# RUSSELL GREINER

Dept of Computing Science, 359 CSC
University of Alberta Edmonton, Alberta T6G 2H1

Phone: (780) 492-5461          Email: greiner@cs.ualberta.ca
FAX: (780) 492-1071     URL: http://www.cs.ualberta.ca/_greiner/

## BACKGROUND

**Education**

Ph.D. Computer Science, Stanford University (1985)
M.Sc. Computer Science, Stanford University (1979)
B.Sc. Mathematics and Computer Science, California Institute of Technology (1976)

**Employment**

Nov 97 - present Professor, Dept. of Computing Science, U. Alberta (Edmonton)
Sept 02 - Sept 03 Scientific Director, Alberta Ingenuity Centre for Machine Learning, Edmonton
July 06 - Dec 07 Scientific Director, Alberta Ingenuity Centre for Machine Learning, Edmonton
May 99 - Dec 03 Consultant, BioTools / ChenomX, Edmonton, AB
Jan 92 - Oct 97 (Senior) Member of Technical Staff, Siemens Corporate Research, Princeton NJ
Oct 85 - Dec 91 Research Scientist / Visiting Professor, Dept. of Computer Science, U. Toronto
Oct 77 - Sept 85 Research Assistant, Computer Science, Stanford University
Mar 81 - Oct 81 Consultant, The Rand Corporation, Santa Monica, CA

## PRIZES and AWARDS

Fellow, AAAI (Association for the Advancement of Artificial Intelligence), 2007
Faculty Research Award UofA CS (2007)
Killam Fellowship (University of Alberta), 2006
ASTech Award, 2006 Outstanding Leadership in Technology (as Member, AICML)
Distinguished Paper Nineteenth International Joint Conference on Artificial Intelligence (IJCAI'05)
  "Learning Coordinate Classifiers"
McCalla Professorship University of Alberta; 2005-06
Best Student Paper Ninth International Conference on User Modeling (UM'2003)
  "Learning a Model of a Web User's Interests"
Best Paper Fourteenth Canadian Conference on Artificial Intelligence (CSCSI'01) (Runner-Up)
  "Learning Bayesian Belief Network Classifiers: Algorithms and System"
Best Paper Ninth Canadian Conference on Artificial Intelligence (CSCSI'92)
  "Probabilistic Hill-Climbing: Theory and Applications"

## PUBLICATIONS
**Refereed Journal Articles**

[J1] C-H L, O. Zaiane, H-H. Park, J. Huang, and R. Greiner, "Clustering High Dimensional Data: A Graph-Based Relaxed Optimization Approach", Information Sciences, *to appear*.

[J2] I. Levner, H. Zhang and R. Greiner, "Heterogeneous Stacking for Classification Driven Watershed Segmentation", EURASIP Journal on Advances in Signal Processing, Jan 2008.

[J3] T. Van Allen, R. Greiner A. Singh, and P. Hooper, "Article title: Quantifying the Uncertainty of a Belief Net Response: Bayesian Error-Bars for Belief Net Inference", Artificial Intelligence, 172 (2008) 483-513.

[J4] L. Li, V. Bulitko and R. Greiner, "Focus of Attention in Reinforcement Learning", Journal of Universal Computer Science, 13(24), October 2007.

[J5] C. Slupsky, K. Rankin, J.Wagner, H. Fu, D. Chang, A. Weljie, E. Saude, B. Lix, D. Adamko, S. Shah, R. Greiner, B. Sykes, and T. Marrie, "Investigations of the Effects of Gender, Diurnal Variation and Age in Human Urinary Metabolomic Profiles", Analytical Chemistry, August 2007.

[J6] David S. Wishart, Dan Tzur, Craig Knox, Roman Eisner, An Chi Guo, Nelson Young, Dean Cheng, Kevin Jewell, David Arndt, Summit Sawhney, Chris Fung, Lisa Nikolai, Mike Lewis, Marie-Aude Coutouly, Ian Forsythe, Peter Tang, Savita Shrivastava, Kevin Jeroncic, Paul Stothard, Godwin Amegbey, David Block, David. D. Hau, James Wagner, Jessica Miniaci, Melisa Clements, Mulu Gebremedhin, Natalie Guo, Ying Zhang, Gavin E. Duggan, Glen D. MacInnis, Alim M. Weljie, Reza Dowlatabadi, Fiona Bamforth, Derrick Clive, Russ Greiner, Liang Li, Tom Marrie, Brian D. Sykes, Hans J. Vogel, Lori Querengesser, "HMDB: The Human Metabolome Database", Nucleic Acids Research, Oxford Journals Online, Volume 35, Pages D521 - D526, January 2007.

[J7] M. Morris, R. Greiner, J. Sander, A. Murtha and M. Schmidt, "Learning a Classification based Glioma Growth Model using MRI Data", Journal of Computers, Academy Publisher, Volume 1(7), Oct/Nov 2006, pp. 21-31.

[J8] L. Pireddu, D. Szafron, P. Lu and R. Greiner, \The Path-A metabolic pathway prediction web server", Nucleic Acids Research, Volume 34 (Web Server issue), July 2006, 6 ms.

[J9] S. Damaraju, D. Murray, J. Dufour, D. Carandang, S. Myrehaug, G. Fallone, C. Field, R. Greiner, J. Hanson, C. Cass and M. Parliament, "Association of DNA Repair and Steroid Metabolism Gene Polymorphisms with Clinical Late Toxicity in Patients Treated with Conformal Radiotherapy for Prostate Cancer", Clinical Cancer Research, 12(8) (pp 2545-2554), 15 April 2006.

[J10] R. Greiner, R. Hayward, M. Jankowska and M. Molloy, "Finding Optimal Satisficing Strategies for And-Or-Trees", Artificial Intelligence, 170: 19-58, January 2006.

[J11] G. Van Domselaar, P. Stothard, S. Shrivastava, J. Cruz, A. Guo, X. Dong, P. Lu, D. Szafron, R. Greiner and D. Wishart, "BASys: a web server for automated bacterial genome Annotation", Nucleic Acids Research, July 2005; 33(Web Server issue): W455-W459.

[J12] R. Greiner, X. Su, B. Shen and W. Zhou, "Structural Extension to Logistic Regression: Discriminative Parameter Learning of Belief Net Classifiers", Machine Learning, special issue on "Probabilistic Graphical Models for Classification" 59(3), June 2005, p. 297-322.

[J13] P. Lu, D. Szafron, R. Greiner, D. Wishart, A. Fyshe, B. Pearcy, B. Poulin, R. Eisner, D. Ngo and N. Lamb, "PA-GOSUB: A Searchable Database of Model Organism Protein Sequences With Their Predicted GO Molecular Function and Subcellular Localization", Nucleic Acids Research, 2005, Vol. 33 (Database issue), D147-D153.

[J14] D. Szafron, P. Lu, R. Greiner, D. S. Wishart, B. Poulin, R. Eisner, Z. Lu, J. Anvik, C. Macdonell, A. Fyshe, and D. Meeuwis, "Proteome Analyst: Custom Predictions with Explanations in a Web-based Tool for High-Throughput Proteome Annotations", Nucleic Acids Research, Volume 32, July 2004, p. W365-W371.

[J15] J. Listgarten, S. Damaraju, B. Poulin, L. Cook, J. Dufour, A. Driga, J. Mackey, D. Wishart, R. Greiner and B. Zanke, "Predictive Models for Breast Cancer Susceptibility from Multiple, Single Nucleotide Polymorphisms", Clinical Cancer Research, 10(2725-2737), 15 April 2004.

[J16] Z. Lu, D. Szafron, R. Greiner, P. Lu, D. Wishart, B. Poulin, J. Anvik, C. Macdonell, and R. Eisner, "Predicting Sub-cellular Localization using Machine-Learned Classifiers in Proteome Analyst", Bioinformatics, 2004 20: 547-556.

**Invited (then Refereed) Publications in Refereed Journals**

[I1] N. Ray, A. Murtha and R. Greiner, "Abnormality Detection From Brain MRI Using Symmetry" Computer Society of India Communications, Volume 31, Issue 10, pp. 7-10, January 2008 (Invited).

**Editor, Books and Special Issues of Refereed Journals**

[E1] R. Greiner and D. Schuurmans: Proceedings of the Twenty-First International Conference on Machine Learning, (ISMB 1-58113-838-5) July 2004, 942 pages.

**Refereed Conference Articles (Full paper refereed, under 1-in-3 acceptance rate)**

[C1] C-H. Lee, M. Brown, W. Shaojun, A. Murtha, and R. Greiner, "Segmenting Brain Tumors using Pseudo-Conditional Random Fields", MICCAI, 2008.

[C2] I. Levner, R. Greiner and H. Zhang, "Supervised Image segmentation via Ground Truth Decomposition", IEEE International Conference on Image Processing (ICIP 2008) October 2008, San Diego.

[C3] A. Isaza, Cs. Szepesvari, V. Bulitko and R. Greiner, "Speeding Up Planning in Markov Decision Processes via Automatically Constructed Abstraction", Uncertainty in Artificial Intelligence (UAI08), July 2008.

[C4] C-H. Lee, M. Brown, S. Wang, A. Murtha and R. Greiner, "Constrained Classification on Structured Data", AAAI (Student Abstract), July 2008. X. Su, T. Khoshgoftaar and R. Greiner, "A Mixture Imputation-Boosted Collaborative Filter", Florida AI Research Symposium (FLAIRS-21), Florida, May 2008.

[C5] A. Farhangfar, R. Greiner, M. Zinkevich, "A Fast Way to Produce Optimal Fixed-Depth Decision Trees" Tenth International Symposium on Artificial Intelligence and Mathematics (ISAIM 2008), Florida, January 2008.

[C6] X. Su, T. Khoshgoftaar, X. Zhu, R. Greiner, "Imputation-Boosted Collaborative Filtering Using Machine Learning Classifiers", ACM Symposium on Applied Computing, Fortaleza, Ceara, Brazil, March 16-20, 2008; pp. 949-950.

[C7] X. Su, R. Greiner, T. Khoshgoftaar, X. Zhu, "Hybrid Collaborative Filtering Algorithms Using a Mixture of Experts", Web Intelligence, Silicon Valley, November 2007.

[C8] O. Schulte, W. Lauo and R. Greiner, "Mind Change Optimal Learning of Bayes Net Structure", 20th Annual Conference on Computational Learning Theory (COLT'07), San Diego, July 2007.

[C9] Y. Guo and R. Greiner, "Optimistic Active-Learning using Mutual Information", 20th International Joint Conference on Artificial Intelligence (IJCAI'07), Hyderabad, January 2007 pp 823-829.

[C10] C-H. Lee, W. Shaojun, F. Jiao, D. Schuurmans and R. Greiner, "Learning to Model Spatial Dependency: Semi-Supervised Discriminative Random Fields", Neural Information Processing Systems (NIPS06), Vancouver, December 2006.

[C11] J. Huang, D. Schuurmans, T. Zhu and R. Greiner, "Information Marginalization on Sub graphs" 10th European Conference on Principals and Practices of Knowledge Discovery in Data (PKDD 2006), Berlin, Sept, 2006.

[C12] C-H. Lee, R. Greiner, O. Zaine and J. Sander, "Efficient Spatial Classification using Decoupled Conditional Random Fields", 10th European Conference on Principals and Practices of Knowledge Discovery in Data (PKDD 2006), Berlin, Sept, 2006.

[C13] F. Jiao, S. Wang, C-H. Lee, R. Greiner and D. Schuurmans, "Semi-Supervised Conditional Random Fields for Segmenting and Labeling Sequence Data via Entropy Regularization", International Committee on Computational Linguistics and the Association for Computational Linguistics (COLING-ACL), July 2006, Sydney.

[C14] C-H. Lee, R. Greiner and S. Wang, "Using Query-Specific Variance Estimates to Combine Bayesian Classifiers", International Conference on Machine Learning (ICML06), June 2006, Pittsburgh.

[C15] D. Szafron, B. Poulin, R. Eisner, P. Lu, R. Greiner, D. Wishart, A. Fyshe, B. Pearcy, C. MacDonell and J. Anvik, "Visual Explanation and Auditing of Evidence with Additive Classifiers", Innovative Applications of Artificial Intelligence (IAAI06), July 2006, Boston.

[C16] M. Morris, R. Greiner, J. Sander, M. Schmidt and A. Murtha, "Classification-based Glioma Diffusion Modeling using MRI Data", Canadian Conference on Artificial Intelligence (CdnAI06), May 2006.

[C17] R. Isukapalli, A. Elgammal and R. Greiner, "Learning Multiclass Object Detection Using Binary Classifiers", European Conference on Computer Vision (ECCV), May 2006.

[C18] B. Price, G. Häubl, R. Greiner and A. Flatt, "Automatic Construction of Personalized Customer Interfaces", International Conference on Intelligent User Interfaces (IUI06), January 2006, Sydney, Australia.

[C19] M. Schmidt, I. Levner, R. Greiner, A. Murtha and A. Bistritz, "Segmenting Brain Tumors using Alignment-Based Features", Fourth International Conference on Machine Learning and Applications (ICMLA05), December 2005.

[C20] R. Eisner, B. Poulin, D. Szafron, P. Lu and R. Greiner, "Improving Protein Function Prediction using the Hierarchical Structure of the Gene Ontology", Computational Intelligence in Bioinformatics and Computational Biology (CIBCB), November 2005.

[C21] C-H. Lee, R. Greiner and M. Schmidt, "Support Vector Random Fields for Spatial Classification", 9th European Conference on Principals and Practices of Knowledge Discovery in Data (PKDD 2005), Porto, Portugal, October 2005, p121-132.

[C22] A. Kapoor and R. Greiner, "Learning and Classifying under Hard Budgets", European Conference on Machine Learning (ECML05), Porto, Portugal, October 2005, pp. 166-173.

[C23] S. Wang, S. Wang, R. Greiner, D. Schuurmans and L. Cheng, "Exploiting Syntactic, Semantic and Lexical Regularities in Language Modeling via Directed Markov Random Fields", International Conference on Machine Learning (ICML05), Bonn, June 2005, p. 953-960.

[C24] Y. Guo, D. Schuurmans and R. Greiner, "Learning Coordinate Classifiers", International Joint Conference on Artificial Intelligence (IJCAI05), Edinburgh, Aug 2005.
Awarded \IJCAI05 Distinguished Paper Prize"

[C25] T. Zhu, R. Greiner, G. Häubl, K. Jewell and B. Price, "Using Learned Browsing Behavior Models to Recommend Relevant Web Pages", International Joint Conference on Artificial Intelligence (IJCAI05), August 2005, p. 1589-1594.

[C26] Y. Guo and R. Greiner, "Discriminative Model Selection for Belief Net Structures", National Conference on Artificial Intelligence (AAAI05), Pittsburgh, July 2005, p. 770-776.

[C27] T. Zhu, R. Greiner, G. Häubl, K. Jewell and B. Price, "Goal-Directed Site-Independent Recommendations from Passive Observations", National Conference on Artificial Intelligence (AAAI05), Pittsburgh, July 2005, p. 549-556.

[C28] T. Zhu, R. Greiner, G. Häubl, K. Jewell and B. Price, "O-line Evaluation of Web User Model", International Conference on User Modeling (UM05), August 2005, p. 337-341.

[C29] O. Madani, D. Lizotte and R. Greiner, "Active Model Selection", Uncertainty in Artificial Intelligence (UAI04) pp 357-365. Banff, 2004.

[C30] I. Levner, V. Bulitko, L. Li, G. Lee and R. Greiner, "Towards Automated Creation of Image Interpretation Systems", Australian Joint Conference on Artificial Intelligence. pp 653-665, 2003.

[C31] B. Shen, X. Su, R. Greiner, P. Musilek and C. Cheng, "Discriminative parameter learning of General Bayesian Network Classifiers", International Conference on Tools with Artificial Intelligence (ICTAI03), Sacramento, 2003.

[C32] D. Lizotte, O. Madani and R. Greiner, "Budgeted Learning of Naive-Bayes Classifiers", Uncertainty in Artificial Intelligence (UAI03) Acapulco, August 2003.

[C33] R. Isukapalli and R. Greiner, "Use of O-line Dynamic Programming for Efficient Image Interpretation', International Joint Conference on Artificial Intelligence (IJCAI03) Acapulco, August 2003.

[C34] V. Bulitko, L. Li, R. Greiner and I. Levner, "Look ahead Pathologies for Single Agent Search", International Joint Conference on Artificial Intelligence (IJCAI03) (Refereed Poster) Acapulco, August 2003.

[C35] T. Zhu, R. Greiner and G. Häubl, "An Effective Complete-Web Recommender System" International World Wide Web Conference (WWW), Budapest, May, 2003.

[C36] T. Zhu, R. Greiner and G. Häubl, "Learning a Model of a Web User's Interests", International Conference on User Modeling (UM03), Pittsburgh, June, p. 65-75, 2003.
"Best Student Paper Prize"

**Refereed Contributions to Books**

[B1] Wishart DS and Greiner R. Computational Approaches to Metabolomics: An Introduction. Pacific Symposium on Biocomputing 12:112-114 (2007).

## ACADEMIC HISTORY

**Research Projects**

Major research projects at University of Alberta
PolyomX Project (http://www.polyomx.ca) (2002-present)
Proteome Analyst (http://www.cs.ualberta.ca/_bioinfo/PA/) (2002-present)
Brain Tumor Growth Prediction (http://www.cs.ualberta.ca/_btgp) (2003-present)
The Human Metabolome Project (http://www.metabolomics.ca/) (2004-present)
All Web Recommendation System, WebIC (http://www.web-ic.com) (2003-2005)

**Research Awards**

Learning for Bio- and Medical-Informatics
Funder: NSERC Discovery Grant
Amount: $42,000/year
Duration: Apr07-Mar12

Genome-Wide Single Nucleotide Polymorphism Based Association Studies in
Metastatic Breast Cancer
Funder: ACBRI [Operating]
With: S Damaraju [PI], J Tuszynski, J Mackey, C Cass, R Lai, R Berendt, R Greiner
Amount: $1,151,363
Duration: Apr07-Mar10

Identification and Validation of Pathways Associated with Failure of Standard
Adjuvant Therapy in Early Stage Breast Cancer
Funder: Alberta Cancer Board [Operating Grant]
With: J. Mackey [PI], R. Lai, C. Cass, K. Graham, R. Greiner
Amount: $490,914
Duration: Apr07-Mar09

Creation of the Alberta Transplant Applied Genomics Centre (ATAGC)
Funder: CFI [New Initiative Fund]
With: P Halloran [PI] and others
Amount: $5,064,408
Duration: Jan07 - Jan10

Creation of the Alberta Transplant Applied Genomics Centre (ATAGC)
Funder: Alberta Science and Research Investment Program (ASRIP)
With: P Halloran [PI] and others
Amount: $4,134,936
Duration: Jan07 - Jan10

A Genome-Wide Search for Identification of Breast Cancer Risk Factors and
Prognostic Markers using Single Nucleotide Polymorphisms
Funder: Alberta Cancer Board: Alberta Breast Cancer Research Initiative
With: S Damaraju [PI], C. Cass, J. Mackey, R. Greiner
Amount: $409,338
Duration: Jun 06-May08

Candidate Gene Polymorphisms and Normal Tissue Radiation Toxicity
Funder: Alberta Cancer Board [RIP]
With: M. Parliament [PI], S. Damaraju, D. Murray, J. Wu, H. Lau, R. Scrimger, G. Fallone, R. Greiner
Amount: $225,000
Duration: Apr06 - Mar 09

**Patents**

[P1] "Automatic identification of compounds in a sample mixture by means of NMR spectroscopy"
with D. Wishart, T. Rosborough, B. Lefebvre, N. Epstein, J. Newton, W. Wong;
(7181348; Awarded 20 Feb 2007).

[P2] "A Method and System for Automatic Detection and Segmentation of Brain Tumors and
Associated Edema (Swelling) in Magnetic Resonance Images (MRI)" with M. Schmidt
and A. Murtha; (US Provisional Patent Application filed: 29 April 2005 -60-675,085)

[P3] "An Efficient Data-Driven Theory Revision System" with R.B. Rao and G. Meredith; (5787232, Awarded 28 July 1998.)

[P4] "Delta learning system for using expert advice to revise diagnostic expert system fault Hierarchies" with R.B. Rao and G. Drastal; (5987445, Awarded 16 November 1999).

[P5] "Process, apparatus, media and signals for automatically identifying compounds in a sample" with D. Wishart, B. Lefebvre, J. Newton, N. Epstein, T. Rosborough, W. Wong
UK Patent: GB2410559 US application led November 2001.


## PROFESSIONAL AFFILIATIONS & ACTIVITIES

Scientific (co)Director: Alberta Ingenuity Centre for Machine Learning,
Director: Oct 2002 -June 2003; July 2006-present
Co-Director: July 2003 - June 2006

Executive Council:
Chief Information Officer, PolyomX, Inc, 2002-2005
Vice President, The Canadian Society for Computational Studies of Intelligence, 1998-2000
Steering Committee, Pacific Institute of Mathematic Sciences, from 1999
Technical Advisory Board, CELCorp, 2000-2003

Co-Editor-in-Chief:
Computational Intelligence: An International Journal until 2006, (with R. Goebel, D. Lin)
Journal Editorial Boards:
Journal of Artificial Intelligence Research (Action Editor, from 2004-2008) (Advisory board, from 2008)
Machine Learning Journal
Journal of Machine Learning Research

Conference chair:
General chair: Twenty-third Int'l Conference on Machine Learning (ICML'06), 2006
Program chair: Twenty-first Int'l Conference on Machine Learning (ICML'04),
(with D. Schuurmans), 2004

Member of Conference Programme Committee:
National Conference on Artificial Intelligence (AAAI), (Senior)
Conference on Uncertainty in Artificial Intelligence (UAI)
Discovery Science
International Symposium on Artificial Intelligence and Mathematics
International Conference on Machine Learning (ICML)
Canadian Society for Computational Studies of Intelligence Conference (CSCSI)
Computational Learning and Natural Learning Theory Conference (CLNL) User Modeling
Computational Intelligence for Robotics and Automation

Referee:
Artificial Intelligence Journal
Computational Intelligence: An International Journal
Computational Optimization and Applications: An International Journal

European Journal of Operational Research
IEEE/ACM Transactions on Computational Biology and Bioinformatics
IEEE Transactions on Pattern Analysis and Machine Intelligence
IEEE Transactions on Systems, Man and Cybernetics
Machine Learning Journal
MIT Encyclopedia of the Cognitive Sciences (MITECS)
Journal of Artificial Intelligence Research
Journal of the ACM
Journal of Logic Programming
User Modeling and User-Adapted Interaction
The Annals of Mathematics and Artificial Intelligence
The Arabian Journal for Science and Engineering
American Control Conference (IEEE)
International Joint Conference on Artificial Intelligence
Pacific Rim International Conference on Artificial Intelligence
IFIP World Computer Congress
Neural Information Processing Systems (NIPS)
Principles of Knowledge Representation and Reasoning Conference
Symposium on Foundations of Computer Science (FOCS)
Natural Sciences and Engineering Research Council Funding Proposals
National Science Foundation Funding Proposal
ACM Distinguished Dissertation Award