CURRICULUM VITAE

PERSONAL DATA

Name

Henrik Boström

Date of birth

Dec. 14, 1965

Sex

Male

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Dept. of Computer and Systems Sciences
Stockholm University
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Present position

Professor,
Department of Computer and Systems Sciences, Stockholm University
Since Dec. 1, 2008

Previous employments

2007 - 2011 Professor, University of Skövde (part-time during 2009-2011)

2002 - 2006 Head of research and development, Compumine AB (part-time)

2000 - 2002 Senior scientist, Virtual Genetics AB (part-time)

1996 - 2008 Senior Lecturer, Stockholm University (part-time 2000-2008)

1994 - 1996 Senior Lecturer (*non-permanent*), Stockholm University

1990 - 1994 Doctoral studentship, Stockholm University

1988 - 1990 Assistant professor (part-time 50%, *non-permanent*), Research assistant (part-time 50%, *non-permanent*), Stockholm University

Academic degrees

1999 Docent, Computer and Systems Sciences, Dept. of Computer and Systems Sciences, Stockholm University

1993 PhD, Computer and Systems Sciences, Dept. of Computer and Systems Sciences, Stockholm University

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.

SCIENTIFIC ACHIEVEMENTS

Brief account of own research profile

Henrik Boström has worked on methods and applications of machine learning since 1988. His Ph.D. thesis in 1993 contributed with a new formulation of a learning framework, known as explanation-based learning, as a method for program transformation of logic programs. After his Ph.D. studies, he switched from purely deductive learning to inductive learning. The new research focus involved developing, evaluating and applying methods that allow for learning from complex data in order to support decision-making and whose result allows for human interpretation. By complex data is here meant data that may contain structure (e.g., hierarchically organized data) and data that reside in multiple databases. Standard methods from the field of machine learning, as well as traditional statistical methods, require that all data to be analyzed is flattened out and put in one single table, with the risk of introducing harmful order dependencies as well as loosing valuable information. This problem is especially significant when applying learning methods within the field of information fusion, since data to be analyzed come from multiple heterogeneous sources. A large number of methods have been proposed within the field of machine learning for learning from data in order to be able to support decision making (e.g., artifical neural networks). One possible, additional benefit of a learning system is not only to be able to accurately suggest decisions, but also to provide the reasoning behind the decision as well as means to understand what are the important relationships in the analyzed data. Methods with this additional property are often referred to as methods for *knowledge discovery*. Rule learning methods are knowledge discovery methods that generate models in the form of if-then rules, which allow for direct interpretation. Henrik Boström has contributed with theoretical results and methods, systems and applications within the field of rule learning. The theoretical results and methods include:

- Theoretical results regarding properties of rule learning methods
- New methods for efficient rule learning in a logical framework
- New methods for generating order-independent rules
- New methods for analyzing structured data
- New methods for applying learned rules
- New criteria for rule generation

More recently, his research focus has been on ensemble methods, i.e., techniques for generating sets of models that collectively form predictions by voting, in particular on ensembles of decision trees (random forests). Within this area he has contributed with:

- Empirical investigations of strategies to combine votes
- Investigations of the effect of probability corrections
- Novel calibration methods for random forests
- New methods to handle uncertain input features in trees and forests
- Investigations of large-scale random forests through parallel execution

He has initiated research on several related problems, both within rule and ensemble learning, which have been further studied by his Ph.D. students and research colleagues. Henrik Boström is the inventor and main developer of a number of machine learning systems, both public domain and commercial, the latter being provided by companies at which he has been working part-time. These systems have been developed in close co-operation with end-users from both industry and academia, often resulting in true interdisciplinary research.

Application areas include:

- Medicinal chemistry
- Molecular biology
- Natural language processing
- Process optimization

List of publications

Journal publications

H. Boström. Forests of probability estimation trees. International Journal of Pattern Recognition and Artificial Intelligence (in press)

T. Karunaratne, H. Boström and U. Norinder. Comparative analysis of the use of chemoinformatics-based and substructure-based descriptors for quantitative structure-activity relationship (QSAR) modeling. Intelligent Data Analysis, vol. 17, no. 2, 2013 (in press)

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 (in press)

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. Lidén, 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. Lidén, 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.

H. Boström and P. Idestam-Almquist. Induction of logic programs by example-guided unfolding. Journal of Logic Programming, 40(2-3):159–183, 1999.

Z. Alexin, T. Gyimothy, and H. Boström. Imput: An interactive learning tool based on program specialization. Intelligent Data Analysis, 1(4):219–244, 1997.

Conference publications

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, pages 828-833, 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 Proceedings of the 2010 International Joint Conference on Neural Networks, pages 1287–1292, 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, 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, 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, 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, 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, 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, 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 mining - 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.

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. Lidén, 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.

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.

H. Boström. Predicate invention and learning from positive examples only. In Proceedings of the Tenth European Conference on Machine Learning, pages 226–237. Springer, 1998.

H. Boström. Theory-guided induction of logic programs by inference of regular languages. In Proceedings of the 13th International Conference on Machine Learning, pages 46–53. Morgan Kaufmann, 1996.

Z. Alexin, T. Gyimothy, and H. Boström. Integrating algorithmic debugging and unfolding transformation in an interactive learner. In Proceedings of the 12th European Conference on Artificial Intelligence, pages 403–407. John Wiley and Sons, 1996.

H. Boström. Covering vs. divide-and-conquer for top-down induction of logic programs. In Proceedings of the Fourteenth International Joint Conference on Artificial Intelligence, pages 1194–1200. Morgan Kaufmann, 1995.

H. Boström. Specialization of recursive predicates. In Proceedings of the Eighth European Conference on Machine Learning, pages 92–106. Springer, 1995.

H. Adé and H. Boström. Jigsaw: puzzling together Ruth and Spectre (extended abstract). In Proceedings of the Eighth European Conference on Machine Learning, pages 263–266. Springer, 1995.

H. Boström. Improving example-guided unfolding. In Proceedings of the European Conference on Machine Learning, pages 124–135. Springer, 1993.

H. Boström. Eliminating redundancy in explanation-based learning. In Proceedings of the Ninth International Conference on Machine Learning, pages 37–42. Morgan Kaufmann, 1992.

C. G. Jansson, H. Boström, and P. Idestam-Almquist. Optimizing horn clause logic programs for particular modes of use: An analysis of explanation-based learning and partial evaluation. In Proceedings of the Third Scandinavian Conference on Artificial Intelligence, pages 252–257, 1991.

H. Boström. Generalizing the order of goals as an approach to generalizing number. In Proceedings of the Seventh International Conference on Machine Learning, pages 260–267. Morgan Kaufmann, 1990.

Workshop publications

H. Boström, U. Norinder, U. Johansson, C. Sönströd, T. Löfström, E. Dura, O. Engkvist, S. Muresan and N. Blomberg, The INFUSIS project – data and text mining for in silico modeling, In Proceedings of the 26th annual workshop of the Swedish Artificial Intelligence Society, pp. 65-70, 2010.

H. Boström and U. Norinder, Utilizing information on uncertainty for in silico modeling using random forests, In Proceedings of the 3rd Skövde Workshop on Information Fusion Topics, pp 59-62, 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.

H. Boström. Analyzing strategies for predicting probabilities with fused classifiers by decomposing the mean squared error of constituent classifiers. In Proceedings of the 2nd Skövde Workshop on Information Fusion Topics, pp 48-50, 2008.

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.

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. In Inductive Logic Programming: 10th International Conference. Work-in-Progress Reports, pages 260–275, 2000.

H. Boström and L. Asker. Combining divide-and-conquer and separate-and conquer for efficient and effective rule induction. In Proceedings of the Ninth International Workshop on Inductive Logic Programming, LNAI Series 1634, pages 33–42. Springer, 1999.

L. Asker and H. Boström. The denox system: Machine learning for process control. In Proceedings of the IJCAI-95 Workshop on Machine Learning in Engineering, 1995.

L. Asker and H. Boström. Building the denox system: Experience from a realworld application of machine learning. In Proceedings of the Workshop on Applying Machine Learning in Practice at the International Conference on Machine Learning, 1995.

H. Boström and P. Idestam-Almquist. Specialization of logic programs by pruning sld-trees. In Proceedings of the 4th International Workshop on Inductive Logic Programming, volume 237 of Gesellschaft fur Mathematik und Datenverarbeitung MBH, pages 31–48, 1994.

H. Boström. Explanation-based generalization of multiple training examples. In Proceedings of the Third International Workshop on Knowledge Compilation and Speedup Learning, pages 14–20, 1993.

L. Asker, H. Boström, and C. Samuelsson. Dynamic explanation-based generalization. In Proceedings of the Third International Workshop on Knowledge Compilation and Speedup Learning, pages 1–6, 1993.

C. G. Jansson, H. Boström, and P. Idestam-Almquist. Theory revision in a logic programming framework. In Proceedings of the Workshop on Logical Approaches to Machine Learning at European Conference on Artificial Intelligence, 1992.

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.

PhD thesis

H. Boström. Explanation-based transformation of logic programs. Ph.D. thesis, Dept. of Computer and Systems Sciences, Stockholm University, 1993.

LicPh thesis

H. Boström. Generalizing goal orders as an approach to generalizing number. Licentiate thesis, Dept. of Computer and Systems Sciences, Stockholm University, 1990.

Grants

Research council funds

Project leader for three projects funded by the Swedish Research Council:

2000 - 2003	1.2 MSEK	Induction of Stochastic Logic Programs
1998 - 1999	0.6 MSEK	Inductive Logic Programming for Knowledge Discovery in Databases
1997 - 1998	0.7 MSEK	Inductive Logic Programming for Natural Language Processing

Funding from EU, trusts or other sources

Project leader for the following projects:

2012 - 2016	19 MSEK	High-performance data mining for drug effect detection. Swedish Foundation for Strategic Research. Co-applicants: Hercules Dalianis, Lars Asker at Stockholm University and Ulf Johansson, Håkan Sundell at University of Borås.
2009 - 2011	2.9 MSEK	INFUSIS - Information Fusion for In Silico Modelling in Pharmaceutical Research. The Knowledge Foundation. Project members: Ulf Johansson, Cecilia Sönströd at University of Borås, Elzbieta Dura at University of Skövde.

Editorial or advisory assignments in international periodicals.

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

Review / referee assignments

In addition to reviewing for the above journals and conferences, Henrik Boström has also reviewed for the following journals:

Data Mining and Knowledge Discovery

Information fusion

IEEE Transactions on Pattern Analysis and Machine Intelligence

Mathematical Problems in Engineering

The Journal of Logic Programming

AI Communications

The Journal for New Generation Computing

The Journal of Automated Software Engineering

Assignments as public examiner/opponent

2011 Chair of the grading committee for PhD thesis of Gustaf Juell-Skielse, Stockholm University, Sweden.

2011 Opponent at Tina Erlandsson's licentiate seminar, University of Skövde, Sweden.

2011 Chair of the grading committee for PhD thesis of Kristofer Waldenström, Stockholm University, Sweden.

2011 Opponent at Rikard Laxhammar's licentiate seminar, University of Skövde, Sweden.

2011 Chair 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 Chair 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 Chair 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.

2002 Member of the grading committee for PhD thesis of Beata Megyesi, Royal Institute of Technology, Sweden.

Assignments as outside expert

2011 Expert evaluator of Ph.D. thesis prior to submission at Örebro University

2010 Expert evaluator of application for promotion to docent at Blekinge Institute of Technology

2005 Expert evaluator of candidates for a position as lecturer in computer and systems sciences at Dept. of Information Science at Uppsala University.

Own patent

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

Build up of, participation and cooperation in international networks

Locally responsible at Stockholm University for participation in the network of excellence in knowledge discovery (KDnet) during 2002 - 2004, which was funded by the European Commission under IST-2001-33086. Prior to that locally responsible for the participation in the networks of excellence in machine learning funded by the European Commission (MLnet and MLnet 2).

Other scientific leadership or development work

2002 - Inventor and main developer of Rule Discovery System (RDS), provided by Compumine AB

2000 - 2002 Inventor and main developer of Virtual Predict, provided by Virtual Genetics AB

PEDAGOGICAL ACHIEVEMENTS

Account of own pedagogical experience

Henrik Boström has developed, been responsible for, administrated, examined, lectured, held seminars and supervised at a large number of courses since 1988, primarily at Dept. of Computer and Systems Sciences, Stockholm University, within artificial intelligence, machine learning and data mining, logic programming and research methodology, several of which were given for students at the Royal Institute of Technology. He has also developed and given courses in cooperation with Karolinska Institutet and at University of Skövde.

He has defined the syllabus, suggested course literature and designed teaching and learning activities for the courses. He has coordinated the work of involved teachers, up to ten teachers at a given course, and handled course administration, including budget and course evaluations. As examiner, he has been responsible for designing and correcting the examination, including written and oral tests as well

as group assignments. As lecturer, he has lectured for both small and large groups of students, up to 300 students. As supervisor, he has guided students with their assignments, both in class rooms and through electronic conferences.

Own teaching effort at undergraduate and postgraduate level

Henrik Boström has developed, been responsible for, administrated, examined, lectured, held seminars and supervised at the following courses. If otherwise not stated, the courses were given at the Dept. of Computer and Systems Sciences, Stockholm University. Several of the courses were given for students at the Royal Institute of Technology (course code starting with "2I"):

2011	Data mining (DAMI) 7.5 ECTS points - 150 students (co-responsible)
2011	Machine learning for extraction of medical knowledge (4HI017), Karolinska Institutet, 7.5 ECTS points - 8 students (co-responsible)
2010 - 2011	Scientific methods and communication in computer and systems sciences (METOD) 7.5 ECTS points - up to 300 students
2007 - 2008	Intelligent data analysis (IDA), University of Skövde, 7.5 ECTS points - 20 students
2006	Research methodology and scientific communication (2I1614) 7.5 ECTS points - 25 students
1995 - 2006	Artificial intelligence (2I1140/INT1) 9 ECTS points - up to 150 students
2004 - 2006	Scientific communication and research methodology (2I1613) 4.5 ECTS points - up to 60 students
2004 - 2006	Medical decision and analysis systems (NMID09), Karolinska Institutet, 7.5 ECTS points - 20 students
2000	Inductive logic programming (graduate course, 7.5 ECTS points) - 10 students
1997 - 2000	AI programming (*:55) 7.5 ECTS points - up to 40 students
1993 - 1996	AI algorithms (*:52b) 4.5 ECTS points - up to 40 students
1988 - 1993	AI and Prolog, 7.5 ECTS points - up to 20 students

In addition to the above courses, he has regularly been giving lectures on other courses, including:

Machine learning

Web mining

Artificial intelligence and cognitive science

Logic programming

Knowledge-based systems

Knowledge representation

Design of own course materials

Henrik Boström has produced compendia in both printed and electronic form, consisting of lecture slides, instructions, exercises, and solution manuals. He has furthermore developed resources for assignments and training in the form of computer programs and data sets.

Own pedagogical education

Henrik Boström participated in a course on doctoral student supervision at Stockholm University in 2009.

Henrik Boström participated in the course University Pedagogy at Stockholm University in 2004.

Pedagogical development effort

Since 1988, he regularly participates in pedagogical seminars at the Dept. of Computer and Systems Sciences (DSV) at Stockholm University.

Academic supervising experience

Degree project works

Henrik Boström has supervised 18 completed degree project works on bachelor and master level. The ten most recent are:

2011 Liu Yang. 30 credits. Exploiting information from data with uncertain classifications - an empirical investigation based on medicinal chemistry datasets.

2011 Ling Qing Wan. 15 credits. Effect of random forest's parameter settings for fingerprint data on classification accuracy for classifying chemical compounds.

2011 Thomas Alexandridis and Johan Nyberg. 15 credits. Using input noise to improve predictive accuracy in ensembles of decision-tree classifiers.

2010 Jing Zhao. 30 credits. Pairwise and mixed treatment comparison models in multicriteria benefit-risk analysis.

2010 Shan Li. 30 credits. A framework for evaluating the functionality of data mining tools with regard to the CRISP-DM process model.

2009 Jan-Thorsten Peter. 15 credits. Active and self-learning in a biological screening task.

2009 Daniel Gusenleitner. 15 credits. In silico modeling for uncertain biochemical data.

2005 Reza Daryaei and Sana Safai. 30 credits. Opponent modeling in poker using artificial intelligence.

2005 Hannah Danielsson and Joel Stenberg. 30 credits. Rangordning med klassificerare.

2005 Jeanette Abrander and Marie Lordkrantz. 30 credits. Utveckling av regelbaserat system för höjdpresentation.

Licentiate and doctoral students

Doctoral degrees

2006 Tony Lindgren, PhD (FD), *Methods of solving conflicts among induced rules*, Dept. of Computer and Systems Sciences, Stockholm University. Main and primary supervisor.

2002 Martin Eineborg, PhD (TeknD), *Inductive logic programming for part of speech tagging*, Dept. of Computer and Systems Sciences, Royal Institute of Technology. Main and primary supervisor.

Licentiate degrees

2009 Sampath Deegalla, *Towards Improving Performance of Nearest Neighbor Classification in High Dimensions*, Dept. of Computer and Systems Sciences, Stockholm University. Main and primary supervisor.

2009 Tuve Löfström. *Utilizing Diversity and Performance Measures for Ensemble Creation*, School of Science and Technology at Örebro University. Main and primary supervisor.

2007 Thashmee Karunaratne, *Graph Propositionalization for Learning from Structured Data,* Dept. of Computer and Systems Sciences, Stockholm University. Main and primary supervisor.

2003 Tony Lindgren, *Rule Conflicts - New Methods of Resolution,* Dept. of Computer and Systems Sciences, Stockholm University. Main and primary supervisor.

Doctoral students at present being supervised

2010 - Main and primary supervisor for Cecilia Sönströd, enrolled at Dept. of Computer and Systems Sciences, Stockholm University.

2007 - Main and primary supervisor for Catarina Dudas, enrolled at Dept. of Computer and Systems Sciences, Stockholm University.

2007 - Main and primary supervisor for Tuve Löfström, enrolled at School of Science and Technology at Örebro University.

2004 - Main and primary supervisor for Thashmee Karunaratne, enrolled at Stockholm University.

2004 - Main and primary supervisor for Sampath Deegalla, enrolled at Stockholm University.

Other pedagogic leadership or developmental work

Project leader to develop master program in information fusion at University of Skövde in 2008, supported by the Knowledge Foundation with 483 KSEK.

Administration of education and educational leadership

2004 - 2006	Director of graduate studies within the unit for Software Development and member of the board of graduate studies at Dept. of Computer and Systems Sciences, Stockholm University.
2003 - 2006	Member of the board of the master of science program in Medical Informatics, a joint education by Karolinska Institute and Royal Institute of Technology.
2004	Director of undergraduate studies within the unit for Software Development at Dept. of Computer and Systems Sciences, Stockholm University.
1999 - 2001	Chairman of the graduate study board at Dept. of Computer and Systems Sciences, Stockholm University.

OTHER ASSIGNMENTS

Administrative assignments

Experience from unit leadership

2009 -	Coordinator of the research group on systems analysis and management science (SAMS) at Dept. of Computer and Systems Sciences, Stockholm University (20+ persons)
2007 - 2009	Co-director of the Information Fusion Research Program, University of Skövde (40+ persons)
2005 - 2006	Deputy Head, Dept. of Computer and Systems Sciences, Stockholm University (200+ persons)
2004 - 2006	Co-director of the Laboratory for Data Mining and Decision Analysis at Dept. of Computer and Systems Sciences, Stockholm University (13 persons)
1996 - 2004	Co-director of the machine learning group at Dept. of Computer and Systems Sciences, Stockholm University (8 persons)

Membership of university boards or councils in the last 5 years

2007 - 2009	Head of the board for research and research education at School of Humanities and Informatics at University of Skövde.
2006	Member of the faculty board for the social sciences at Stockholm University.
1996 - 2006	Member of the board of Dept. of Computer and Systems Sciences at Stockholm University.

Own joint efforts with industry, trade and business life

2000 -	Cooperation with researchers in the pharmaceutical industry, including Prof. Ulf Norinder, AstraZeneca R&D Södertälje and Dr. Sorel Muresan, AstraZeneca R&D Mölndal.
2007 - 2010	Cooperation with companies associated to the Information Fusion Research Program at University of Skövde, including ICA AB and Volvo Powertrain.

Member of trade and industry and public authorities boards

2003 - Chairman of the board of Compumine AB