Lawrence E. Hunter, PhD

Personal History

Current Positions:

University of Colorado, Professor, 2008 to present:
School of Medicine, Department of Pharmacology
School of Public Health, Department of Biometrics
Arts & Sciences (Boulder), Department of Computer Science
Arts & Sciences (Denver), Department of Biology

Computational Bioscience Program (Director)

Biomolecular Structure Program

Cardiovascular Institute

Cancer Center

Human Medical Genetics Program

IQ Biology / BioFrontiers Program (Boulder)

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University of Colorado School of Medicine
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Education

- B.A. in Psychology, 1982, Yale University, *cum laude*.
- M.S. and M.Phil. in Computer Science, 1987, Yale University.
- Ph.D. in Computer Science, 1989, Yale University.
- Thesis: *Knowledge Acquisition Planning: Gaining Expertise Through Experience,* advised by Roger Schank.

Academic Appointments

Teaching Assistant, Yale University, Computer Science Department 1983-1988.

Adjunct Assistant Professor, George Mason University, Computational Science and Informatics, 1991-1997

Adjunct Associate Professor, George Mason University, Computational Science and Informatics, 1997-2000

Fellow, Krasnow Institute of Advanced Study in Cognition, 1995-2000.

Associate Professor, University of Colorado School of Medicine, 2000-2008.

Professor, University of Colorado School of Medicine, 2008-

Other Professional Positions

Government Positions

Board of Scientific Counselors, Environmental Protection Agency, Office of Research and Development / Computational Toxicology Subcommittee 2009-2012

Chief of Section, National Cancer Institute (NIH), Section on Molecular Statistics and Bioinformatics, 1999-2000.

Computer Scientist, National Library of Medicine (NIH), Lister Hill Center, 1989-1999.

National Science Foundation Scientific Database Network Project, Board of Directors, 1992-1996;

Corporate Positions

Consultant, SomaLogic, Inc., 2014-

Consultant, Cycorp, Inc. 2010-11

Founder & Member of the Board of Directors, Molecular Mining Corporation, 1997-2003

Cooperative Research and Development Agreement (CRADA) with VIPS Systems, Inc. 1998-2000

Consultant, Medical Scientists, Inc. (1998-2005)

Consultant, SmithKlein Beecham, Inc. (1996-2000)

Honors, Special Recognition, and Awards

Daniel T. Richards Prize, Medical Library Association, 2016

Outstanding Service Award, International Society for Computational Biology, 2015

Senior member, American Association for Artificial Intelligence, 2014-

Fellow, International Society for Computational Biology, 2010-

Fellow, American College of Medical Informatics, 2002-

Excellence in Research Award, UC Denver Pharmacology Department, 2007

Excellence in Teaching Award, Preventive Medicine and Biometrics Department, 2004

Engelmore Prize for Innovative Applications of Artificial Intelligence, 2003 (presented by the American Association for Artificial Intelligence)

Regent's Award for Scholarship and Technical Achievement, (the highest honor granted by the National Library of Medicine), 1994.

Meritorious Service Award, National Library of Medicine, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998

Winner, student paper competition, Knowledge Acquisition for Knowledge Based Systems Workshop, 1988.

Patents

A System for Synergistic Combination of Multiple Automatic Induction Methods and Re-Representations of Data. US Patent 6,449,603, issued September 10, 2002. Licensed to firms in healthcare, insurance and the pharmaceutical industry.

A Machine Learning Method for Predicting Rare but Significant Events. US Patent 6,917,926 issued July 12, 2005. Coinventors Hung-Han Chen, Harry Poteat and Kristin Kendall.

Membership in professional organizations

International Society for Computational Biology, 1996-. Founder, 1996; President 1996-2000; Awards Committee Chair, 2003-2005; Finance Committee Chair 2005-2007; member of the Board of Directors, 1996-2007

American Association for Artificial Intelligence, 1984-

American Medical Informatics Association, 1990-, Publications Committee (1990-1993)

International Biomatrix Society, Board of Directors, 1991-1996;

Major Committee and Service Responsibilities

Departmental

Curriculum Committee, 2000-2004

Faculty Search Committee, 2002-2003

Space Planning Committee, 2003-2009

Graduate Training Committee, 2007

Promotion and Tenure Committee, 2009-2012, 2014-

School of Medicine

Strategic Plan Committee, 2002-2003

Research Advisory Committee, 2003-2005

Computational Bioscience Program, 2004- (Director)

D2V, 2016- (Training Program co-director)

UCD AMC

Search Committee, Director of the Dennison Library, (2006-2007)

Faculty Promotions Committee 2012-2014

CU Boulder

Faculty Search Committee, Computer Science Department (2005)

Molecular Biotechnology Initiative (2005-2006)

CU Denver

Steering Committee, CU Denver Center for Computational Biology (2001-2006)

Faculty Search Committee, Biology Department, 2012

CU System

University Without Walls (2002-2004)

Genomics Taskforce (2001-2005)

National / International Scientific Advisory Boards

University of Pittsburgh Biomedical Informatics Training Program 2016-

ELIXIR Scientific Advisory Board (European Union) 2016-

RD-Connect Scientific Advisory Board, (UK) 2012-

BioMedNet Scientific Advisory Board (European Commission), 2012-2016

Multidisciplinary Research Partnership on Bioinformatics (Ghent, Belgium), Scientific Advisory Board, 2012-2016

Dartmouth Medical School Quantitative Biology Program, 2015

European Bioinformatics Institute, Literature Services Advisory Board, 2011-2015

Rat Genome Database, Scientific Advisory Board, 2007-2012

Gene Ontology Consortium, Scientific Advisory Board 2004-2009

Columbia University Department of Biomedical Informatics, External Reviewer 2004

University of Michigan Computational Biology Program, External Reviewer 2003

National / International Conference Organizing

Founder, International Conference on Intelligent Systems for Molecular Biology 1993 (Cochair, 1993; Organizing committee 1994-1996). Still the most successful academic conference in bioinformatics

Founder and Cochair, Pacific Symposium on Biocomputing (1996-)

Founder and Program Chair, Rocky Mountain Regional Conference on Computational Biology (2004-)

Founder and Steering Committee Member, VizBi conference on computational visualization in biology, 2010-

Steering Committee, IEEE Conference on Biological Visualization, 2011-

Program chair, Biotechnology Computing Track, Hawaiian International Conference on System Sciences, 1993, 1994, 1995.

Program chair, Biotechnology Computing Minitrack, Hawaiian International Conference on System Sciences, 1991, 1992

Area Chair for Machine Learning, National Conference on Artificial Intelligence, 1992, 1993.

Program committee, AAAI-91 Workshop on Pattern Recognition and Inference in Molecular Biology, 1991

Program chair, AAAI Spring Symposium on Artificial Intelligence and Molecular Biology, 1990.

Program committee, International Conference on the Biomatrix, 1990

Review and referee work

Service on Editorial Boards

Associate Editor, *Journal of Biomedical Informatics*, 2002-2012

Associate Editor, *BMC Bioinformatics,* 2009-2014

Associate Editor, *PLoS Computational Biology,* 2010-

Associate Editor, *Bioinformatics,* 2010-

Editorial Board, *Journal of Machine Learning Research*, 1999-2004

Special editor, *IEEE Expert*, track on Molecular Biology Applications, 1996.

Associate Editor, *Journal of Artificial Intelligence Research*, 1993-1997

Editorial board, *Artificial Intelligence and Medicine*, 1993-1995

Editorial board, *Journal of Computational Molecular Cell Biology*, 1993-1998

Grant Study Sections and Ad Hoc Grant Reviews

Ad Hoc Reviewer for BD2K 2016/05 ZRG1-PSE-K-50

Ad Hoc reviewer at NCATS, 2016/10 ZTR1-CI-9-01

Ad Hoc reviewer at NHLBI 2017/01 ZHL1-CSR-Q-F1

Chair, NIH Office of the Director Transformative Research Award Review ZRG1 BCMB-A (50) R 2015-2016

Chair, NIAID Special Emphasis Panel ZAI1 MP-I (S4), 2008

Biomedical Library and Informatics Review Committee, National Library of Medicine study section, 2004-2008

Ad hoc reviewer, NIH Office of the Director, Big Data to Knowledge Research Center awards, 2014

Ad hoc reviewer, NIH Office of the Director, Pioneer awards, 2014, 2015

Ad hoc reviewer, NIH Office of the Director, Transformational Science Awards, 2012, 2013, 2014, 2015

Ad hoc reviewer, NCRR / CTSA reviews, 2010

Ad hoc reviewer, National Library of Medicine, 2009

Ad hoc reviewer, National Library of Medicine, 1999-2004

Ad hoc reviewer, NIH Roadmap U54 Interdisciplinary Research Consortia, 2007

Ad hoc reviewer, National Institute of General Medical Sciences, 2004

Ad hoc reviewer, National Academy of Sciences, 2003

Genome Canada Research Review Panel, 2001, 2003

Ad hoc reviewer, National Institute for Mental Health, 2000

Human Brain Project (trans-NIH review section), 1997-1999

Ad hoc reviewer, National Institute for Mental Health (Research Contracts), 1998

Invited lectures and presentations (highlights)

The Challenges of Biological Information Visualization, Keynote at ISMB Biomedical Information Visualization SIG, 2015

Ontologically Grounded Knowledge Representation for Semantic Data Integration and Natural Language Processing Keynote at ISMB BioOntologies SIG, 2015

Knowledge Representation in and about Text. Keynote at Biological Linked Annotation Hackathon 2015

Translational Analytics: Semantic Computing at Genomic Scale. Translational Bioinformatics Conference keynote 2014

A Mind for Life: Why Watson isn't AI-Complete, and How Molecular Biomedicine Might Make It So. Invited address to IBM Deep Q/A Research Team, 2012

Twenty years of the Intelligent Systems for Molecular Biology Conference. Keynote address, ISMB, 2012

Openness as a value in biomedical research, Invited address, Third Annual Research Ethics Conference, University of Colorado, 2012

Formal Knowledge Representation and Automated Reasoning for Explanation of Genome-Scale Data Keynote address, International Conference on Biomedical Ontology, 2012

The Role of Openness in Knowledge-based Systems for Biomedicine, invited presentation to the Biomedical Open Source Conference / ISMB SIG, 2011

Sense-making in Molecular Biology, invited presentation, IEEE conference on Visualization in Biology, 2011

Computational Bridges over Biomedical Chasms, invited presentation, Gold Lab Symposium, 2011

Building a Mind for Life, invited presentation to International Lisp Conference, 2010

Visualization in Biology, invited capstone panel presentation, IEEE VizWeek, Oct. 2009

Rethinking our goals for BioNLP and its evaluation, Keynote address, BioCreative II.5, October 2009

Innovative Training for Bioinformatics, Invited address, National Library of Medicine Board of Regents, September 2009

Tools for Scientific Insight, invited presentation, SRI International, October 2007

Twenty Years of Planning to Learn, keynote presentation, Planning to Learn workshop, European Conference on Machine Learning, September 2007

New ideas for secondary school biology education, Ewing Marion Kaufmann Foundation, May 2006

Bioinformatics: Putting Systems Biology Information in Context, lecture in UCHSC Systems Biology and Biomedical Research Symposium, Dec 2, 2005

Language, Knowledge and Molecular Biology, Invited presentation to Yale Bioinformatics Symposium, New Haven, CT, November 3, 2005

Biomedical Language Processing, Keynote address to Human Language Technology / Empirical Methods in Natural Language Processing conference, Vancouver, Canada, Oct. 6, 2005

Biognostic Systems, Keynote address to Italian Association for Artificial Intelligence conference, Milan, Italy Sept. 20, 2005

The Role of Community in Computational Biology, keynote address to the Rocky Mountain Regional Bioinformatics Meeting ("Rocky 1") in Aspen, Colorado, December 5-7, 2003.

The Era of Biognostic Machines, keynote address to Association for Computing Machinery Special Interest Group on Applied Computing (ACM-SAC) conference., 2003

Proteomic Bioinformatics, Center for Computational Pharmacology mini-symposium, 2003

Biognostic Machines for Cognitive Disability, invited address, Coleman Institute annual meeting, 2002

Bioinformatics and Human Health, UCHSC Chancellor's Luncheon Address, 2002

Data Mining for High Throughput Biomedicine, keynote address to the Research Society on Alcoholism conference, Denver, Colorado, June 2000

Edgar: Extraction of Drugs, Genes and Relations from the Biomedical Literature, Pacific Symposium on Biocomputing, January, 2000

The Role of Machine Learning and Natural Language Processing in Contemporary Drug Discovery, Pharmacology Grand Rounds, University of Colorado School of Medicine, October, 1999

Inductive Modeling: Power and Pitfalls, keynote address to MODEL-IT conference, Waginengen, the Netherlands, November 1998

Coevolution of Symbol Systems and Behavior, lecture and workshop, Simulations of Adaptive Behavior conference, Zurich, Switzerland, August 1998.

Machine Learning for Drug Discovery, invited address, SmithKline Beecham Data Mining Days, November 1997.

Computer Science : Biology :: Mathematics : Physics, MIT Media lab, April 1997

The Role of Computation in Cognitive Science, Krasnow Institute for Advanced Study of Cognition Seminar Series, November, 1996.

Coevolution Learning: Syngerstic Evolution of Learning Agents and Problem Representations, Multistrategy Learning Workshop, June, 1996.

AI Models for Biology, and Biological Models for AI, Keynote address, Second International Conference on Intelligent Systems for Molecular Biology, July 1995.

Computers, Modelling , and Theorretical Biology, Invited address to the Keystone Center Scientist to Scientist Colloquium, August, 1994

The National Library of Medicine on the Internet: A Digital Library for Biomedicine. Invited address to the Computers and Chemistry Division of the American Chemical Society conference, Aug 1994

Planning to Discover in Molecular Biology, MIT AI Lab Revolving Seminar Series, April 1994

Molecular Biology for the Computer Scientist, Full day tutorial at the Hawaiian International Conference on System Sciences, January 1993. Repeated Jan 1994.

AI & Molecular Biology, Plenary address, National Conference on Artificial Intelligence, San Jose, CA, July 1992.

Megaclustering of Unsegmented Datastreams and Applications to Molecular Biology, Johns Hopkins Applied Physics Laboratory distinguished lecture series, October 1992.

Electronic Facilitation of Scientific Communication, Panel organizer and speaker, International Conference on the Biomatrix, George Mason University, July 1990

Knowledge Acquisition Planning for Inference from Large Datasets, Keynote address, 1990 Conference on AI Systems in Government, Washington, DC, May 1990

Machine Learning: Ready for Industrial Application, Invited address to Third Annual Artificial Intelligence Forum, Sanibel Island, FL, February, 1989

Artificial Neural Networks as Theories of Mind. International Neural Network Society, Boston MA, September, 1988

Machine Learning for Molecular Biology. Invited address to the Theoretical Biology and Biophysics Group, Los Alamos National Laboratory, June 1988

Indexing and Recognition. AI/BioMed: The First International Conference on Artificial Intelligence and its Impacts in Biology and Medicine, Montpellier, France, September 1986

Computers and Privacy. Guest lecture in Constitutional Law, University of Connecticut at Hartford Law School, Dec., 1985.

Teaching record

Courses taught

2017 CPBS 7805 Mechanistic Inference

2010-present SoM CPBS 7712 *Research in Computational Biology (*course director 2010-12)

2009-present SoM CPBS 7711 *Introduction to Computational Biology (*course director, 2009-2012)

2008, 2011, 2013, 2015, 2017 SoM CPBS 7605 *Ethics and Values in Computational Biology*

2011-2012 SoM CPBS 7792 *Next Generation Human Phenotyping*

2004 BIOI 7791 *Readings in Computational Biology*

2003-2006 SoM BIOI 7713 (each year) *Research in Computational Biology*

2003, 2005, 2013, 2014 BIOI 7792 *Special Topics in Computational Biology*

2002-2007 SoM BIOI 7710, 7711 (each year) *Introduction to Computational Biology*

2002, 2003 University of Colorado, Denver, BIOL 5099 *Biology for Computer Scientists, Mathematicians and Engineers*

2001 PHCL 7611 *Advanced Statistics for Pharmacology*
2000 PHCL 6611 *Statistics for Pharmacology*
1991-1999 George Mason University *Graduate Computational Bioscience*

Lectures given in other courses
2003-2014 PHCL 7561 *Bioinformatics in Drug Discovery*
2004-2014 PHCL 7600 *Innovative Bioinformatics for Pharmacology*
2004-2009 Informatics Elective for Residents *Clinical Bioinformatics*
2001 PHRD 4450 *Ethical Issues in Pharmacy Informatics*

Courses Created

CPBS 7805 *Mechanistic Inference*

CPBS 7792 *Next generation human phenotyping*.

BIOI 7605 (now CPBS 7605) *Ethics and Values in Computational Biology*

BIOI 7710 *Survey of Bioinformatics Methods*

BIOI 7711 (now CPBS 7711) *Introduction to Computational Biology*

BIOI 7712 (now CPBS 7712) *Research in Computational Biology*

BIOI 7713 *Graduate Bioinformatics 3* (now included in 7712)

BIOI 7791 *Readings in Bioinformatics*

BIOI 7792 *Special Topics in Bioinformatics*

BIOL 5099 (CU Denver) *Molecular Biology for Computer Scientists, Mathematicians and Engineers*

Teaching Administration
Director, Computational Bioscience Training Program
Course Director, CPBS 7711
Course Director, CPBS 7712
Course Director, CPBS 7792
Course Director, CPBS 7605

Teaching Awards
Excellence in Teaching Award, Preventive Medicine and Biometrics Department, 2004.

Ph.D. Dissertations Directed

Jeffery L. Krichmar, *A Computational Model of Cerebellar of Saccadic Control,* GMU Computational Science and Informatics, 1997.

Judith E. Devany, *Equation Discovery Through Global Self-Referential Geometric Invariants and Machine Learning,* GMU Information Technology, 1997.

Imran Shah, *Predicting Enzyme Function from Sequence,* GMU Computational Science and Informatics, 1998

Barry Zeeberg, *Whole Genome Information Analysis and Processing*, GMU Computational Science and Informatics, 1999

Robert S. Erb, *Analysis and Modeling of Gene Expression Circuits*, GMU Computational Science and Informatics, 1999

Myriam Abramson, *Learning Coordination Strategies* GMU Information Technology, 2003.

Lorraine Tanabe, *Text mining the biomedical literature for genetic interactions* GMU Computational Science and Informatics, 2003

Ronald Taylor *Reconstruction of metabolic and genetic networks from gene expression perturbation data using a Boolean model: construction of a simulation testbed and an empirical exploration of some of the limits* GMU Computational Science and Informatics, 2003.

Min Hong, *Implicit constraint enforcement to control physically-based biomedical simulation* UCHSC Computational Bioscience 2005

Steve Russell, *Machine Learning and In-silico Modeling for Improved Identification of Peptides from Shotgun Proteomic MS/MS Spectra*. UCHSC Computational Bioscience 2005

Sonia Leach, *Informed Structural Priors for Bayesian Networks: Applications in Molecular Biology Using Heterogeneous Data Sources* Brown University Computer Science 2006

Zhiyong Lu, *Text Mining on GeneRIFs,* UCHSC Computational Bioscience 2007

Anis Karimpour-Fard, *Prediction of protein-protein interactions and function in bacteria* UCHSC Computational Bioscience 2008

Elizabeth White, *Pattern-Based Recovery of Argumentation from Scientific Text*, UC Boulder Computer Science, 2009

Philip V. Ogren, *Coordination resolution in biomedical texts*. UC Boulder Computer Science, 2011

Daniel C. McShan, *Computational Bioalchemy: Optimal Search Algorithms for the Analysis and Synthesis of Metabolic Systems*. UC Denver Computational Bioscience, 2012

Ronald P. Schuyler, *Multi-component Genetic Associations*. UC Denver Computational Bioscience, 2012

Christopher Funk, *Ontological Concept Recognition and its Application for Biomedical Discovery,* UC Denver Computational Bioscience, 2015

William A. Baumgartner, Jr., *Enhancing Ontology Term Enrichment through Deductive Entailment,* UC Denver Computational Bioscience, 2015

Michael Hinterberg, *Algorithmic and Visual Analyses for Discovery of Robust Phenotype-Biomarker Associations,* UC Denver Computational Bioscience, 2016

Formal Junior Faculty Mentoring

Deborah Glueck, Department of Preventive Medicine and Biometrics

Debra Goldberg, Department of Computer Science (Boulder).

Grant support:

Active Grants (Principal Investigator)		Annual direct costs
NIH 2R01LM009254	9/2006-4/2019	$404,767
Biomedical Language Processing Writ Large: Scaling to all of PubMedCentral		
NIH 2R01LM008111	10/2003-3/2018	$401,329
Technology Development for a Molecular Biology Knowledge-base		
NIH 5T15LM009451	7/2007-6/2017	$472,566
Computational Bioscience Program Training Grant		

Pending Grants (Principle Investigator)		Annual direct costs
NIH 1P01GM118485	9/2016 – 8/2021	$998,405
Automated Explanation and Hypothesis Generation at Genomic Scale		

Prior Grants (Principal Investigator)		Annual direct costs
NIH/Clinical Center Research Contract	7/2000-6/2001	$100,000
Gene Expression Array Analysis for Investigation of Sepsis		
NIH 1U01 AA13524	9/2001-8/2006	$500,000
Neuroinformatics Core for the *Integrated Neuroscience Initiative on Alcoholism*		
Genetics Institute / Wyeth-Ayerst	9/2001-8/2003	$113,650
Development of Biological Literature Text Mining Software		
NIH 5G08LM009639-02	9/2007- 9/2010	$142,851
Construction of a Full Text Corpus for Biomedical Text Mining		
NIH 3G08LM009639-02S1	7/2009-9/2010	$66,015
Supplement (additional annotators) to corpus construction grant		
NIH 5R01GM083649-02	9/2007- 8/2011	$631,600
Ontologies and Biomedical Language Processing		
NIH 3T15LM009451-04S1	9/2010-8/2011	$199,259
Supplement (curriculum development) to training grant		
NIH HHS-N276201000033C	9/2010-8/2011	$377,982
Contract: Computational Thinking to Support Clinicians and Biomedical Scientists		

NIH 3T15LM009451-03S2 6/2010-6/2012 $37,179
Supplement (additional trainees) to training grant

NIH 5R01LM010120-02 7/2009-6/2012 $577,291
Automated Literature Mining for Validation of High-Throughput Function Prediction
(Transferred from Verspoor in 2011)

NSF DBI-0965616 7/2009-5/2014 $49,680
GOSTRUCT: Modeling the Structure of the Gene Ontology for Accurate Protein Function Prediction
(Transferred from Verspoor in 2011)

Prior Grants (Co-investigator)

DARPA W911NF-14-C-0109 (Burstein, PI) 1/2015 – 1/2016 $200,000
R3E: Reading, Reasoning, and Reporting
Role: Colorado Subcontract PI

NSF DBI - 0849977 (Burns, PI) 10/01/09 – 09/30/13
Text Mining Infrastructure for the Entire Biomedical Literature
(U. Colorado subcontract)

NIH 5R01 DE015191-02 (Richard Spritz, PI) 4/04-3/08
Gene Discovery for Craniofacial Disorders

NIH 5P50 CA058187-09 (Paul Bunn, PI) 9/92-4/08
SPORE Grant in Lung Cancer

Canine Health Foundation (Jamie Modiano, PI) 12/2005 – 11/2008
Spontaneous Canine Tumors as Models for Cancer Gene Discovery

NIH 5P01 HL68743 (Edward Abraham, PI) 9/2002-8/2007
Heterogeneous neutrophil responses in acute lung injury

NIH 1 R24 AA13162-01 (Boris Tabakoff, PI) 4/2001-3/2006
Gene Expression Array Technology Center for Alcohol Research

NIH 1M01 RR00051 (Robert Eckel, PI) 4/2002-3/2007
University of Colorado General Clinical Research Center.

NIH 5 P30 CA46934-15 (Paul Bunn, PI) 3/1988-1/2006
Cancer Center Support Grant.

NIH P01 HL67671-01 (Robert Mason, PI) 7/2001-6/2004
SCOR: Pathobiology of Fibrotic Lung Disease.

Cystic Fibrosis Foundation, (David Rodman, PI) 4/2001-3/2003
Effects of Psuedomonas aeruginosa on Inflammatory Gene Expression.

NIH 5R01HL072340-02 (Mark Geraci, PI) 10/2002-9/2005
Application of expression analysis to study disease pathogenesis

Philanthropic gifts received

Pfizer/Selventa, 2012: $125,000 Fund for computational bioscience research

Larry Gold, 2011-present: $5,000 each year to support scientific conference organizing effort

NEC America, 2011, $5,000 to support conference organizing

IBM, 2005-present: $10,000 each year to support scientific conference organizing

IBM, 2007: $24,000 UIMA Innovation Award

Hibernia, Inc., 2006: $500 Fund for computational bioscience recruiting

Oracle, 2005: CIT Innovation award (license, support & training for Oracle 10g, value $2500)

Hitatchi, 2005: CIT Innovation award (10TB RAID Array, value: $50,000)

IBM, 2003 (p690 Supercomputer with 64GB of RAM, value $990,000)

Bibliography

Peer Reviewed Publications

1. **Hunter, L**., Schank, RC. Encapsulation and Expectation: A response to Fodor's Modularity of Mind. *Behavioral and Brain Sciences*, 8(1): 29-30, 1985.
2. **Hunter, L**. Indexing and Recognition: Metaknowledge for Organizing Information. *Proceedings of AI/BioMed: The First International Conference on Artificial Intelligence and its Impacts in Biology and Medicine,* Montpellier, France, September 1986, p.93-5
3. **Hunter, L.** Steps Toward building a Dynamic Memory. *Proceedings of the Third International Workshop in Machine Learning*, Skytop, PA, June 1986, p.70-74, Morgan Kaufmann Associates, San Mateo, CA
4. Collins, G., **Hunter,** L., Schank, RC. Transcending Inductive Category Formation in Learning, *Behavioral and Brain Sciences*, 9(4):639-686, December 1986.
5. **Hunter, L.** and Silbert, J. Progress Report on IVY: A Learning System for Information Retrieval in Pathology, *Proceedings of the Artificial Intelligence and Medicine Workshop,* Seattle WA, 1987.
6. **Hunter, L.** Knowledge Acquisition Planning. *Third Knowledge Acquisition for Knowledge Based Systems Workshop*, Banff, Alberta, Canada, November, 1988 (Winner, best student paper prize)
7. **Hunter, L.** Artificial Neural Networks as Theories of Mind. *Proceedings of First Annual Conference of the International Neural Network Society*, Boston MA, September, 1988, IEEE Computer Society Press, Los Alamitos, CA.
8. **Hunter, L**. Explanation Based Discovery. *Proceedings of the AAAI Symposium on Explanation Based Learning*, Stanford, CA, March 1988, pp. 2-7.
9. **Hunter, L.,** Some Memory, but No Mind: A response to Smolensky's On the Proper Treatment of Connectionism. *Behavioral and Brain Sciences*, 11(1), March 1988
10. **Hunter, L**. Estimating Human Cognitive Capacities *Cognitive Science,* 12(2):257-261, April-June 1988

11. **Hunter, L.** Planning to Learn, *The Proceedings of The Twelfth Annual Conference of the Cognitive Science Society*, Boston, MA., July 1990, pp. 26-34, Lawrence Erlbaum Associates, Hillsdale, NJ.

12. **Hunter, L.** Knowledge Acquisition Planning for Inference from Large Datasets, *The Proceedings of The Twenty Third Annual Hawaii International Conference on System Sciences, Kona, HI. vol. 2, Software track*, pp. 35-44. IEEE Press, 1990.

13. **Hunter, L**. & Ram, A. The Use of Explicit Goals for Knowledge to Guide Inference and Learning, *Proceedings of the Eighth International Workshop on Machine Learning,* Chicago, IL, June 1991, pp. 265-269, Morgan Kaufmann, San Mateo, CA.

14. **Hunter, L**. Applying Bayesian Classification to Protein Structure, *Proceedings of the Seventh Conference on Artificial Intelligence Applications,* vol. 1. Los Alamitos, CA: IEEE Computer Society Press. Feb. 1991; 10-16.

15. **Hunter, L.** Artificial Intelligence and Molecular Biology, *AI Magazine* 11(5):27-36, 1991 Supplement.

16. **Hunter, L**. Bayesian Classification of Protein Structure Fragments, *The Proceedings of The Twenty Fourth Annual Hawaii International Conference on System Sciences; vol. 1.* Los Alamitos, CA: IEEE Computer Society Press. Jan. 1991; 595-604

17. **Hunter, L**., Harris, N. & States, DJ. Megaclassification: Discovering Motifs in Massive Datastreams, *Proceedings of the Tenth National Conference on Artificial Intelligence,* pp. 837-842, 1992, AAAI Press, Menlo Park, CA.

18. **Hunter, L.**, Harris, N. & States, DJ. Efficient Classification of Massive, Unsegmented Datastreams, *Proceedings of the Ninth International Workshop on Machine Learning* , pp. 224-233, 1992, Morgan Kaufmann Associates, San Mateo, CA.

19. **Hunter, L.** & States, DJ., Bayesian Classification of Protein Structure, *IEEE Expert,* 7(4):67-75, 1992.

20. **Hunter, L.** Knowledge Acquisition Planning: Using Multiple Sources of Knowledge to Answer Questions in Biomedicine, *Mathematical and Computer Modeling,* 16(6/7):79-91, 1992.

21. **Hunter, L.** & Ram, A., Goals for Learning and Understanding. *Journal of Applied Intelligence*. 2(1):47-73, 1992.

22. **Hunter, L.** AI and Grand Challenges in Biotechnology Computing, *Proceedings of the 13th International Joint Conference on Artificial Intelligence,* Morgan Kaufman, San Mateo, CA, Vol. 2, pp. 1677-1683, 1993.

23. Harris, N., **Hunter, L.** & States, DJ. ClassX: A Tool for Browsing Protein Sequence Megaclassifications, *Proceedings of the Twenty-Sixth Annual Hawaii International Conference on System Sciences,* vol. 1, Los Alamitos, CA: IEEE Computer Society Press, Jan 1993; pp 554-563.

24. **Hunter, L.** & Klein, T. Finding Relevant Biomolecular Features, in Hunter, et al., (eds). *Proceedings of the First International Conference on Intelligent*

Systems for Molecular Biology, AAAI Press, Menlo Park CA, 1993, pp. 190-197.

25. States, DJ, Harris, N., **Hunter, L**. Computationally Efficient Cluster Representation in Molecular Sequence Megaclassification, in Hunter, et al (eds). *Proceedings of the First International Conference on Intelligent Systems for Molecular Biology*, AAAI Press, Menlo Park CA, 1993, pp. 387-394.
26. Dowe, D., Allison, L., Dix, T., **Hunter, L.**, Wallace, CS., & Edgoose, T., Circular Clustering of Protein Dihedral Angles by Minimum Message Length, *Pacific Symposium on Biocomputing* (1):242-255. World Scientific Press, 1996.
27. **Hunter, L.** Coevolution Learning: Synergistic Evolution of Learning Agents and Problem Representations, *Proceedings of 1996 Multistrategy Learning Conference*, pp. 85-94, Menlo Park, CA: AAAI Press, 1996.
28. Abramson. M. Z. and **Hunter, L**.. Classification using Cultural Coevolution and Genetic Programmin. *Genetic Programming: Proc. of the First Anuual Conf.* 1996, pp. 249-254, MIT Press, 1996
29. Krichmar, JL, Olds, JL. & **Hunter, L.** Qualitative Neurobiology, *Proceedings of the 1997 Workshop on Qualitative Reasoning,* pp. 265-276,1997
30. Krichmar, JL, Ascoli, G.A., Olds, J.L. and **Hunter, L**. A model of cerebellar saccadic motor learning using qualitative reasoning, *Biological and Artificial Computation: From Neuroscience to Technology* 1240: 133-145 (1997)
31. Shah, I. & **Hunter, L**. Functional Classification of Enzymes by Sequence Alignment, *Intelligent Systems for Molecular Biology,* 5:276-83 , Menlo Park, CA: AAAI Press 1997
32. Zeeberg, B.R. & **Hunter, L**. A Hidden Markov Model Whose Alphabet Is Nucleic Acid Triplet Codons and its Use to Discover Chimerism in Protein Families, *Intelligent Systems for Molecular Biology* 5:153-156 , Menlo Park, CA: AAAI Press, 1997
33. Zeeberg, B.R. & **Hunter, L.** Characterization of a Family of Chimeric Proteins, the Amino Acyl tRNA Synthetases, by Determining Differential Codon Usage using One and Two State HMMs. *Mathematical Modeling and Scientific Computation,* 9(1):58-67, 1998.
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