm University, Examiner Prof. Inga Sanner
- .

¹ In the following the term *assistant supervisor* denotes an individual who complements the main supervisor. The term *primary supervisor* denotes an individual who, in practice, has the main responsibility for the progress of the thesis. The *main supervisor* denotes an individual who has the formal responsibility for the progress of the thesis.

Other Academic Assignments

Editorial boards

- 2008 - Machine Learning
- 2006 - Intelligent Data Analysis
- 2000 - Journal of Machine Learning Research
- 2000 - 2002 Journal of Artificial Intelligence Research

Conference program committees

- 2011 ACM SIGKDD Conference on Knowledge Discovery and Data Mining
- 2011 International Conference on Machine Learning
- 2011 Twenty-Fifth Conference on Artificial Intelligence (AAAI)
- 2011 International Symposium on Intelligent Data Analysis
- 2011 The Fourteenth International Conference on Discovery Science
- 2011 Scandinavian Conference on Artificial Intelligence
- 2010 ACM SIGKDD Conference on Knowledge Discovery and Data Mining
- 2010 International Conference on Machine Learning
 - *area chair for rule and decision tree learning*
- 2010 European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases
- 2009 ACM SIGKDD Conference on Knowledge Discovery and Data Mining
- 2009 International Conference on Machine Learning
- 2009 European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases
- 2009 International Conference on Information Fusion
- 2009 International Conference on Hybrid Artificial Intelligence Systems
- 2008 International Conference on Machine Learning
- 2008 European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases
- 2008 International Conference on Data Warehousing and Knowledge Discovery
- 2007 European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases
- 2007 International Conference on Data Warehousing and Knowledge Discovery
- 2006 European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases
 - *area chair for rule learning*
- 2006 European Conference on Artificial Intelligence
- 2006 International Conference on Data Warehousing and Knowledge Discovery
- 2005 International Conference on Machine Learning
- 2005 European Conference on Machine Learning

2005	European Conference on Principles and Practice of Knowledge Discovery in Databases
2004	The European Conference on Machine Learning
2004	The ECML/PKDD Workshop on Advances in Inductive Rule Learning
2003	The European Conference on Machine Learning
2003	The International Conference on Intelligent Systems for Molecular Biology
2002	The European Conference on Machine Learning
2002	The Workshop on Data Mining in Bioinformatics
2001	The European Conference on Machine Learning
2001	The International Conference on Inductive Logic Programming
2000	The International Conference on Inductive Logic Programming
2000	The International Conference on Intelligent Systems
2000	The International Workshop on Learning Language in Logic
1999	The International Conference on Inductive Logic Programming
1999	The International Workshop on Learning Language in Logic
1998	The International Conference on Inductive Logic Programming
1997	The International Conference on Inductive Logic Programming
1996	The International Conference on Inductive Logic Programming

Leading roles in expert networks

2006 -	Member of Executive Board, Swedish AI Society (SAIS)
2002 -	Locally responsible for participation in the network of excellence in knowledge discovery (KDnet), which was funded by the European Commission under IST-2001-33086.

Expert evaluation commissions

2011	Member of the grading committee for PhD thesis of Atelach Alemu Argaw, Stockholm University, Sweden.
2011	Opponent at Jamie Walter's licentiate seminar, Mid-Sweden University, Sundsvall, Sweden.
2011	Member of the grading committee for PhD thesis of Maria Riveiro, Örebro University, Sweden.
2009	Member of the grading committee for PhD thesis of Marcin Kierczak, Uppsala University, Sweden.
2008	Member of the grading committee for PhD thesis of Fredrik Olsson, Gothenburg University, Sweden.
2008	Member of the grading committee for PhD thesis of Martin Persson, Örebro University, Sweden.
2008	Member of the grading committee for PhD thesis of Claes Andersson, Uppsala University, Sweden.

- 2007 Member of the grading committee for PhD thesis of Daniel Gillblad, Royal Institute of Technology, Sweden.
- 2007 Member of the grading committee for PhD thesis of Martin Hassel, Royal Institute of Technology, Sweden.
- 2007 Member of the grading committee for PhD thesis of Ulf Johansson, Linköping University, Sweden.
- 2006 Member of the grading committee for PhD thesis of Magnus Sahlgren, Stockholm University, Sweden.
- 2006 Opponent at Niklas Lavesson's licentiate seminar, Blekinge Institute of Technology, Sweden.
- 2005 Member of the grading committee for PhD thesis of Rickard Cöster, Stockholm University, Sweden.
- 2005 Member of the grading committee for PhD thesis of Lisa Brouwers, Stockholm University, Sweden.
- 2005 Expert evaluator of candidates for a position as lecturer in computer and systems sciences at Dept. of Information Science at Uppsala University.
- 2002 Member of the grading committee for PhD thesis of Beata Megyesi, Royal Institute of Technology, Sweden.

Additional academic leadership

- 2009 - Coordinator of the research group on systems analysis and management science (SAMS) at Dept. of Computer and Systems Sciences, Stockholm University, Sweden.
- 2007 - 2009 Co-director of the Information Fusion Research Program, University of Skövde, Sweden.
- 2007 - 2009 Head of the board for research and research education at School of Humanities and Informatics at University of Skövde, Sweden.
- 2005 - 2006 Deputy Head, Dept. of Computer and Systems Sciences, Stockholm University, Sweden.
- 2004 - 2006 Co-director of the Laboratory for Data Mining and Decision Analysis at Dept. of Computer and Systems Sciences, Stockholm University, Sweden.
- 1999 - 2001 Chairman of the graduate study board at Dept. of Computer and Systems Sciences, Stockholm University, Sweden.
- 1996 - 2004 Co-director of the machine learning group at Dept. of Computer and Systems Sciences, Stockholm University, Sweden.

Research projects (principal investigator)

- 2009 - 2011 INFUSIS - Information Fusion for In Silico Modelling in Pharmaceutical Research, Swedish Knowledge Foundation, 2.9 MSEK
- 2007 - 2010 Data mining for identification of purchase patterns, Swedish Knowledge Foundation, 1.4 MSEK
- 2000 - 2003 Induction of Stochastic Logic Programs, Swedish Research Council, 1.2 MSEK
- 1998 - 1999 Inductive Logic Programming for Knowledge Discovery in Databases, Swedish Research Council, 0.6 MSEK

- 1997 - 1998 Inductive Logic Programming for Natural Language Processing, Swedish Research Council, 0.7 MSEK
- 1996 - 1999 Inductive Logic Programming II (ESPRIT LTR No. 20237) 0.9 MSEK

Software

- 2002 - Inventor and main developer of Rule Discovery System (RDS), provided by Compumine AB, <http://www.compumine.com/web/public/rds/me>
- 2000 - 2002 Inventor and main developer of Virtual Predict, provided by Virtual Genetics AB

External Collaboration

- 2007 - 2010 Cooperation with companies associated to the Information Fusion Research Program at University of Skövde, including ICA AB and Volvo Powertrain.
- 2000 - Cooperation with researchers within the pharmaceutical industry, including Prof. Ulf Norinder, AstraZeneca R&D Södertälje and Dr. Sorel Muresan, AstraZeneca R&D Mölndal.
- 1993 - 1999 Cooperation with the following European universities and institutes within EU projects: Katholieke Universiteit Leuven (Belgium), Universities of Oxford, York and Bristol (Great Britain), GMD (now Fraunhofer-Institut) and University of Bonn (Germany), Jozef Stefan Institute (Slovenia), Université Paris Sud (France), Università di Torino (Italy) and Jozsef Attila University (Hungary).

Refereed publications since 2000

Journals

- U. Johansson, C. Sönströd, T. Löfström and H. Boström. Obtaining Accurate and Comprehensible Classifiers Using Oracle Coaching. *Intelligent Data Analysis*, vol. 16, no. 2, 2012 (to appear)
- U. Johansson, C. Sönströd, U. Norinder and H. Boström. The Trade-Off between Accuracy and Interpretability for Predictive In Silico Modeling. *Future Medicinal Chemistry*, vol. 3, no. 5, 2011
- U. Norinder, P. Liden, and H. Boström. Discrimination between modes of toxic action of phenols using rule based methods. *Molecular Diversity*, 10(2):207–212, 2006.
- T. Lindgren and H. Boström. Resolving rule conflicts with double induction. *Intelligent Data Analysis*, 8(5):457–468, 2004.
- M. Jacobsson, P. Liden, E. Stjernschantz, H. Boström, and U. Norinder. Improving structure-based virtual screening by multivariate analysis of scoring data. *Medicinal Chemistry*, 46(26):5781–5789, 2003.
- J. J. Rodriguez, C. J. Alonso, and H. Boström. Boosting interval based literals. *Intelligent Data Analysis*, 5(3):245–262, 2001.

Conference publications (full paper submission)

- H. Boström. Concurrent Learning of Large-Scale Random Forests. In *Proceedings of Scandinavian Conference on Artificial Intelligence*, pages 20-29, 2011
- T. Karunaratne, H. Boström, and U. Norinder. Pre-processing structured data for standard machine learning algorithms by supervised graph propositionalization – a case study with medicinal chemistry datasets. In *Proceedings of the Ninth International Conference on Machine Learning and Applications*. IEEE Computer Society, 2010.

- U. Johansson, C. Sönströd, U. Norinder, H. Boström, and T. Löfström. Using feature selection with bagging and rule extraction in drug discovery. In *Advances in Intelligent Decision Technologies, Second KES International Symposium IDT 2010*, pages 413–422, 2010.
- C. Sönströd, U. Johansson, H. Boström, and U. Norinder. Pin-pointing concept descriptions. In *Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, pages 2956–2963, 2010.
- T. Löfström, U. Johansson, and H. Boström. Implicit vs. explicit methods for generating diverse ensembles of artificial neural networks. In *WCCI 2010 IEEE World Congress on Computational Intelligence, IJCNN 2010*, pages 1287–1292, 2010. T. Löfström, U. Johansson, and H. Boström. Implicit vs. explicit methods for generating diverse ensembles of artificial neural networks. In *Proceedings of the 2010 International Joint Conference on Neural Networks*, 2010.
- T. Karunaratne and H. Boström. Graph Propositionalization for Random Forests. In *Proceedings of the Eighth International Conference on Machine Learning and Applications*, pages 196–201. IEEE Computer Society, 2009.
- S. Deegalla and H. Boström. Improving Fusion of Dimensionality Reduction Methods for Nearest Neighbor Classification. In *Proceedings of the Eighth International Conference on Machine Learning and Applications*, pages 771–775. IEEE Computer Society, 2009.
- S. Deegalla and H. Boström. Fusion of dimensionality reduction methods: A case study in microarray classification. In *Proceedings of the 12th International Conference on Information Fusion*, pages 460–465, 2009.
- C. Dudas and H. Boström. Using uncertain chemical and thermal data to predict product quality in a casting process. In *Proceedings of the First ACM SIGKDD Workshop on Knowledge Discovery from Uncertain Data*, pages 57–61, 2009.
- C. Dudas, A. Ng, and H. Boström. Information extraction from solution set of multi-objective simulation optimisation using data mining. In *Proceedings of Industrial Simulation Conference*, pages 65–69, 2009.
- T. Löfström, U. Johansson, and H. Boström. Ensemble member selection using multi-objective optimization. In *Proceedings of the IEEE Symposium on Computational Intelligence and Data Mining*, pages 245–251, 2009.
- H. Boström. Calibrating random forests. In *Proceedings of the Seventh International Conference on Machine Learning and Applications*, pages 121–126. IEEE Computer Society, 2008.
- T. Löfström, U. Johansson, and H. Boström. On the use of accuracy and diversity measures for evaluating and selecting ensembles of classifiers. In *Proceedings of the Seventh International Conference on Machine Learning and Applications*, pages 127–132. IEEE Computer Society, 2008.
- C. Sönströd, U. Johansson, U. Norinder, and H. Boström. Comprehensible models for predicting molecular interaction with heart-regulating genes. In *Proceedings of Seventh International Conference on Machine Learning and Applications*, pages 559–564. IEEE Computer Society, 2008.
- C. Dudas, A. Ng, and H. Boström. Information extraction in manufacturing using data mining techniques. In *Proceedings of Swedish Production Symposium*, pages 111–118, 2008.
- R. Johansson, H. Boström, and A. Karlsson. A study on class-specifically discounted belief for ensemble classifiers. In *Proceedings of the IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems*, pages 614–619, 2008.
- H. Boström, R. Johansson, and A. Karlsson. On evidential combination rules for ensemble classifiers. In *Proceedings of the 11th International Conference on Information Fusion*, pages 553–560, 2008.
- U. Johansson, T. Löfström, and H. Boström. The problem with ranking ensembles based on training or validation performance. In *Proceedings of the International Joint Conference on Neural Networks*, pages 3221–3227. IEEE Press, 2008.

- U. Johansson, H. Boström, and R. König. Extending nearest neighbor classification with spheres of confidence. In Proceedings of the 21st Florida Artificial Intelligence Research Society Conference, pages 282–287. AAAI Press, 2008.
- U. Johansson, C. Sönströd, T. Löfström, and H. Boström. Chipper - a novel algorithm for concept description. In Proceedings of the Scandinavian Conference on Artificial Intelligence, pages 133–140. IOS Press, 2008.
- H. Boström. Estimating class probabilities in random forests. In Proceedings of the Sixth International Conference on Machine Learning and Applications, pages 211–216. IEEE Computer Society, 2007.
- S. Deegalla and H. Boström. Classification of microarrays with knn: Comparison of dimensionality reduction methods. In Proceedings of the 8th International Conference on Intelligent Data Engineering and Automated Learning, LNCS 4881, pages 800–809. Springer-Verlag, 2007.
- H. Boström. Feature vs. classifier fusion for predictive data - a case study in pesticide classification. In Proceedings of the 10th International Conference on Information Fusion, pages 121–126, 2007.
- H. Boström. Maximizing the area under the roc curve with decision lists and rule sets. In Proceedings of the SIAM International Conference on Data Mining, pages 27–34, 2007.
- T. Karunaratne and H. Boström. Using background knowledge for graph based learning: a case study in chemoinformatics. In Proceedings of the 16th International Conference on Inductive Logic Programming, pages 116–118, 2006.
- T. Karunaratne and H. Boström. Learning to classify structured data by graph propositionalization. In Proceedings of the Second IASTED International Conference on Computational Intelligence, pages 393–398, 2006.
- S. Deegalla and H. Boström. Reducing high-dimensional data by principal component analysis vs. random projection for nearest neighbor classification. In Proceedings of the Fifth International Conference on Machine Learning and Applications, pages 245–250, 2006.
- T. Karunaratne and H. Boström. Learning from structured data by finger printing. In Proceedings of the Ninth Scandinavian Conference on Artificial Intelligence, pages 120–126. IOS Press, 2006.
- H. Boström. Maximizing the area under the roc curve using incremental reduced error pruning. In Proceedings of the ICML 2005 Workshop on ROC Analysis in Machine Learning, 2005.
- H. Boström. Pruning and exclusion criteria for unordered incremental reduced error pruning. In Proceedings of the Workshop on Advances in Rule Learning at 15th European Conference on Machine Learning, pages 17–29, 2004.
- W. Rao, H. Boström, and S. Xie. Rule induction for structural damage identification. In Proceedings of International Conference on Machine Learning and Cybernetics, pages 2865–2869, 2004.
- T. Lindgren and H. Boström. Resolving rule conflicts with double induction. In Proceedings of the 5th International Symposium on Intelligent Data Analysis, pages 60–67. Springer, 2003.
- T. Lindgren and H. Boström. Classification with intersecting rules. In Proceedings of the 13th International Conference on Algorithmic Learning Theory, pages 395–402. Springer, 2002.
- P. Liden, L. Asker, and H. Boström. Rule induction for classification of gene expression array data. In Proceedings of Principles of Data Mining and Knowledge Discovery: 6th European Conference, LNAI vol. 2431, pages 338–347. Springer, 2002.
- M. Eineborg and H. Boström. Classifying uncovered examples by rule stretching. In Proceedings of the Eleventh International Conference on Inductive Logic Programming, volume 2157 of LNAI, pages 41–50. Springer, 2001.
- A. Hulth, J. Karlgren, A. Jonsson, H. Boström, and L. Asker. Automatic keyword extraction using domain knowledge. In Proceedings of Second International Conference on Computational Linguistics and Intelligent Text Processing, LNCS 2004, pages 472–482. Springer, 2001.

M. Huss, H. Boström, L. Asker, and J. Cöster. Learning to recognize brain specific proteins based on low-level features from on-line prediction servers. In Proceedings of BIOKDD-2001: Workshop on Data Mining in Bioinformatics, pages 45–49, 2001.

J. J. Rodriguez, C. J. Alonso, and H. Boström. Learning first order logic time series classifiers: Rules and boosting. In Principles of Data Mining and Knowledge Discovery: 4th European Conference, LNAI vol. 1910, pages 299–308. Springer, 2000.

J. J. Rodriguez, C. J. Alonso, and H. Boström. Learning first order logic time series classifiers. In Inductive Logic Programming: 10th International Conference. Work-in-Progress Reports, pages 260–275, 2000.

Refereed book chapter

H. Boström. Induction of recursive transfer rules. In J. Cussens and S. Dzeroski, editors, Learning Language in Logic, LNAI 1925, pages 237–246. Springer-Verlag, 2001.

Patent

Boström H., United States Patent no. 7,379,941. Method for Efficiently Checking Coverage of Rules Derived from a Logical Theory. Filed on September 13, 2003, issued May 27, 2008.