MATTHEW DOUGLAS HOFFMAN

Ph.D. Candidate, Princeton University

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RESEARCH INTERESTS:

Bayesian modeling and machine learning applications.
Signal processing and audio synthesis.
Content-based media information retrieval.

EDUCATION:

Ph.D., Computer Science, Princeton University, expected 2010.
M.A., Computer Science, Princeton University, September 2006.
B.A., Management-Engineering, Claremont McKenna College, December 2003.
B.S., Computer Science, School of Engineering and Applied Science, Columbia University, May 2003.
Thomas Jefferson High School Degree, Thomas Jefferson High School for Science and Technology, June 1999.

TEACHING EXPERIENCE:

Spring 2009: Adjunct Professor, New York University. E85.2607: Advanced Digital Signal Theory.
Spring 2007: Teaching Assistant, Princeton University. Computer Science/Music 325: Transforming Reality By Computer (Digital Signal Processing for Music).
Spring 2006: Teaching Assistant, Princeton University. Computer Science 226: Algorithms and Data Structures.
Fall 2005: Teaching Assistant, Princeton University. Computer Science 109: Computers in Our World.

WORK EXPERIENCE:

August, 2004-Present: Research Assistant, Princeton University Computer Science Department, Princeton, New Jersey.
Conducted research and wrote on the use of nonparametric Bayesian models for latent source discovery and separation, automatic content-based estimation of similarity for recorded music, automatic estimation of dissonance in recorded music, using perceptual modeling with Bayesian statistics and global optimization heuristics to control complex musical synthesizers, content-based search of large speech audio corpora, and improving the auditory display of medical data obtained in real time.

May-August, 2008: Intern, Google, New York, New York.
Sped up core Google web search retrieval by 3% by further improving highly optimized C++ code.

February-August, 2004: Programmer, Bear, Stearns and Company, Inc, New York, New York.
Developed interfaces, analytics, and tools in C++ for mortgage trading desk.

Summer, 2003: Intern, Crushing Music, New York, New York.
Assisted with day-to-day operations of advertising music production house.

Summers, 1998-2002: Intern at Cincinnati Bell Information Systems/Convergys (Reston, VA), Global InfoTek Inc. (Reston, VA), Decisive Analytics Corporation (Crystal City, VA).
Developed interfaces and implemented algorithms for various Java applications.

AWARDS:

Best student paper award, ISMIR 2009 (for "Easy as CBA: A Simple Probabilistic Model for Tagging Music"), Google best student paper award, New York Academy of Sciences Machine Learning Symposium 2009 (for "Finding Latent Sources in Recorded Music With a Shift-Invariant HDP")

PUBLICATIONS (most available online at *http://soundlab.cs.princeton.edu/publications*):

M. Hoffman, D. Blei, P. Cook, "Easy as CBA: A Simple Probabilistic Model for Tagging Music," in *Proceedings of the 10th International Conference on Music Information Retrieval (ISMIR)*, Kobe, 2009.
(Winner, Best Student Paper Award, ISMIR 2009)

M. Hoffman, D. Blei, P. Cook, "Finding Latent Sources in Recorded Music With a Shift-Invariant HDP," in *Proceedings of the 12th International Conference on Digital Audio Effects*, Como, 2009.
(Winner, Best Student Paper Award, New York Academy of Sciences Machine Learning Symposium 2009)

M. Hoffman, P. Cook, D. Blei, "Bayesian Spectral Matching: Turning Young MC into MC Hammer via MCMC Sampling," in *Proceedings of the 2009 International Computer Music Conference*, Montreal, 2009.

M. Hoffman, D. Blei, P. Cook, "Content-Based Musical Similarity Computation Using the Hierarchical Dirichlet Process," in *Proceedings of the 9th International Conference on Music Information Retrieval*, Philadelphia, 2008.

M. Hoffman, P. Cook, "Real-Time Dissonancizers: Two Dissonance-Augmenting Audio Effects," in *Proceedings of the 11th International Conference on Digital Audio Effects*, Espoo, 2008.

M. Hoffman, P. Cook, D. Blei, "Data-driven recomposition using the hierarchical Dirichlet process hidden Markov model," in *Proceedings of the 2008 International Computer Music Conference*, Belfast, 2008.

M. Hoffman, P. Cook, "The FeatSynth Framework for Feature-Based Synthesis: Design and Applications," in *Proceedings of the 2007 International Computer Music Conference*, Copenhagen, 2007.

M. Hoffman, P. Cook, "Real-time Feature-Based Synthesis for Live Musical Performance," in *Proceedings of the 2007 International Conference on New Interfaces for Musical Expression*, New York, 2007.

M. Hoffman and P. Cook, "Feature-Based Synthesis: Mapping from Acoustic and Perceptual Features to Synthesis Parameters," in *Proceedings of the International Computer Music Conference*, New Orleans, 2006.

Z. Wang, M. Hoffman, P. Cook, K. Li, "VFerret: Content-Based Similarity Tool for Continuous Archived Video," in *Proceedings of the 3rd ACM Workshop on Continuous Archival and Retrieval of Personal Experiences*, Santa Barbara, 2006.

M. Hoffman, P. Cook, "Feature-Based Synthesis: A Tool for Evaluating, Designing, and Interacting with Music-IR Systems," in *Proceedings of the 7th International Conference on Music Information Retrieval*, Victoria, 2006.

M. Hoffman, P. Cook, D. Vilkomerson, "Staining Doppler Audio," in *Proceedings of the IEEE International Ultrasonics Symposium*, Vancouver, 2006.

M. Hoffman, P. Cook, "Feature-Based Synthesis for Sonification and Psychoacoustic Research," in *Proceedings of the International Conference on Auditory Display*, London, 2006.