

# Lyle H. Ungar

Computer and Information Science Department  
University of Pennsylvania  
Philadelphia, PA 19104  
*ungar@cis.upenn.edu* (215) 898-7449  
<http://www.cis.upenn.edu/~ungar>

## Education

1979-84 *Massachusetts Institute of Technology*  
PhD in Chemical Engineering  
1975-79 *Stanford University*  
BS in Chemical Engineering (with distinction)

## Experience

2013-18 *University of Pennsylvania*  
Professor of  
Computer and Information Science  
Bioengineering  
Genomics and Computational Biology, SOM  
Operations, Information and Decisions (formerly OPIM), Wharton  
Psychology, SAS

1990-2013 *University of Pennsylvania*  
Associate Professor of  
Computer and Information Science  
Bioengineering (2010-13)  
Chemical and Biomolecular Engineering (1990-2005)  
Electrical and Systems Engineering (1996-99)  
Genomics and Computational Biology, SOM (2002-13)  
Operations and Information Management, Wharton (2000-13)  
Psychology, SAS (2012-13)

1984-90 *University of Pennsylvania*  
Assistant Professor of  
Chemical Engineering  
Computer and Information Science (1987-90)

2007 *Google, New York Office* (on leave)

1999 *Carnegie Mellon University* (sabbatical)

1982 (summer) *Boston Consulting Group*  
Associate: Strategic business analysis.

## Awards

- National Science Foundation (NSF) Graduate Fellow (1979-83)
- Presidential Young Investigator (1984-89)

## Research interests

- *Psychology*: personality, well-being, health psychology, group decision making
- *Machine learning*: feature selection, dimensionality reduction, spectral estimation, clustering
- *NLP and text mining*: parsing, analysis of user-generated content, language modeling, language visualization
- *Computer Science/Economics*: forecasting, bibliometrics, auction mechanism design, applied economics
- *Computational Biology*: genomics, proteomics, brain image analysis
- *Chemical Engineering*: fluid dynamics, molecular dynamics, process modeling and control, supply chain optimization

## Administration at Penn (since 2000)

- Graduate Chair, *Computer and Information Science (CIS)* (2015-8)
- Associate Director, *Penn Center for Bioinformatics (PCBI)* (2004-13)
- Executive Committee, *Genomics and Computational Biology (GCB)* (2002-8)
- Admissions Committee, *Genomics and Computational Biology (GCB)* (2002-4)
- Director, *Executive Masters in Technology Management (EMTM)*, SEAS and Wharton (1996-2004)
- Director, *CIS Graduate Admissions* (2000-2)

## Public Service

### Conferences Chaired

- IEEE International Conference on Bioinformatics and Biomedicine (BIBM), (co-chair) 2012
- ACM International Conference on Knowledge Discovery and Data Mining (SIG-KDD), 2006
- Gordon Research Conference on Statistics in Chemistry and Chemical Engineering, 1997

### Associate Editor

- Journal of Machine Learning Research

### Program committees served on (last ten years)

- American Association for Artificial Intelligence (AAAI)
- ACM Knowledge Discovery and Data Mining (KDD)
- World Wide Web (WWW)
- IEEE International Conference on Data Mining (ICDM)
- International Conference on Machine Learning (ICML)
- Neural Information Processing Systems (NIPS)

### Tutorials given (last ten years)

- Crowdsourcing for Natural Language Processing (with Chris Callison-Burch)
  - North American Chapter of the Association for Computational Linguistics (NAACL) 2015
- Textmining, including information extraction and sentiment analysis, (with Ronen Feldman)
  - SIGIR 2008, KDD 2008, KDD 2009, CIKM 2010, ICWSM 2011, ICWSM 2012, AAAI 2012, AAAI 2013
- Crowdsourcing for Statisticians (with Adam Kapelner)
  - American Statistical Association (ASA) 2013

- Spectral Learning Algorithms for Natural Language Processing (with Michael Collins, Shay Cohen and Dean Foster)
  - North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL-HLT), 2013

## Courses taught

### Undergraduate

<b>CIS 140/COGS 1</b>	<b>Cognitive Science</b>
ChE 231	Thermodynamics
ChE 350	Fluid Mechanics
CSE 120	Programming Languages and Techniques
CSE/ChE 270	Expert Systems
CSE 391	Artificial Intelligence
EAS 410	Model Building with Modern Statistics

### Graduate

<b>CIS 520</b>	<b>Machine Learning</b>
CIS 521	Artificial Intelligence
CIS/GCB 535	Introduction to Bioinformatics
CIS 545	Big Data Analytics
CIS 620	Machine Learning (Advanced)
CIS 700	Machine Learning in Bioinformatics
ChE 500	Applied Mathematics I
ChE 501	Applied Mathematics II
ChE 640	Fluid Dynamics
ChE 641	Heat and Mass Transfer
ChE 700	Bifurcation Theory
EMTM 554	Data Mining
EMTM 605	Advances in Artificial Intelligence
MGMT 560	Management of Technology
MGMT 732	Technology for Managers

## Masters Students

2009	Paramveer Dhillon	”Transfer Learning using Feature Selection.”
2003	Alex Vasserman	“Identifying Chemical Names in Biomedical Text: An Investigation of the Substring Co-occurrence Based Approaches”
1988	Michael R. Weinstein Kodak	“Process scheduling using artificial intelligence”

## Doctoral Students

<i>current</i>	Tony Liu (CIS)	“TBA”
<i>current</i>	Sal Giorgi (CIS)	“TBA”

<i>current</i>	Joao Sedoc (CIS)	“TBA”
2016	Ville Satopää (Stat) INSEAD	“Partial Information Framework: Basic Theory and Applications”
2014	Paramveer Dhillon (CIS) MIT (postdoc)	“Advances in Spectral Learning with Applications to Text Analysis and Brain Imaging.”
2010	Perry Evans (GCB) Childrens’ Hospital of Pennsylvania	“Modeling virus-host networks”
2010	Ted Sandler (CIS) amazon	“Regularization and Model Selection with Networks of Features”
2009	Bill Kandylas (CIS) Microsoft	“Online clustering and citation analysis using Streemer”
2008	Gary Morris (CIS)	“Active relational learning for kinship analysis”
2006	Jing Zhou (ESE) Microsoft	“Streaming Feature Selection”
2005	Andrew Schein Amaranth LLC	“Active learning using A-optimality”
2004	Sasha Popescul Yahoo	“Statistical Learning from Relational Databases”
2004	Panos Markopoulos University of Cyprus	“The Information Gap: Understanding Product Information Dissemination”
2003	Eugene Buehler NIH	“Statistical Models for the analysis of heterogeneous biological data sets”
2002	Roy Kwon University of Toronto	“Approximate Mechanisms and Algorithms for Combinatorial Auctions” (with G. Anandalingam)
2000	David Parkes Harvard University	“Iterative Combinatorial Auctions: Achieving Economic and Computational Efficiency”
1999	Rinaldo Jose private practice	“On the optimal coordination of profit maximizing divisions using auctions and price theory”
1995	Evi Gazi Chem. Ind. Inst. Toxicology	“Verification of controllers for incompletely-known chemical plants” (with W.D. Seider)
1995	Jack Vinson Pharmacia	“Automated first principles reasoning using qualitative and quantitative models”
1993	Bill Foster BMS	“The significance of neuronal ionic conductances in the cardiorespiratory nucleus of the solitary

		tract of the rat and in Hodgkin-Huxley models”
1993	Catherine Catino Air Products	“Automated modeling of chemical plants with application to hazard and operability studies”
1993	Dimitris Psychogios JP Morgan	“Process control using structured neural networks”
1990	Stephen Grantham Merck	“Automated reasoning from first principles using qualitative physics”
1989	Charles X. Ling U. Western Ontario	“Inductive learning and invention in domains with primitive recursive structures”
1989	Paul P. Durand Exxon-Mobil	“Percolation and transport in random media with application to high temperature superconductors”
1989	Thomas J. Balsano Amoco	“Unidirectional solidification of an anisotropic binary alloy”
1989	Ralph Gonzales U. Rutgers, Camden	“Learning by progressive subdivision of state space”
1988	Steven J. Weinstein Kodak	“The low flow rate limit for immiscible fluid systems in narrow gaps”
1988	Francis X. Kelly Exxon-Mobil	“Growth morphologies in rapid solidification”

## Postdoctoral Fellows

*current* Sharath Chandra Guntuku  
*current* Kokil Jaidka  
*current* Anneke Buffone (joint with Martin Seligman)  
*current* Daniel Preotiuc-Pietro  
 2014-6 Jordan Carpenter (joint with Martin Seligman)  
 2014-5 Jens Witkowski  
 2012-4 H. Andrew Schwarz

## Publications - Refereed Conference Proceedings

1. Semantic Word Clusters Using Signed Normalized Graph Cuts  
J Sedoc, J Gallier, D Foster, L Ungar In *Proc. 55th Annual Meeting of the Association for Computational Linguistics (ACL)*. 2017
2. EmoNet: Fine-Grained Emotion Detection with Gated Recurrent Neural Networks.  
M Abdul-Mageed, L Ungar In *Proc. 55th Annual Meeting of the Association for Computational Linguistics (ACL)*. 2017.
3. Recognizing Counterfactual Thinking in Social Media Texts  
Y Son, A Buffone, A Janocko, A Larche, J Raso, K Zembroski, HA Schwartz, L Ungar In *Proc. 55th Annual*

- Meeting of the Association for Computational Linguistics (ACL)*. 2017.
4. Predicting emotional word ratings using distributional representations and signed clustering.  
J. Sedoc, D. Preotiuc-Pietro, and L. Ungar. In *European Association for Computational Linguistics (EACL) 2017*, page 564, 2017.
  5. Studying Personality through the Content of Posted and Liked Images  
SC Guntuku, W Lin, WK Ng, LH Ungar In *ACM WebSci 2017*
  6. Recognizing Pathogenic Empathy in Social Media.  
M. Abdul-Mageed, A. Buffone, H. Peng, S. Giorgi, J. Eichstaedt, and L. Ungar. In *Proc 11th International AAAI Conference on Web and Social Media (ICWSM) 2017*
  7. Proper proxy scoring rules.  
J. Witkowski, P. Atanasov, L. H. Ungar, and A. Krause. In *Proceedings of the 31st AAAI Conference on Artificial Intelligence (AAAI)*. 2017.
  8. Analyzing biases in human perception of user age and gender from text.  
L. Flekova, J. Carpenter, S. Giorgi, L. Ungar, and D. Preotiuc-Pietro. In *Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics (ACL)*, pages 843–854. 2016.
  9. Exploring stylistic variation with age and income on twitter.  
L. Flekova, L. Ungar, and D. Preotiuc-Pietro. In *Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics (ACL)*, pages 313–319. 2016.
  10. D. Fulgoni, J. Carpenter, L. Ungar, and D. Preotiuc-Pietro. *An empirical exploration of moral foundations theory in partisan news sources*. In *LREC*. 2016.
  11. Analyzing personality through social media profile picture choice.  
L. Liu, D. Preotiuc-Pietro, Z. R. Samani, M. E. Moghaddam, and L. Ungar. In *Tenth International AAAI Conference on Web and Social Media (ICWSM)*. 2016.
  12. Studying the dark triad of personality through twitter behavior.  
D. Preotiuc-Pietro, J. Carpenter, S. Giorgi, and L. Ungar. In *Proceedings of the 25th ACM International on Conference on Information and Knowledge Management (CIKM)*, pages 761–770. ACM, 2016.
  13. Modelling valence and arousal in facebook posts. D. Preotiuc-Pietro, H. A. Schwartz, G. Park, J. C. Eichstaedt, M. Kern, L. Ungar, and E. P. Shulman. In *Proceedings of NAACL-HLT*, pages 9–15. 2016.
  14. Discovering user attribute stylistic differences via paraphrasing.  
D. Preotiuc-Pietro, W. Xu, and L. H. Ungar. In *AAAI*, pages 3030–3037. 2016.
  15. Predicting individual well-being through the language of social media.  
H. A. Schwartz, M. Sap, M. L. Kern, J. C. Eichstaedt, A. Kapelner, M. Agrawal, E. Blanco, L. Dziurzynski, G. Park, D. Stillwell, et al. In *Pac Symp Biocomput*, volume 21, pages 516–527. 2016.
  16. Crowdsourcing for NLP.  
C. Callison-Burch, L. H. Ungar, and E. Pavlick. In *HLT-NAACL*, pages 2–3. 2015.
  17. Analyzing crowdsourced assessment of user traits through twitter posts.  
L. Flekova, S. Giorgi, J. Carpenter, L. Ungar, and D. Preotiuc-Pietro. In *Third AAAI Conference on Human Computation and Crowdsourcing (HCOMP)*. 2015.
  18. The role of personality, age and gender in tweeting about mental illnesses.  
D. Preotiuc-Pietro, J. Eichstaedt, G. Park, M. Sap, L. Smith, V. Tobolsky, H. A. Schwartz, and L. Ungar. In *NAACL HLT*, volume 2015, page 21. 2015.
  19. Mental illness detection at the world well-being project for the clpsych 2015 shared task.  
D. Preotiuc-Pietro, M. Sap, H. A. Schwartz, and L. Ungar. *NAACL HLT 2015*, page 40, 2015.
  20. New Subsampling Algorithms for Fast Least Squares Regression.  
Paramveer Dhillon, Yichao Lu, Dean Foster and Lyle Ungar, *Neural Information Processing Systems (NIPS) 2013*.
  21. Faster Ridge Regression via the Subsampled Randomized Hadamard Transform.  
Yichao Lu, Paramveer Dhillon, Dean Foster and Lyle Ungar, *Neural Information Processing Systems (NIPS) 2013*.
  22. Using Regression for Spectral Estimation of HMMs.  
Jordan Rodu, Dean Foster, Lyle Ungar and Weichen Wu *First International Conference on Statistical Language*

- and Speech Processing (SLSP)* 2013.
23. Experiments with Spectral Learning of Latent-Variable PCFGs.  
Shay B. Cohen, Karl Stratos, Michael Collins, Dean P. Foster and Lyle Ungar *Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL-HLT)* 2013
  24. Choosing the Right Words: Characterizing and Reducing Error of the Word Count Approach.  
H. Andrew Schwartz, Johannes Eichstaedt, Eduardo Blanco, Lukasz Dziurzynski, Margaret L. Kern, Stephanie Ramones, Martin Seligman, and Lyle Ungar. *Second Joint Conference on Lexical and Computational Semantics (\*SEM-2013)*, 2013
  25. Characterizing Geographic Variation in Well-Being using Tweets.  
H. Andrew Schwartz, Johannes Eichstaedt, Richard Lucas, Lukasz Dziurzynski, Margaret L Kern, Gregory Park, Megha Agrawal, Shrinidhi K Lakshminanth, Shneha Jha, Martin Seligman and Lyle Ungar *International AAAI Conference on Weblogs and Social Media (ICWSM)* 2013.
  26. Toward Personality Insights from Language Exploration in Social Media.  
H. Andrew Schwartz, Johannes Eichstaedt, Lukasz Dziurzynski, Margaret Kern, Eduardo Blanco, Michal Kosinski, David Stillwell, Martin Seligman, Lyle H. Ungar. *AAAI-2013 Spring Symposium: Analyzing Microtext* 2013.
  27. The Marketcast Method for Aggregating Prediction Market Forecasts.  
Pavel Atanasov, Barbara Mellers, Lyle Ungar, Philip Tetlock, Phillip Rescober and Emile Servan-Schreiber *International Conference on Social Computing, Behavioral-Cultural Modeling, & Prediction (SBP13)*, 2013.
  28. How do Infomediaries affect firms information strategies, and how do they impact buyer and social welfare?  
P Markopoulos, R Aron, L Ungar *Proceedings of the International Conference of Information Systems (ICIS)*, 2013.
  29. Improving Supervised Sense Disambiguation with Web-scale Selectors.  
H. Andrew Schwartz, Fernando Gomez, Lyle H. Ungar. *COLing-2012: the 24th International Conference on Computational Linguistics* 2012.
  30. New Insights from Coarse Word Sense Disambiguation in the Crowd.  
Adam Kapelner, Krishna Kaliannan, H. Andrew Schwartz, Lyle Ungar and Dean Foster *COLing-2012: the 24th International Conference on Computational Linguistics* 2012.
  31. Spectral Dependency Parsing with Latent Variables.  
Paramveer Dhillon, Jordan Rodu, Michael Collins, Dean Foster and Lyle Ungar *EMNLP* 2012.
  32. Spectral Learning of Latent-Variable PCFGs.  
Shay Cohen, Karl Stratos, Michael Collins, Dean Foster, and Lyle Ungar *ACL* 2012.
  33. Using CCA to improve CCA: A new spectral method for estimating vector models of words.  
Paramveer Dhillon, Dean Foster and Lyle Ungar, *ICML* 2012.
  34. Using Word Similarities to better Estimate Sentence Similarity.  
Sneha Jha, H. Andrew Schwartz and Lyle H. Ungar, *Semeval* 2012.
  35. Characterizing Emergence Using a Detailed Micro-model of Science: Investigating Two Hot Topics in Nanotechnology.  
Kevin W. Boyack, Richard Klavans, Henry Small and Lyle Ungar, *Technology Management for Emerging Technologies (PICMET)* 2012.
  36. Partial Sparse Canonical Correlation Analysis (PSCCA) for population studies in medical imaging.  
Paramveer Dhillon, Brian Avants, Lyle Ungar, James Gee, *ISBI 2012 Paper 1074*, 2012.
  37. Spectral methods for estimating probabilistic language models.  
Lyle Ungar, Paramveer Dhillon, Jordan Rodu, Michael Collins, and Dean Foster *Snowbird Learning Workshop*, 2012.
  38. Online discussion of drug side effects and adherence behaviors by breast cancer survivors.  
Mao JJ, Chung A, Benton A, Hill S, Ungar L, Leonard C, Hennessy S, Holmes J. *Sixth Biennial Cancer Survivorship Research Conference: Translating Science to Care*, Arlington, VA, June 2012.
  39. Multi-View Learning of Word Embeddings via CCA.  
Paramveer Dhillon, Dean Foster, Lyle Ungar, *Neural Information Processing Systems (NIPS)* 2011.
  40. Discovery of Significant Emerging Trends.

- Saurabh Goorha and Lyle Ungar *ACM Knowledge Discovery and Data mining (KDD)* 57–64, 2010.
41. A System for De-identifying Medical Message Board Text.  
Benton, A. and Hill, S. and Ungar, L. and Chung, A. and Leonard, C. and Freeman, C. and Holmes, J.H. *IEEE Ninth International Conference on Machine Learning and Applications*. 485490, 2010. also published in *BMC Bioinformatics*, Jun 9;12 Suppl 3:S2, 2011.
  42. Mining Internet Conversations for Evidence of Supplement-Associated Adverse Events.  
J.H. Holmes, A. Benton, A. Chung, C. Freeman, S. Hennessy, S. Hill, C. Leonard, J. Mao and L. Ungar *AMIA 2010 Symposium Proceedings (AMIA-1851-A2009)* 1082. 2010.
  43. A new approach to lexical disambiguation of Arabic text.  
R. Shah, P. Dhillon, M. Liberman, D. Foster, M. Maamouri and L. Ungar, *Proceedings of the 2010 Conference on Empirical Methods in Natural Language Processing*, 725–735, 2010.
  44. Feature Selection using Multiple Streams.  
Paramveer Dhillon, Dean Foster and Lyle Ungar. *Proceedings of The Thirteenth International Conference on Artificial Intelligence and Statistics (AISTATS): Journal of Machine Learning Research - Proceedings Track 9* 153-160, 2010.
  45. Multi-Task Feature Selection using the Multiple Inclusion Criterion (MIC).  
Paramveer Dhillon, Brian Tomasik, Dean Foster and Lyle Ungar, *ECML-PKDD (European Conference on Machine Learning)*, Bled, Slovenia, Sept. 2009.
  46. Transfer Learning, Feature Selection and Word Sense Disambiguation.  
Paramveer Dhillon, and Lyle Ungar. *ACL-IJCNLP (Annual Meeting of the Association of Computational Linguistics)*, 257-260, 2009.
  47. Transfer Learning Using Feature Selection.  
Paramveer S. Dhillon, Dean P. Foster, Lyle H. Ungar, *CoRR* abs/0905.4022, 2009.
  48. Gamma-band ECoG correlates of human cognitive representations.  
Jacobs, J., Ungar, L.H. and Kahana, M.J. Program No. 279.2. Chicago, IL: *Society for Neuroscience*, 2009.
  49. Efficient Clustering of Web-Derived Data Sets.  
Luis Sarmiento, Alexander Kehelenbeck, Eugenio Oliveira, and Lyle Ungar, *International Conference on Machine Learning and Data Mining (MLDM)* 2009.
  50. An Approach to Web-scale Named-Entity Disambiguation.  
Luis Sarmiento, Alexander Kehelenbeck, Eugenio Oliveira, and Lyle Ungar, *International Conference on Machine Learning and Data Mining (MLDM)* 2009.
  51. Resolving Identity Uncertainty with Learned Random Walks.  
Ted Sandler, Lyle H. Ungar and Koby Crammer, *International Conference on Data Mining (ICDM)*, 457-465, 2009.
  52. Regularized Learning with Networks of Features.  
Ted Sandler, John Blitzer, Partha Pratim Talukdar, Lyle H. Ungar, *Neural Information Processing Systems (NIPS)*, 1401-1408, 2008.
  53. Protein-Protein Interaction Network Alignment by Quantitative Simulation.  
Perry Evans, Ted Sandler and Lyle Ungar *Proceedings of the 2008 IEEE International Conference on Bioinformatics and Biomedicine (BIBM '08)*, 325-328, 2008.
  54. Multiway Clustering for Creating Biomedical Term Sets.  
V Kandylas, L Ungar, T Sandler, S Jensen *Proceedings of the 2008 IEEE International Conference on Bioinformatics and Biomedicine (BIBM '08)*, 449-452, 2008.
  55. Using Text Mining to Analyze User Forums.  
R. Feldman, M. Fresko, J. Goldenberg, O. Netzer, L. Ungar *5th IEEE ICSSSM'08, Melbourne*, 2008.
  56. Web-Scale Named Entity Recognition. Casey Whitelaw, Alex Kehlenbeck, Nemanja Petrovic and Lyle Ungar *ACM 17th Conference on Information and Knowledge Management (CIKM)*, 123-132, 2008.
  57. Using sequence classification for filtering web pages.  
Binyamin Rosenfeld, Ronen Feldman and Lyle H. Ungar *ACM 17th Conference on Information and Knowledge Management (CIKM)*, 1355-1356, 2008.
  58. Efficient Feature Selection in the Presence of Multiple Feature Classes.



- Paramveer S. Dhillon, Dean Foster and Lyle H. Ungar *IEEE International Conference on Data Mining (ICDM)*, 2008.
59. Scalable Methods for Extracting Named Entities from the Web.  
Casey Whitelaw, Alex Kehlenbeck, Luis Sarmiento, Lyle Ungar *INFORMS* 2008 (abstract only)
  60. In defense of  $L_0$ .  
Dongyu Lin, Dean Foster and Lyle Ungar *ICML-2008 Workshop on Sparse Optimization and Variable Selection*, 2008.
  61. Information Theory-Based Feature Selection.  
Dean P. Foster and Lyle H. Ungar *Fourteenth Yale Workshop on Adaptive and Learning Systems*, 2008
  62. Learning with Locally Linear Feature Regularization.  
Ted Sandler, John Blitzer, Lyle Ungar *Snowbird Learning Workshop*, 2008
  63. Maximal Subset Feature Selection for BioInformatics.  
Dean P. Foster, Anna Goldenberg and Lyle H. Ungar *Snowbird Learning Workshop*, 2008
  64. Finding cohesive clusters for analyzing knowledge communities.  
Vasileios Kandylas, S. Phineas Upham, and Lyle H. Ungar, *Seventh IEEE International Conference on Data Mining (ICDM)*, Oct 2007.
  65. Extracting Product Comparisons from Discussion Boards.  
Feldman, R., M. Fresko, J. Goldenberg, O. Netzer and L. Ungar *Seventh IEEE International Conference on Data Mining (ICDM)*, Oct 2007.
  66. Innovating Knowledge Communities.  
Phin Upham, Lori Rosenkopf, and Lyle Ungar 2007 Academy of Management Meeting, Philadelphia, PA (selected for the “Best Paper Proceedings of the 2007 Academy of Management Meeting.”)
  67. An Empirical Study of the Behavior of Active Learning for Word Sense Disambiguation.  
J. Chen, A. Schein, L. Ungar and M. Palmer *HLT-NAACL 06*, 2006.
  68. Is Online Product Information Driven by Quality or Differentiation?  
P.M. Markopoulos and R. Aron and L.H. Ungar. *Proceedings of the International Conference of Information Systems (ICIS-2005)*, 2005.
  69. Cluster-based Concept Invention for Statistical Relational Learning.  
A. Popescul and L. Ungar, *KDD-2004*, 2004.
  70. Genomic Characterization of Synaptic Proteins, SynapseDB.  
M. Bucan et al. *The Biology of Genomes (Cold Spring Harbor May, 2004)*. (abstract only)
  71. Integrated Annotation for Biomedical Information Extraction.  
S. Kulick, A. Bies, M. Liberman, M. Mandel, R. McDonald, M. Palmer, A. Schein and L. Ungar, *HLT/NAACL, Boston*, May, 2004.
  72. Statistical Relational Learning for Document Mining.  
A. Popescul, L. H. Ungar, S. Lawrence and K.M. Pennock. *International Conference on Data Mining (ICDM-2003)*, 2003.
  73. Using Reinforcement Learning to Refine Autonomous Robot Controllers  
G. Grudic, V. Kumar and L. Ungar, *International Conference on Intelligent Robots and Systems (IROS)*, 2003.
  74. Mixtures of Conditional Maximum Entropy Models.  
D. Pavlov, A. Popescul, D.M. Pennock and L.H. Ungar, *International Conference on Machine Learning (ICML)*, 2003.
  75. Structural Logistic Regression for Link Prediction.  
A. Popescul and L. H. Ungar, *KDD Workshop on Multi-Relational Data Mining* and a similar paper, Statistical Relational Learning for Link Prediction. A. Popescul and L. H. Ungar, *IJCAI-03 Workshop on Relational Learning*, 2003.
  76. A Combinatorial Auction-Based Method for Supply Chain Management.  
R. Kwon and L. Ungar, *Institute for Operations Research and the Management Sciences (INFORMS)*, 2003.
  77. Static and Dynamic Analysis of the Internet’s Susceptibility to Faults and Attacks.  
S-T. Park, A. Khrabrov, D.M. Pennock, S. Lawrence, C.L. Giles and L.H. Ungar, *Infocom*, 2003.
  78. A Generalized Linear Model for Principal Component Analysis of Binary Data.

- A. I. Schein, L. K. Saul and L. H. Ungar, *Proc. 9th International Workshop of AI and Statistics*, Jan 3-6, 2003.
79. Rates of Convergence of Performance Gradient Estimates Using Function Approximation and Bias in Reinforcement Learning.  
G. Grudic, and L. Ungar, *NIPS 14*, 2002.
  80. Dual Pricing and Information Deficit in Electronic Markets.  
P. Markopoulos, R. Aron and L. H. Ungar, *International Conference on Information Systems (ICIS) 2003*; earlier version appeared in *Workshop on Information Systems and Economics (WISE)*, 2002.
  81. Towards Structural Logistic Regression: Combining Relational and Statistical Learning.  
A. Popescul, L. H. Ungar, S. Lawrence and D. M. Pennock, *Workshop on Multi-Relational Data Mining, at the Eighth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD 2002)*, 2002.
  82. Methods and Metrics for Cold-Start Recommendations.  
A. I. Schein, A. Popescul, L. H. Ungar and D. M. Pennock, *ACM Special Interest Group on Information Retrieval SIGIR-2002*, August 2002.
  83. Pricing Price Information in E-commerce.  
P.M. Markopoulos and L.H. Ungar, *Proceedings of the ACM Conference on Electronic Commerce (EC01)*, Tampa, Florida, October 2001.
  84. Towards Learning by Ontological Leaps.  
L. Ungar and D. Foster, *Snowbird Learning Workshop*. 2001.
  85. A Primal-Dual Algorithm for Winner Determination in Combinatorial Auctions.  
R. Kwon, G. Anandalingam and L.H. Ungar, *INFORMS*, 2001.
  86. Maximum Entropy Methods for Biological Sequence Modeling.  
Buehler, E. and L.H. Ungar, *BIOKDD 2001 workshop*, 2001.
  87. Generative Models for Cold-Start Recommendations.  
A. Schein, A. Popescul, L. H. Ungar and D. M. Pennock, *Workshop on Recommender Systems, SIGIR-2001*, 2001
  88. Exploiting Multiple Secondary Reinforcers in Policy Gradient Reinforcement Learning.  
G. Z. Grudic and L. H. Ungar, *IJCAI 2001*, 2001.
  89. Probabilistic Models for Unified Collaborative and Content-Based Recommendation in Sparse-Data Environments.  
A. Popescul, L. H. Ungar, D. M. Pennock and S. Lawrence, *Uncertainty in AI (UAI 2001) Conference*, August 2001
  90. Efficient Reinforcement Learning for Robots.  
G. Z. Grudic and L. H. Ungar, *Yale Workshop on Adaptive and Learning Systems*, June, 2001.
  91. Iterative Combinatorial Auctions: Theory and Practice.  
D. C. Parkes and L.H. Ungar, *Proc. 18th National Conference on Artificial Intelligence, (AAAI-00)*, 74-81. 2000.
  92. Preventing Strategic Manipulation in Iterative Auctions: Proxy-Agents and Price-Adjustment.  
D. C. Parkes and L.H. Ungar, *Proc. 18th National Conference on Artificial Intelligence, (AAAI-00)*, 82-89. 2000.
  93. Localizing Search in Reinforcement Learning.  
G. Z. Grudic and L. H. Ungar, *Proc. 18th National Conference on Artificial Intelligence, (AAAI-00)*, 590-595. 2000.
  94. Localizing Policy Gradient Estimates to Action Transitions.  
G. Z. Grudic and L. H. Ungar, *International Conference on Machine Learning (ICML2000)*, 343-350. 2000.
  95. Efficient Clustering of High-Dimensional Data Sets with Application to Reference Matching.  
A. McCallum, K. Nigam and L. Ungar, *KDD-2000*, 2000.
  96. Clustering and Identifying Temporal Trends in Document Databases.  
A. Popescul, G. W. Flake, S. Lawrence, L.H. Ungar and C. L. Giles, *Proc. IEEE Advances in Digital Libraries 2000 Conference*, 2000.
  97. String Edit Analysis for Merging Databases.  
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## Patents

1. US 5,335,391 Method and apparatus for pattern mapping system with self-reliability check  
M.A. Kramer, J.A. Leonard and L.H. Ungar
2. US 5,951,623 Lempel-Ziv data compression technique utilizing a dictionary prefilled with frequent letter combinations, words and/or phrases  
J.C Reynar, F. Herz, J. Eisner and L. Ungar
3. US 5,835,087 System for general of object profiles for a system for customized electronic identification of desirable objects  
F. Herz, J. Eisner and L. Ungar
4. US 5,758,257 System and method of scheduling broadcast of and access to video program and other data using customer profiles  
F. Herz, L. Ungar, J. Zhang, D. Wachob and M. Salganicoff
5. US 5,754,939 System for generation of user profiles for a system for customized electronic identification of desirable objects  
F. Herz, J. Eisner L. Ungar, M. Marcus
6. US 6,088,722 System and method for scheduling broadcast of and access to video programs and other data using customer profiles (divisional of the 5,835,087)  
F. Herz, L. Ungar, J. Zhang, D. Wachob and M. Salganicoff
7. US 6,020,883 System and method of scheduling broadcast of and access to video program and other data using customer profiles  
F. Herz, L. Ungar, J. Zhang, D. Wachob and M. Salganicoff
8. US 20,030,135,445 Stock market prediction using natural language processing  
F. Herz, L. Ungar, J. Eisner and P. Labys
9. US 20,020,184,102 Selling price information in e-commerce  
P. Markopoulos and L. Ungar