

## Byron C. Wallace

### The Institute for Clinical Research & Health Policy Studies (ICRHPS)

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### RESEARCH INTERESTS

My research is in machine learning with an emphasis on applications in health informatics. I'm particularly interested in using machine learning to mine, organize and filter clinical/biomedical texts, especially in the context of evidence-based medicine (EBM). There are too few experts to make sense of the torrents of published clinical data. I am interested in mitigating this problem by developing novel learning algorithms to induce models that semi-automate the clinical evidence synthesis process, thereby reducing workload. More broadly, I'm interested in core machine learning issues: e.g., structured and unstructured classification techniques; semi-supervised learning methods; learning with imbalanced data; and learning with alternative forms of supervision. I am also interested in computational methods for evidence-synthesis.

### EDUCATION

Ph.D. Candidate in Computer Science, Tufts University, 2009-2012 (*expected.*)

Advisor: Carla E. Brodley

Thesis Topic: *Interactive Machine Learning Protocols in Health Informatics*

M.S. in Computer Science, Tufts University, 2006-2008

Advisor: Carla E. Brodley

Thesis: *Using Machine Learning to Monitor Glucose Levels Non-Invasively*

B.S. in Computer Science, UMass, Amherst, 2002-2006

Minor in Philosophy

Cumulative GPA 3.7 (*Baystate Scholar*)

### PROFESSIONAL EXPERIENCE

**Research Computer Scientist**      ICRHPS,      Spring 2008-Present  
Boston, MA

Conducting cross-disciplinary research at the intersection of machine learning and health informatics under the joint supervision of Professor Carla Brodley and Professor Thomas Trikalinos. Responsibilities include: developing novel active learning methods for the task of biomedical citation screening; experimenting with new machine learning methods for mining biomedical data; developing and maintaining open-source software for clinical informatics.

**Research Assistant**      Tufts University      2007-2008  
Medford, MA

Conducted research under Professor Carla Brodley investigating machine learning methods for non-invasively monitoring glucose levels. Developed a novel framework for regression scenarios in which prediction errors made in one direction are more harmful than errors made in the other.

**Software Engineer**      IBM      Summer 2006  
Westford, MA

Worked in a collaborative team environment developing Portlet web-applications for Lotus Notes products. Gained invaluable experience working on large-scale, production software; contributed to the code-base within two weeks on the job.

**Research Assistant**      RIPPLEs lab, Dept. of CS at UMass      2000-2006  
Amherst, MA

Conducted research in the the Research in Presentation Production for Learning Electronically (RIPPLEs) lab under the guidance of Professors Rick Adrian and James Kurose. Investigated novel applications of software and technology to asynchronous virtual learning environments. Designed and developed jMANIC, a pure Java courseware system with a modular plug-in architecture.

## PUBLICATIONS

A preamble (especially for non-computer scientists): for historical reasons, conferences are the main venue of research dissemination in computer science. Conference proceedings comprise full-length articles and are peer-reviewed (usually by 2-3 reviewers); these proceedings tend to be more highly read than journals.

## PEER-REVIEWED CONFERENCE PUBLICATIONS

1. Byron C. Wallace. **Multiple Narrative Disentanglement: *Unraveling Infinite Jest***. In Proc. of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies (NAACL-HLT), *to appear*, 2012.
2. Byron C. Wallace, Kevin Small, Carla E. Brodley, Joseph Lau, and Thomas A. Trikalinos. **Deploying an Interactive Machine Learning System in an Evidence-Based Practice Center**. In Proc. of the ACM International Health Informatics Symposium (IHI), 2012.
3. Byron C. Wallace, Kevin Small, Carla E. Brodley and Thomas A. Trikalinos. **Class Imbalance, Redux**. In Proc. of the International Conference on Data Mining (ICDM), 2011.
4. Kevin Small, Byron C. Wallace, Carla E. Brodley and Thomas A. Trikalinos. **The Constrained Weight Space SVM: Learning with Labeled Features**. In Proc. of the International Conference on Machine Learning (ICML), 2011.
5. Byron C. Wallace, Kevin Small, Carla E. Brodley and Thomas A. Trikalinos. **Who Should Label What? Instance Allocation in Multiple Expert Active Learning**. In Proc. of the SIAM International Conference on Data Mining (SDM), 2011.
6. Byron C. Wallace, Kevin Small, Carla E. Brodley, Joseph Lau and Thomas A. Trikalinos. **Modeling Annotation Time to Reduce Workload in Comparative Effectiveness Reviews**. In Proc. of the ACM International Health Informatics Symposium (IHI), 2010.
7. Byron C. Wallace, Kevin Small, Carla E. Brodley and Thomas A. Trikalinos. **Active Learning for Biomedical Citation Screening**. In Proc. of the ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2010.

From another (undergraduate) lifetime..

8. Byron C. Wallace, Wayne P. Bursleson, Brian Donovan, James F. Kurose, Irene Ros and M. Zink. **Integrating CASA ERC Wireless Networking into Education**. In Proc. of the International Conference on Engineering Education (ICEE). 2006.
9. Byron C. Wallace, Rick Adrion, Wayne Bursleson, Wendy Cooper, James Cori and Ken Watts. **Using Multimedia to Support Research, Education and Outreach in an NSF Engineering Research Center**. In Proc. of Frontiers in Education (FIE). 2005.

## JOURNAL PUBLICATIONS

10. Carla E. Brodley, Umaa Rebbapragada, Kevin Small and Byron C. Wallace. **Challenges and Opportunities in Applied Machine Learning**. Artificial Intelligence Magazine, 33(1):11-24. 2012.
11. Byron C. Wallace, Kevin Small, Carla E. Brodley, Joseph Lau, Chistopher H. Schmid, Lars Bertram, Christina M. Lill, Josh T. Cohen, and Thomas A. Trikalinos. **Toward Modernizing the Systematic Review Pipeline in Genetics: Efficient Updating via Data Mining**. Genetics in Medicine, 2012.
12. Byron C. Wallace, Issa J. Dahabreh, Thomas A. Trikalinos, Joseph Lau, Paul Trow, Chistopher H. Schmid. **Closing the Gap Between Methodologists and End-Users: R as a Computational Back-end**. Journal of Statistical Software. *to appear*, 2012.

13. Ragnhild D. Whitaker, Steve Pember, Byron C. Wallace, Carla E. Brodley, and David R. Walt. **Single Cell Time Resolved Quorum Responses Reveal Dependence on Cell Density and Configuration.** *Journal of Biological Chemistry*, 286:21623-21632. 2011.
14. Byron C. Wallace, Thomas A. Trikalinos, Joseph Lau, Carla E. Brodley and Christopher H. Schmid. **Semi-automated Screening of Biomedical Citations for Systematic Reviews.** *BMC Bioinformatics*, 11(1):55+, 2010.
15. PJ Castaldi, MH Cho, M Cohn, F Langerman, S Moran, N Tarragona, H Moukhachen, R Venugopal, D Hasinija, E Kao, BC Wallace, CP Hersh, S Bagade, L Bertram, EK Silverman, TA Trikalinos. **The COPD Genetic Association Compendium: a Comprehensive Online Database of COPD Genetic Associations.** *Human Molecular Genetics*, 1;19(3):526-34. 2009.
16. Byron C. Wallace, Christopher H. Schmid, Joseph Lau and Thomas A. Trikalinos. **Meta-analyst: Software for Meta-analysis of Binary, Continuous and Diagnostic Data.** *BMC Medical Research Methodology*, 9(1):80+. 2009.

## WORKSHOPS & SYMPOSIA

Byron C. Wallace, Kevin Small, Carla E. Brodley, and Thomas A. Trikalinos. **Active Learning for Biomedical Citation Screening.** In *Northeast Student Colloquium on Artificial Intelligence (NESCAI)*, 2010.

## TEACHING EXPERIENCE

I was co-head instructor of CS150 AIH: **artificial intelligence in health informatics** alongside Dr. Kevin Small in the Computer Science department of Tufts University, fall 2011.  
<http://www.cs.tufts.edu/comp/150AIH/>

## PROFESSIONAL SERVICE

I have reviewed articles for:

- *Agency for Healthcare Research and Quality (AHRQ)*
- *Bioinformatics*†
- *BMC Medical Informatics and Decision Making*
- *BMC Research Notes*
- *Current Bioinformatics*
- *Conference of the North American Chapter of the Association for Computational Linguistics (NAACL)*†
- *HI-KDD: ACM SIGKDD Workshop on Health Informatics*
- *Research Synthesis Methods*
- *Empirical Methods in Natural Language Processing (EMNLP)* †

A † indicates that I was an external reviewer.

## AWARDS

Recipient of the 2012 **Outstanding Graduate Researcher at the Doctoral Level** award, Tufts University.

Recipient of the **Outstanding Student Award in the Area of Systems in Computer Science**, 2006 at UMass, Amherst.

Recipient of the 2005-2006 **Gerald F. Scanlon Student Employee of the Year** Award at UMass, Amherst for my work with the RIPPLEs lab.

Recipient of the 2005-2006 **Jonathon Edwards Philosophy Essay Prize**.