

# Jaime G. Carbonell -- Curriculum Vita

## Business Address

Language Technologies Institute  
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**Personal:** Born: July 29, 1953. Citizenship: USA

## Academic and Professional Positions Held

1996 - Present	Director, Language Technologies Institute, Carnegie Mellon University
1995 - Present	Allen Newell Professor of Computer Science, Carnegie Mellon University
2006 - Present	Adjunct Faculty, Dept of Computational Biology, U Pittsburgh Medical School.
2003 - 2009	Chief Scientist, Meaningful Machines Inc.
2001 - 2011	Co-Founder, Board chairman, Carnegie Speech Incorporated
1995 - 2003	Co-Founder, Board chairman, Wisdom Technologies Corporation
1986 - 1996	Director, Center for Machine Translation, Carnegie Mellon University
1987 - 1995	Professor of Computer Science, Carnegie Mellon University
1983 - 1987	Associate Professor of Computer Science, Carnegie Mellon University
1983 - 1996	Co-Founder, Director, Scientific advisor, Carnegie Group Inc.
1979 - 1983	Assistant Professor of Computer Science, Carnegie Mellon University
1975 - 1978	Research Fellow in Computer Science, Yale University
1975 - 1977	Teaching Assistant in Computer Science, Yale University
1974 - 1975	Research Assistant, Center for Space Research, MIT
1971 - 1975	Research Programmer, Artificial Intelligence, BBN, Cambridge, MA

## Education

1975 - 1979 <b>Yale University</b>	PhD 1979 – Computer Science MPhil 1977 - Computer Science MS 1976 - Computer Science
1971 - 1975 <b>Massachusetts Institute of Technology</b>	SB 1975 - Physics SB 1975 - Mathematics

## Professional Organizations and Activities

**Member:** ACM (elected Chair of SIGART 1983-85), ACL, AAAI (AAAI Fellow 1988-present, AAAI executive committee 1990-92), Cognitive Science Society, Sigma Xi, AMTA.

**Government Committees:** NIH Human Genome Scientific Advisory Committee, aka "Watson Committee" (1988-1992). DFKI (National German AI Lab) Scientific Advisory Board (1988-2003). National Institute of Standards and Technology (NIST/IAD), Scientific Advisory Committee (1997-2001), DOE Oakridge National Laboratories Scientific Advisory Committee (1985-1987), GMD/IPS/Information Sciences (Germany) Scientific Advisory board (1990-2001), Citigroup Technology Advisory committee (1987-1995).

**Book Series co-Editor:** *Lecture Notes in Artificial Intelligence* North American editor, Springer (1996-2008).

**Editorial Boards:** Machine Learning Journal (1984-2000, editor-in-chief 1988-1993), Machine Translation Journal (1980's), Artificial Intelligence Journal (1984-2008).

## Other Accomplishments

**Research:** Invented multiple well-known algorithms and methods in statistical machine learning and including: Proactive Machine Learning (with Donmez) for multi-source cost-sensitive active learning, Linked Conditional Random Fields (L-SCRF, with Liu) for predicting tertiary and quaternary protein folds, Maximal Marginal Relevance (MMR, with Goldstein) for information novelty, retrieval and summarization, topic-conditioned modeling for novelty detection, symmetric optimal phrasal alignment method for trainable example-based and

statistical machine translation, series-anomaly modeling for financial fraud detection and syndromic surveillance, knowledge-based interlingual machine translation (and later extended it with colleagues: Tomita, Nirenburg, Nyberg, and Mitamura), transformational analogy for case-based reasoning, derivational analogy for reconstructive justification-based reasoning (with Veloso), robust case-frame parsing (with Hayes), Seeded Version-Space Learning (with polynomial complexity), and developed improvements to several other machine learning algorithms. Current research foci include robust statistical learning and mapping protein sequences to 3D structure and inferring functional properties, automated transfer-rule learning for Machine Translation, , enriched active transfer learning context-based machine translation, and machine translation for very rare languages.

**Software artifacts:** Protein structure prediction software (with Liu), active and proactive learning algorithms (with Donmez), PRODIGY general-purpose planner (with Minton and Veloso), KANT knowledge-based machine translation (with Nyberg and Mitamura), JAVELIN Question-Answering system (with Nyberg et al), CONDOR search engine (with Callan et al), MMR summarizer engine (with Goldstein), POLITICS simulated reasoning engine, DIPLOMAT speech-MT (with Frederking et al), EBMT example-based general purpose MT (with Brown), SMOKEY distributed sensor-based fire detection and suppression system, and several others.

**Education:** Created the PhD program at CMU on Language Technologies with 100 PhD candidates presently enrolled. Created new courses in Language Technologies, Machine learning, Data Mining and eCommerce. Edited 3 books on Machine Learning. Created multiple industrial intensive tutorials. Taught undergraduate and graduate courses in Artificial Intelligence, Machine Learning, Software Engineering, Natural Language Processing, Language Technologies, Data Mining, Information Retrieval, Web-Based Architectures, Machine Translation, Algorithms, and related Computer Science topics.

**Other initiatives:** Created the Center for Machine Translation at CMU in 1986, and the Language Technologies Institute in 1996. Co-creator & co-director of the Universal Library and million-book project (US, China, India). MT Summit chair 1991, Co-designer of interactive pinpointing speech tutor. Co-creator & co-PI of new Computational Biolinguistics Initiative at CMU.

**Industrial Consulting:** Meaningful Machines (participated in designing the context-based machine translation methods, 2002-2009), Industrial Scientific (data mining to improve workplace safety, 2008-present), Carnegie Speech Inc. (business and technology strategy for intelligent language tuotoring, 2002-present) Carnegie Group Inc (expert systems & financial data mining: 1984-1997), Citicorp (financial data mining, real time transactions, new IT technology insertion: 1990-1998), Lycos Inc. (launching the internet search engine 1998-1999), Vivisimo (2003-2006, scientific advisory board), Searchline (launched the new search engine, 2002-2004), Wisdom Technologies (financial optimization and data mining for corporate treasures, large banks, etc. 1995-2003), Dynamix Technologies (designed their large-scale data mining engine with applications to Homeland Security, AR/AP financial optimization, transactional optimization in bond trading and in re-insurance, pattern discovery in network-wire-transfer streams, syndromic surveillance, etc. 2000-present), Peak Strategy (financial analytics, investment, mining, 2005-2007), Boeing (designed their intensive data mining course), Citibank (technology advisory board for 10 years, focusing on text and data mining, fraud detection, optimization methods, etc.), plus about 10 other shorter-term engagements in data mining in industry, including financial data mining: transactional fraud detection, instant-credit bad-dept minimization, collection effectiveness, cash-flow optimization (sweep/invest/float), data mining for risk/cost tradeoff minimization (FX, interest rate, counterparty, debt, etc), and so on. During these engagements process I designed or co-designed three data mining engines, and evaluated and help improve numerous other data mining engines, including the machine learning algorithms at their core.

**Miscellaneous:** Gave over 500 invited or refereed-paper presentations (colloquia, seminars, panels, addresses, conferences, key-notes, etc.). Received the *IJCAI Best Paper Award* in 1997 for translingual information retrieval. Received the CMU Computer Science Department's teaching award (1987), the Sperry Fellowship for excellence in AI research (1986), unsolicited gifts from Alcoa and Hughes corporations for research in machine learning, and a "recognition of service" award from the ACM for the SIGART presidency (1983-1985). Provided congressional testimony on machine translation (1990). Leader of the NSF/JTEC study group on Japanese machine translation science and technology (1990-91). Principal investigator or major participant in research grants and contracts totaling over 90 million dollars since 1979 at the CMU School of Computer Science, Center for Machine Translation, and Language Technologies Institute.

**Expert witness:** Provided expert testimony (depositions, expert reports, advice, etc.) and consulting in several cases involving intellectual property including: software design and copyrights, patents for data mining, patents for search engine algorithms and methods, speech recognition, integrated software systems, computational and statistical applications in finance, statistical machine learning, text mining, text processing, etc.

**Patents:** Inventor in several issued patents, provided advice on patentability of new software and methods, helped draft software-related patents, conducted prior art searches, composed responses to patent examiners, evaluated validity of issued patents As expert witness provided opinions and reports on patent infringement, patent validity (anticipation, obviousness), claim constructions, etc.

## Completed PhD Advisees & co-Advisees

Masaru Tomita, Professor and Dean, Keio University, Computer Science and Biology  
Steven Minton, USC-ISI & CTO of Fetch Inc  
Manuela Veloso, Professor, CMU Computer Science  
Jack Mostow, Research Professor, CMU Robotics  
Michael Mauldin, Founder of Lycos Inc. (and former faculty at CMU)  
Oren Etzioni, Professor, U of Washington (and founder of Metacrawler)  
Robert Frederking, Sr. System Scientist, CMU Language Technologies Institute  
Alex Hauptmann, Research Professor, CMU Computer Science  
Klaus Gross, Chief Scientist, Haley Enterprises  
Wei-Min Shen, USC-ISI and faculty at USC Computer Science  
Eric Nyberg, Professor, CMU Language Technologies Inst & Heinz School  
Ralf Brown, Sr. System Scientist, CMU Language Technologies Institute  
Craig Knoblock, USC-ISI and faculty at USC Computer Science  
Akira Ushioda, Fujitsu Labs, Manager Language Technologies  
Daniel Kuokka, Senior researcher, Tektronix  
Yolanda Gil, USC-ISI, senior researcher  
Xuemei Wang, Lockheed Martin & ISLE Computing  
Robert Joseph, Verizon Communication, senior researcher  
Jill Fain-Lehman, Founder of Autism Technology  
Eugene Fink, Senior Sys Scientist CMU (formerly Asst Prof, U of Florida)  
Angela Kennedy, CEO Carnegie Speech (formerly CEO Wisdom Technologies)  
Alicia Perez, Faculty at Universidad Catolica de Salta, Argentina  
Jim Blythe, Researcher, USC-ISI  
Yan Qu, Senior Researcher, Oracle Corp  
Jade Goldstein, US DoD research laboratory  
Boyan Onyskevich, US DoD research laboratory, senior manager  
Michael Mateas, Faculty, University of CA.  
Kathreina Probst, Faculty at Georgia Tech  
Yan Liu, Faculty at University of Southern Cal.  
Lucian Lita, Siemens Princeton Research Lab  
Paul Bennett, Microsoft Research Labs  
Chun Jin, AT&T Research  
Ariadna Font-Llitzos, Vivisimo Inc.  
Ulas Bardak, Postdoctoral fellow, Tokyo University  
Christian Monson, Oregon Graduate Institute  
Cenk Gazen, Fetch Inc. Los Angeles  
Monica Rogati, Linked-In, manager of R&D  
Vasco Pedro, CEO of Bueda Inc.  
Meryem Pinar Donmez, Salesforce R&D  
Jingrui He, IBM Yorktown Research  
Jaedy Kim, Google Pittsburgh  
Rashmi Gangadharaiyah, Microsoft Research Labs  
Oznur Tastan, Microsoft Research Labs  
Jonathan Elsas, Google Pittsburgh  
Vamshi Ambati, AT&T Research

## Publications

1. Chen, X., Liu, H., and Carbonell, J., "Structured Sparse Canonical Correlation Analysis", *International Conf. on AI and Statistics* (AISTATS), 2012.
2. Yang, L. Hanneke, S. and Carbonell., J., "A Theory of Transfer Learning with Applications to Active Learning," *Machine Learning Journal*, 2012, DOI: 10.1007/s10994-012-5310-y
3. Chen, X., He, J., Lawrence, R., and Carbonell, J., "Adaptive Multi-Task Sparse Learning with an Application to fMRI Study", *SIAM International Conference on Data Mining* (SDM), 2012.
4. Chen, X., Lin, Q., Kim, S., Carbonell, J., Xing, E., "Smoothing Proximal Gradient Method for General Structured Sparse Learning", *Annals of Applied Statistics*, 2012. (Full version.)

5. Ambati, V., Vogel, S. and Carbonell, J., "Collaborative Workflow for Crowdsourcing Translation", *Proc of ACM Conference on Computer Supported Cooperative Work*, Washington, USA. 2012.
6. Balakrishnan, S., Kamisetty, H., Carbonell, J., Lee, S., Langmead, C., "Learning Generative Models for Protein Fold Families", *Proteins*, Vol 79, Issue 4, pp 1061-1078, 2011,
7. Chen, X., Qi, Y., Bai, Q., Carbonell, J. "Sparse Latent Semantic Analysis", *Proc of SIAM International Conference on Data Mining (SDM)*, 2011.
8. Chen, X., Lin, Q., Kim, S. Carbonell, J. Xing, P. "Smoothing Proximal Gradient Method for Generalized Structure Learning" *Proc of Uncertainty in Artificial Intelligence Conference (UAI)*, 2011. (Short version).
9. Yang, L., Hanneke, S., Carbonell, J. "The Identifiability of Priors from Bounded Sample Sizes with Applications to Transfer Learning", *Proc of the 24<sup>th</sup> Proc of the Annual Conference on Learning Theory (COLT)*, Budapest, 2011.
10. Yang, L., Hanneke, S., Carbonell, J., "The Sample Complexity of Self-Verifying Bayesian Active Learning", *Proc of the International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2011.
11. Ambati, V., Vogel S., and Carbonell, J., "Multi-Strategy Approaches to Active Learning for Statistical Machine Translation", *Proc of the 13th Machine Translation Summit*, Xiamen, China. 2011
12. Ambati, V., Hewavitharana, S., Vogel, S., Carbonell, J., "Active Learning with Multiple Annotations for Comparable Data Classification Tasks", *Proc of Comparable Corpora workshop of ACL*, 2011.
13. Ambati V., Vogel, S., Carbonell, J. "Towards Task Recommendation in Micro-Task Market", *Proc of 3<sup>rd</sup> Workshop on Human Computation of AAAI*, 2011.
14. Balakrishnan S., Tastan O., Carbonell J., and Klein-Seetharaman J., "Alternative Paths in HIV-1 Targeted Human Signal Transduction Pathways." *BMC Genomics*, Vol. 10. 2010. (Shorter version in *International Conference on Bioinformatics*, 2009.)
15. Balakrishnan, S., Kamisetty, H., Carbonell, J., Lee, S. and Langmead, C., "Learning Networks of Statistical Couplings in Protein Fold Families using L1-regularization", *Proc. of Structural Bioinformatics and Computational Biophysics*, 2010.
16. He, J., and Carbonell, J. "Co-Selection of Features and Instances for Unsupervised Rare Category Analysis." *Proceedings of the SIAM International Conference on Data Mining*, Columbus, OH 2010
17. He, J., and Carbonell, J. "Co-Selection of Features and Instances for Unsupervised Rare Category Analysis." *Proceedings of the SIAM International Conference on Data Mining*, Columbus, OH 2010.
18. Donmez, P., Carbonell, J., Schneider, J., "A Probabilistic Framework to Learn from Multiple Annotators with Time-Varying Accuracy", *Proceedings of the SIAM International Conference on Data Mining*, Columbus, OH 2010.
19. Donmez, P. and Carbonell, J. "From Active to Proactive Learning" in *Advances in Machine Learning I*, Koronacki, J., Ras, Z. Wierzchoin S, and Karprzyk (eds.), Studies in Computational Intelligence Series, Vol. 262. pp 97-120.. Springer, 2010.
20. Xiong, L., Chen, X., Huang, T., Schneider, J., Carbonell, J., "Temporal Collaborative Filtering with Bayesian Probabilistic Tensor Factorization", *Pro. of the SIAM International Conf. on Data Mining*, Columbus, OH, 2010.
21. Carbonell, J. "Intelligent Resource Collection for Low-Density Languages" (extended abstract of invited talk), In *Proceedings of LREC*, 2010.
22. Chen, X., Liu, Y. Liu, H., Carbonell, J., "Learning Spatial-Temporal Varying Graphs with Applications to Climate Change Analysis", in *Proc of the Twenty-fourth Conference on Artificial Intelligence (AAAI)*, 2010.
23. Bilotti, M., Elsas, J., Carbonell, J., and Nyberg, E., "Rank Learning for Factoid Question Answering with Linguistic and Semantic Constraints", *Proc. of the 19<sup>th</sup> ACM Internal Conference on Information and Knowledge Management (CIKM)*, 2010.

24. Zhao Z, Xia J, Tastan O, Singh I, Kshirsagar M, Carbonell J, Klein-Seetharaman J. "Virus Interactions with Human Transduction Pathways", *International Journal of Computational Biology Drug Discovery*. 2011;4(1):83-105. doi: 10.1504/IJCBDD.2011.038658. Epub 2011 Feb 17. PMID: 21330695.
25. Gangadharaiyah, R., Brown, R. and Carbonell, J. "Monolingual Distributional Profiles for Word Substitution in Machine Translation", *The 23rd International Conference on Computational Linguistics*, (COLING2010), China, August 2010.
26. Gangadharaiyah R., Brown, R. and Carbonell, J., "Automatic Determination of Number of clusters for creating Templates in Example-Based Machine Translation", *The 14th Annual Conference of the European Association for Machine Translation*, (EAMT2010), France, May 2010.
27. Chen, X., Qi, Y., Bai, B., Lin, Q., Carbonell, J., "Learning Preferences with Millions of Parameters by Enforcing Sparsity", International Conference on Data Mining (ICDM), 2010.
28. Chen, X., Lin, Q., Kim, S., Carbonell, J., and Xing, E., "An Efficient Proximal-Gradient Method for General Structured Sparse Learning", ArXiv: 1005.4717, 2010 (also in NIPS workshop on Sparse Modeling).
29. Chen, X., Kim, S., Lin, Q., Carbonell, J., Xing, E., "Graph-Structured Multi-Task Regression and an Efficient Optimization Method for General Fused Lasso", arXiv:1005.3579, 2010.
30. Chen, X., Bai, B., Lin Q., and Carbonell. J., "Sparse Latent Semantic Analysis", NIPS Workshop on Practical Applications of Sparse Modeling, 2010.
31. Ambati, V., Vogel, S. and Carbonell, J., "Active Learning-Based Elicitation for Semi-Supervised Word Alignment", In *Proceedings of the Association for Computational Linguistics* (ACL), Uppsala, Sweden, 2010.
32. Ambati, V., Vogel, S., and Carbonell, J., "Active Semi-Supervised Learning for Improving Word Alignment", In *Proceedings of the Active Learning for NLP Workshop, NAACL*, Los Angeles, USA, 2010.
33. Ambati, V., Vogel, S. and Carbonell, J., "Active Learning and Crowd-Sourcing for Machine Translation", *Proceedings of LREC*, 2010.
34. Kim, J., Brown, R. and Carbonell, J "Chunk-Based EBMT". In *Proceedings of the 14the Workshop of the European Association for Machine Translation*, Raphael, France, 2010.
35. Mohamed, T., Carbonell, J. and Ganapathiraju, M., "Active Learning for Human Protein-Protein Interaction Prediction. *BMC Informatics*, Vol 11, Supp 1, 2010.
36. Osmanbeyogly, H., Wehner, J., Carbonell, J. and Ganapathiraju, M., "Active Learning for Membrane Protein Structure Prediction", *BMC Informatics*, Vol 11, Supp 1, 2010.
37. Yang, L., Hanneke, S., Carbonell, J., "Bayesian Active Learning Using Arbitrary Binary-Valued Queries", *Proc of the 21<sup>st</sup> International Conference on Algorithmic Learning Theory* (ALT), 2010.
38. Xiong, L, Chen, X., Huang, T., Schneider, J., and Carbonell, J., "Time-Evolving Collaborative Filtering", SIAM International Conference on Data Mining (SDM), 2010.
39. Yang, L., Hanneke, J., and Carbonell, J., "The Sample Complexity of Self-Verifying Bayesian Active Learning", *Tech Report* CMU-ML-10-105, 2010.
40. Sharifi, M., Finke, E., and Carbonell, J. "Learning Personalized Security Settings", Proceedings of the IEEE SMC, 2010.
41. Qi Y, Tastan O, Carbonell JG, Klein-Seetharaman J, Weston J., "Semi-Supervised Multi-Task Learning for Predicting Interactions Between HIV-1 and Human Proteins," *Bioinformatics*. 2010. Sep 15;26(18):i645-52. PMID: 20823334.

42. Balakrishnan, S., Kamisetty, H., Carbonell, J., Langmead, C., "Structure Learning Generative Models for Protein Fold Families" Tech report CMU-CS-09-177. 2009.
43. Yang, L. and Carbonell, J., "Cost Complexity of Proactive Learning via a Reduction to Realizable Active Learning", Tech report CMU-ML-09-113. 2009.
44. Yang, L. and Carbonell, J., "Adaptive Proactive Learning with Cost-Reliability Tradeoff", *Tech report CMU-ML-09-114*, 2009.
45. Donmez, P., Carbonell, J., and Schneider, J. "Efficiently Learning the Accuracy of Labeling Sources for Selective Sampling", *Proceedings of the 15<sup>th</sup> ACM Knowledge and Data Discovery Conference (KDD-09)*, 2009.
46. Donmez, P., Carbonell, J. "Active Sampling for Rank Learning via Optimizing the Area Under the ROC Curve", In *Proceedings of the 31st European Conference on Information Retrieval (ECIR '09)*, Toulouse, France 2009.
47. He, J. and Carbonell, J. "Prior-Free Rare Category Detection" In *Proceedings of the SIAM International Conference on Data Mining (SDM09)*, 2009.
48. Chen, X., Pan, W., Kwok, J. and Carbonell, J. "Accelerated Gradient Method for Multi-Task Sparse Learning Problems", *Proceedings of the International Conference on Data Mining. (ICDM)*, 2009.
49. Tastan O, Qi Y, Carbonell, J., and Klein-Seetharaman, J. "Prediction of Interactions between HIV-1 and Human Proteins by Information Integration." In *Proceedings of the Pacific Symposium on Biocomputing* 14:516-527, 2009.
50. Elsas, J. and Carbonell, J., "It Pays to be Picky: An Evaluation of Thread Retrieval in Online Forums," *Proceedings of the 32nd Annual International ACM SIGIR Conference on R&D on Information Retrieval*, 2009.
51. Elsas, J., Donmez, P., Callan, J. and Carbonell, J. "Pairwise Document Classification for Relevance Feedback", In *Proceedings of TREC*, 2009
52. Fink, E., Sarin, A., and Carbonell, J. "Analysis of uncertain data: Smoothing of histograms", In *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics*, 2009
53. Gershman, A. Fink, A., Fu, B., and Carbonell, J. "Analysis of uncertain data: Evaluation of given hypotheses" In *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics*, 2009
54. Gershman, A., Fink, E., Fu, B. and Carbonell, J. "Analysis of uncertain data: Selection of probes for information gathering", In *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics*, 2009.
55. Gelernter, J. Cao, D., Lu, R. Fink, E. and Carbonell J. "Creating and visualizing fuzzy document classification." In *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics*, 2009
56. Ambati, V., Lavie, A. and Carbonel, J. "Extraction of Syntactic Translation Models from Parallel Data using Syntax from Source and Target Languages." In *Proceedings of Machine Translation Summit XII*, Canada, 2009.
57. Ambati, V., and Carbonell, J. "Proactive Learning for Building Machine Translation Systems for Minority Languages." *NAACL HLT Workshop on Active Learning for NLP*. Boulder, CO. 2009.
58. Tastan O., Qi Y., Carbonell J., and Klein-Seetharaman J., "Prediction of HIV-1 Human Protein Interactome" (extended abstract), *VIII European Symposium of The Protein Society*, Zurich. June, 2009.
59. Tastan O., Carbonell J., and Klein-Seetharaman J. "Refining the HIV-1, Human Protein Interaction Network with Multiple Expert Opinions" (extended abstract), *The 23rd Annual Meeting of the Groups Studying the Structures of AIDS-Related Systems and their Application to Targeted Drug Design*, Bethesda, MD, Jun 25-26, 2009.
60. Rashmi G., Brown, R. and Carbonell, J. "Active Learning in Example-Based Machine Translation", Proc. Of *The 17th Nordic Conference on Computational Linguistics*, Odense, Denmark, May 2009.
61. Donmez, P., Carbonell, J. "Proactive Learning: Cost-Sensitive Active Learning with Multiple Imperfect Oracles", In *Proceedings of the 17th ACM Conference on Information and Knowledge Management*. Napa Valley, 2008.

62. Donmez, P. and Carbonell, J. "Optimizing Estimated Loss Reduction for Active Sampling in Rank Learning", In *Proceedings of the International Conference in Machine Learning*, Helsinki, 2008.
63. Cheng, B. and Carbonell, J. "Statistical Detection of Resistance-Associated Mutations Using Techniques from Human Language Technologies". *XVII International HIV Drug Resistance Workshop*, Sitges, Spain. 2008.
64. Freed, M., Carbonell, J., Gordon, G., Hayes, J., Meyers, B., Siewiorek, D., Smith, S., Steinfeld, A. and Tomasic, A., "RADAR: A Personal Assistant that Learns to Reduce Email Overload", in *Proceedings of the 23<sup>rd</sup> American Association of Artificial Intelligence Conference*, Chicago, 2008.
65. Jin, C. and Carbonell, J. "Predicate Indexing for Incremental Multi-Query Optimization", In *Proceedings of the ISMIS 2008 Symposium*, Springer LNCS series, 2008.
66. He, J. and Carbonell, J. "Rare Class Discovery Based on Active Learning". In *Proceedings of the 10<sup>th</sup> International Symposium on Artificial Intelligence and Mathematics* (SIAM), Florida, 2008.
67. Donmez, P. and Carbonell, J. "Paired Sampling in Density-Sensitive Active Learning". In *Proceedings of the 10<sup>th</sup> International Symposium on Artificial Intelligence and Mathematics* (SIAM), Florida, 2008.
68. Monson, C., Font-Llitjos, A., Levin, L., Lavie, A., Alvarez, A., Aaranovich, R., Carbonell, J., Frederking, R., Peterson, E., Probst, K., and Ambati, V. "Linguistic Structure and Bilingual Informants to Induce Machine Translation of Lesser-Resourced Languages", in *Proceedings of LREC*, 2008.
69. Monson, C., Lavie, A., Carbonell, J. and Levin L., "Evaluating an Agglutinative Segmentation Model for ParaMor", In *Proceedings of the 10<sup>th</sup> Meeting of the ACL Special Interest Group in Computational Morphology and Phonology* (SIGMORPHON), 2008.
70. Carvalho, V. Elsas, J., Cohen, W. Carbonell, J., "Suppressing Outliers in Pairwise Preference Ranking," *Proceedings of the 17th annual ACM Conference on Information and Knowledge Management*, 2008
71. Elsas, J., Arguello, J., Callan J. and Carbonell, J., "Retrieval and Query-Expansion Models for BLOG-Feed Search", *Proceedings of the 31<sup>st</sup> ACM's SIGIR Conference on Information Retrieval*, 2008.
72. Arguello, J, Elsas, J. Callan, J., and Carbonell, J. "Document Representation and Query Expansion Models for Blog Recommendation," *Proceedings of the Second International Conference on Weblogs and Social Media (ICWSM)*, 2008. (Best Paper nominee)
73. Carvalho, V., Elsas, J., Cohen, W., and Carbonell, J., "A Meta-Learning Approach for Robust Rank Learning", *Proceedings of the SIGIR Workshop on Learning to Rank for Information Retrieval*. 2008.
74. Elsas, J. Carvalho, R., and Carbonell, J. "Fast Learning of Document Ranking Functions with the Committee Perceptron". In *Proceedings of the 1<sup>st</sup> ACM International Conference on Web Search and Data Mining*, Stanford U, CA, 2008.
75. Fu, B., Fink, E. and Carbonell, J. "Analysis of uncertain data: Tools for representation and processing", In *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics*, pages 3256-3260, 2008.
76. Carpentier, A., Sharifi, M., Fink, E. and Carbonell, J., "Scheduling with uncertain resources: Learning to ask the right questions", In *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics*, pages 2543-2547, 2008.
77. Gardiner, S., Fink, E. and Carbonell, J., "Scheduling with uncertain resources: Learning to make reasonable assumptions", In *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics*, pages 2554-2559, 2008..
78. Elsas, J. Arguello, J. Callan, J., and Carbonell, J. "Retrieval and Feedback Models for BLOG Distillation and Mining", In *Proceedings of the Text Retrieval Conference (TREC)*, National Institute of Standards and Technology, MD, 2007 (Top performing system in the TREC BLOG-distillation track).
79. He, J. and Carbonell, J. "Nearest-Neighbor Based Active Learning for Rare Category Detection", In *Proceedings of the 21<sup>st</sup> Annual Conference on Neural Information Processing* (NIPS-2007), Vancouver, Canada. 2007
80. Donmez, P. Carbonell, J. and Bennett, P. "Dual-Strategy Active Learning", In *Proceedings of the 18<sup>th</sup> Annual European Conference on Machine Learning* (ECML-2007), Warsaw, Poland. 2007.

81. Liu, Y. Carbonell, J., and Gopalakrishnan, V. "Protein Quaternary Fold Recognition Using Conditional Graphical Models." In *Proceedings of the Twentieth International Joint Conference on Artificial Intelligence (IJCAI-07)*. Hyderabad, India. 2007.
82. Lita, L. and Carbonell, J., "Cluster-Based Selection of Statistical Answering Strategies." In *Proceedings of the Twentieth International Joint Conference on Artificial Intelligence (IJCAI-07)*. Hyderabad, India. 2007.
83. He, J. and Carbonell, J., "Graph-Based Semi-Supervised Learning as a Generative Model." In *Proceedings of the Twentieth International Joint Conference on Artificial Intelligence (IJCAI-07)*. Hyderabad, India. 2007.
84. Cheng B and Carbonell J., Combining N-grams and Alignment in G-Protein Coupling Specificity Prediction. *Advances in Bioinformatics & Computational Biology: 5th Asia-Pacific Bioinf Conf*, Imperial College Pr, p. 363-372. 2007.
85. Monson, C., Carbonell, J., Lavie, and Levin, L., "ParaMor: Finding Paradigms across Morphology", In *Proceedings of CLEF Morpho-Challenge Workshop*, 2007.
86. Monson, C., Carbonell, J., Lavie A., and Levin, L., "ParaMor: Minimally-Supervised Induction of Paradigm Structure and Morphological Analysis", In *Proceedings of the 9<sup>th</sup> Meeting of the ACL's SIGMORPHON*, 2007.
87. Carbonell, J., Klein, S., Miller, Steinbaum, M., D., Grassiany, T., and Frey, J., "Context-Based Machine Translation" In *Proceedings of the Association for Machine Translation of the Americas (AMTA-2006)*, Boston, 2006.
88. Liu Y, Carbonell J, Weigle P, Gopalakrishnan. V, "Segmentation Conditional Random Fields (SCRFs): A New Approach for Protein Fold Recognition," *Journal of Computational Biology*, Vol. 13, No. 2, 2006. [Longer version of RECOMB-05 paper.]
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