

Wyatt Clark

Ph.D. Candidate

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Research Experience

2007–present **Research Assistant**, *Laboratory of Predrag Radivojac*.
School of Informatics and Computing, Indiana University

- *Protein function prediction*: Utilized multi-output neural networks and kernel methods to predict Gene Ontology function from sequence derived properties. This project not only resulted in a highly accurate tool for the prediction of functions, but new insights into Gene Ontology annotations and the development of a class of novel information content based metrics for predicted evaluation.
- *Testing the ortholog conjecture*: Evolutionary analysis of how speciation and gene duplication influence the rate of functional divergence between homologous sequences. Work from this project, for which I am co-first author, was published in *PLoS Computational Biology* and featured in *Nature Methods*.
- *Critical Assessment of Functional Annotation (CAFA)*: Was responsible for the selection of tested targets, the development and application of analysis techniques. A paper detailing the results of CAFA, whose writing I contributed to, was recently accepted at *Nature Methods*.
- *Classification of protein secondary structure*: Represented protein structures as backbone torsion angles as well as sequence derived characteristics. Sequences were encoded using a Vector Quantization based spectral kernel for the assignment of protein fold class.

Summer 2006 **Undergraduate Research Assistant**, *Laboratory of Michael Lynch*.
Department of Biology, Indiana University

- *D. pulex transposable elements*: Assisted Ph.D. Student Sarah Schaack in the annotation of transposable elements in the genome of *D. pulex*

2005–2007 **Undergraduate Research Assistant**, *Laboratory of Predrag Radivojac*.
School of Informatics and Computing, Indiana University

- *Detection of inauthentic text*: Originated a novel method using compression profiles to detect classes of inauthentic computer generated text. This project resulted in a published paper at the 2006 SIAM Conference on Data Mining.

Education

2013 **Ph.D. Informatics**, *Indiana University*, Bloomington, IN.
Track: Bioinformatics (Expected to graduate in March 2013)

2006 **B.S. Informatics**, *Indiana University*, Bloomington, IN.
Minors: Biology, Philosophy

Publications

P. Radivojac, **W.T. Clark**, T. Ronnen Oron, A.M. Schnoes, T. Wittkop, A. Sokolov, K. Graim, C. Funk, K. Verspoor, A. Ben-Hur, G. Pandey, J.M. Yunes, A.S. Talwalkar, S. Repo, M.L. Souza, D. Piovesan, R. Casadio, Z. Wang, J. Cheng, H. Fang, J. Gough, P. Koskinen, P. Törönen, J. Nokso-Koivisto, L. Holm, D. Cozzetto, D.W.A. Buchan, K. Bryson, D.T. Jones, B. Limaye, H. Inamdar, A. Datta, S.K. Manjari, R. Joshi, M. Chitale, D. Kihara, A.M. Lisewski, S. Erdin, E. Venner, O. Lichtarge, R. Rentzsch, H. Yang, A.E. Romero, P. Bhat, A. Paccanaro, T. Hamp, R. Kassner, S. Seemayer, E. Vicedo, C. Schaefer, D. Achten, F. Auer, A. Böhm, T. Braun, M. Hecht, M. Heron, P. Hönigsmid, T. Hopf, S. Kaufmann, M. Kiening, D. Krompass, C. Landerer, Y. Mahlich, M. Roos, J. Björne, T. Salakoski, A. Wong, H. Shatkay, M.N. Wass, M.J.E. Sternberg, N. Škunca, F. Supek, M. Bošnjak, P. Panov, S. Džeroski, T. Šmuc, Y.A.I. Kourmpetis, A.D.J. van Dijk, C.J.F. ter Braak, Y. Zhou, Q. Gong, X. Dong, W. Tian, M. Falda, P. Fontana, E. Lavezzo, B. Di Camillo, S. Toppo, L. Lan, N. Djuric, Y. Guo, S. Vucetic, A. Bairoch, M. Linial, P.C. Babbitt, S.E. Brenner, C. Orengo, B. Rost, S.D. Mooney, and I. Friedberg. A large-scale evaluation of computational protein function prediction. *Nature Methods*. (In Press).

N.L. Nehrt, **W.T. Clark***, P. Radivojac, and M.W. Hahn. Testing the ortholog conjecture with comparative functional genomic data from mammals. *PLoS Computational Biology*, 7(6):e1002073, 2011. (* Co-first author).

W.T. Clark and P. Radivojac. Analysis of protein function and its prediction from amino acid sequence. *Proteins: Structure, Function, and Bioinformatics*, 79(7):2086–2096, 2011.

Y. Zhao, **W.T. Clark**, M. Mort, D.N. Cooper, P. Radivojac, and S.D. Mooney. Prediction of functional regulatory snps in monogenic and complex disease. *Human Mutation*, 32(10):1183–1190, 2011.

M.M. Dalkilic, J.C. Costello, **W.T. Clark**, and P. Radivojac. From protein-disease associations to disease informatics. *Frontiers in Bioscience*, 13:3391–3407, 2008.

P. Radivojac, K. Peng, **W.T. Clark**, B.J. Peters, A. Mohan, S.M. Boyle, and S.D. Mooney. An integrated approach to inferring gene-disease associations in humans. *Proteins: Structure, Function, and Bioinformatics*, 72(3):1030–1037, 2008.

M.M. Dalkilic, **W.T. Clark**, J.C. Costello, and P. Radivojac. Using compression to identify classes of inauthentic texts. In *Proceedings of the 2006 SIAM Conference on Data Mining*, pages 604–608, April 2006.

Conference Presentations

W.T. Clark. *Information theoretic metrics for the evaluation of ontological annotations*. ISMB Automated Function Prediction SIG, July, 2012, Long Beach, CA.
(Journal article in preparation)

W.T. Clark. *Using data from additional pairs of organisms to test the ortholog conjecture*. Rocky Mountain Bioinformatics Conference, December, 2011, Snow Mass, CO.

W.T. Clark, P. Radivojac, M.W. Hahn. *Testing the ortholog conjecture with functional data from human and mouse*. Intelligent Systems for Molecular Biology and European Conference on Computational Biology, July, 2011, Vienna, Austria.

Extracurricular activities

IU Bioinformatics Club, Co-Founder.

The purpose of the club is to foster undergraduate and graduate awareness of bioinformatics, as well as bring together individuals with a shared interest in the field. The group organizes talks and facility tours which focus on the three main data-generating platforms in bioinformatics: high-throughput next generation sequencing, mass-spectrometry, and DNA microarrays.

IU Caving Club, Member.

The Indiana University Caving Club regularly organizes underground trips for novice and expert cavers. With an emphasis put on both recreation and conservation, member have taken an active role in the restoration of several defaced and littered caves in southern Indiana.

Academic Recognition and Awards

2012 **Research Fellowship**, Center for Bioinformatics Research, Indiana University.

2011 **Travel Fellowship**, *ISMB 2011*, Vienna Austria, National Institutes of Health.

2006 **Travel Fellowship**, *SDM 2006*, Bethesda Maryland, Lawrence Livermore National Laboratory.

Professional Membership

2009–present **International Society for Computational Biology (ISCB).**

Technical Skills

Programming **MATLAB, Perl, R, HTML, CGI, CSS.**

Machine Learning **Multi-output Neural Networks, Decision Trees, Random Forests, Hidden Markov Models, Support Vector Machines, Natural Language Processing.**

Thesis Committee

Haixu Tang, *Associate Professor*, School of Informatics and Computing, hatang@indiana.edu.

Michael Lynch, *Distinguished Professor*, Department of Biology, milynch@indiana.edu.

Matthew Hahn, *Associate Professor*, Department of Biology and School of Informatics and Computing, mwh@indiana.edu.

References

Predrag Radivojac, *Thesis Advisor*, Associate Professor, Indiana University School of Informatics and Computing.

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Matthew Hahn, *Thesis Committee and Research Collaborator*, Associate Professor, Indiana University Department of Biology and School of Informatics and Computing.

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Sean Mooney, *Research Collaborator*, Associate Professor and Director of Bioinformatics, The Buck Institute for Research on Aging.

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Iddo Friedberg, *Research Collaborator*, Assistant Professor, Miami University Ohio Departments of Microbiology and Computer Science and Software Engineering.

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