SUNY at Buffalo, Dept. Computer Science & Engineering   TEL: 716.645.3180 x154   WEB: www.cse.buffalo.edu/~mbeal
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MATTHEW J. BEAL

BA   MSCI   MA   PHD

ACADEMIC POSITIONS

Assistant Professor: University at Buffalo, The State University of New York (SUNY)   [Aug. 04 – present]
Department of Computer Science & Engineering

Adjunct Assistant Professor: Univeristy at Buffalo, SUNY   [Aug. 04 – present]
Department of Biostatistics

Full Member: Center of Excellence in Bioinformatics and Life Sciences, Buffalo, NY   [Aug. 04 – present]

Postdoctoral Research Fellow: University of Toronto   [July 03 – Aug. 04]
Machine Learning Group, Department of Computer Science
(advisor: Radford Neal, Statistics)

Doctor of Philosophy: University College London   [Sept. 98 – June 03]
Gatsby Computational Neuroscience Unit
(advisor: Zoubin Ghahramani, director: Geoffrey Hinton)

MSci in Natural Sciences, Part III Physics   [Sept. 94 – May 98]
BA MA in Natural Sciences, Experimental and Theoretical Physics
Downing College, University of Cambridge, UK. First class honours

A-Levels: Math, Further Math, Physics, Chemistry, Statistics (AS) all A's   [Sept. 92 – May 94]
GCSEs (General Certificate of Secondary Education) 14, all at grade A.   [Sept. 90 – May 92]
Eastbourne College, Old Wish Road, Sussex, UK

INDUSTRIAL AND RESEARCH EXPERIENCE

Microsoft Research, *Machine Learning and Applied Statistics group*, Redmond WA   [June – Oct. 01]
Advisor Dr. Hagai Attias, reporting to Dr. David Heckerman.
Designed and built Bayes Nets for multimedia fusion. Applied graphical model inference
algorithms and Bayesian learning to simultaneous fusion of audio and video data for optimal-
tracking tasks.

Microsoft Research, *Machine Learning and Perception group*, Cambridge, UK   [July – Sept. 00]
Advisor Dr. Ben Bradshaw, reporting to Prof. Chris Bishop.
Designed Bayesian hierarchical wavelet state-space models for video sequence compression.

Part III Physics Long Project, *Materials Sciences group*, University of Cambridge, UK   [Oct. 97 – May 98]
Gaussian Process models of the microstructural evolution of thermomechanically processed
Inconel-718 superalloys.

Unilever Research, *Colworth Laboratories*, Bedfordshire, UK   [June – Sept. 96,97,98]
Designed and implemented real-time models of microwave power delivery for dielectrically
diverse materials. Awarded bonus for important advances in the *Phase Control* project.

HONOURS & AWARDS ....

Distinguished Teacher Award, University at Buffalo, CSE dept.	[05]
Gatsby Foundation graduate full scholarship	[98 – 02]
Unilever Research bursarial award	[97]
Buchanan Scholar, Downing College, University of Cambridge	[95 – 96, 96 – 97]
Institute of Physics (IoP) award — highest marks in UK for A-Level Physics	[94]
Four perfect scripts in A-Level Math	[93,94]

PROFESSIONAL & SYNERGISTIC ACTIVITIES ....

Patent application: Designated Primary Inventor: "Speaker detection and tracking using audiovisual data".
Patent Application No. 20040001143. Proprietor: Microsoft Corporation.

New York State Center of Excellence in Bioinformatics and Life Sciences: Full member.

NIPS Workshop Organiser: Nonparametric Bayesian methods and Infinite models (2003), with Y. W. Teh.

Program Committee Member: International Conference on Machine Learning (ICML, 2004), Artificial Intelligence and Statistics (AISTATS, 2005), Uncertainty in Artificial Intelligence (UAI, 2005).

Vice-President of the Buffalo-Niagara Chapter of the American Statistical Association (ASA, 2005).

Peer Reviewing regularly for:
  Journals: IEEE Transactions on Biomedical Engineering (TBME),
      IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI),
      IEEE Transactions on Signal Processing,
      Neural Computation,
      Neural Networks,
      Journal of Machine Learning Research (JMLR)
      Bayesian Analysis
  Conferences: Advances in Neural Information Processing Systems (NIPS),
      International Conference on Machine Learning (ICML),
      Artificial Intelligence and Statistics (AISTATS),
      Uncertainty in Artificial Intelligence (UAI),
      Intelligent Systems for Molecular Biology (ISMB).

Society Memberships: Institute of Physics (IoP), International Society for Bayesian Analysis (ISBA), American Statistical Association (ASA).

PUBLICATIONS ....

PhD. Dissertation:

▷ Beal, M.J. (2003)
  Variational Algorithms for Approximate Bayesian Inference
  PhD. Thesis, Gatsby Computational Neuroscience Unit, University College London, UK, 2003.

Peer-Reviewed Publications:

▷ Teh, Y.W., Jordan, M.I., Beal, M.J. and Blei, D.M. (2004)
Hierarchical Dirichlet Processes
In *Advances in Neural Information Processing Systems 17*, MIT Press, 2005.

▷ Beal, M.J., Falciani F. L., Ghahramani Z., Rangel C. and Wild D. (2003)
A Bayesian Approach to Reconstructing Genetic Regulatory Networks with Hidden Factors
In *Bioinformatics*, Feb. 2005; 21: 349–356.

▷ Neal, R.M., Beal, M.J. and Roweis, S.T. (2003)
Inferring State Sequences for Non-linear Systems with Embedded Hidden Markov Models
In *Advances in Neural Information Processing Systems 16*:401–408, MIT Press, 2004.

▷ Beal, M.J. and Ghahramani, Z. (2002)
The Variational Bayesian EM Algorithm for Incomplete Data: with Application to Scoring Graphical Model Structures.
In *Bayesian Statistics* **7**:453–463, Oxford University Press, 2003.

▷ Beal, M.J., Jojic, N. and Attias H. (2003)
A Graphical Model for Audio-Visual Object Tracking
In IEEE *Transactions on Pattern Analysis and Machine Intelligence*, Vol. 25, No. 7:828–836, July 2003.

▷ Beal, M.J., Attias, H. and Jojic, N. (2002)
Audio-Video Sensor Fusion with Probabilistic Graphical Models
In *Lecture Notes in Computer Science: Computer Vision - ECCV*, January 2002, Vol. 2350:736–750, Springer, 2002.

▷ Beal, M.J., Jojic, N. and Attias, A. (2002)
A Self-Calibrating Algorithm for Speaker Tracking based on Audio-Visual Statistical Models
In *Proc. International Conf. Acoustics Speech and Signal Processing (ICASSP)*, Volume 2:1997–2000, 2002.

▷ Beal, M.J., Ghahramani, Z. and Rasmussen, C.E. (2002)
The Infinite Hidden Markov Model
In *Advances in Neural Information Processing Systems 14*:577–584, MIT Press, 2002.

▷ Ghahramani, Z. and Beal, M.J. (2001)
Propagation Algorithms for Variational Bayesian Learning
In *Advances in Neural Information Processing Systems 13*:507–513, MIT Press, 2001.

▷ Ghahramani, Z. and Beal, M.J. (2000)
Variational Inference for Bayesian Mixtures of Factor Analysers
In *Advances in Neural Information Processing Systems 12*:449–455, MIT Press, 2000.

Book chapters & Technical reports:

▷ Teh, Y.W., Jordan, M.I., Beal, M.J. and Blei, D.M. (2004)
Hierarchical Dirichlet Processes
Technical Report 653, Department of Statistics, University of California, Berkeley, 2004.

▷ Beal, M.J. and Ghahramani, Z. (2000,2)
The Variational Kalman Smoother
Technical Report GCNU TR 2001-003. Gatsby Computational Neuroscience Unit, University College, London.

▷ Ghahramani, Z. and Beal, M.J. (2000)
Graphical Models and Variational Methods
Book chapter in *Advanced Mean Field methods - Theory and Practice*, MIT Press, 2000.

Poster Presentations (for workshops with unpublished proceedings):

▷ Beal, M.J., Rangel C., Falciani F. L., Ghahramani Z. and Wild D. (2003)
Classical and Bayesian Approaches to Reconstructing Genetic Regulatory Networks
12th International Conference on Intelligent Systems for Molecular Biology (ISMB) July 31–August 4, 2004.

▷ Teh, Y.W., Jordan, M.I., Beal, M.J. and Blei, D.M. (2004)
Hierarchical Dirichlet Processes
Invitation-only *Snowbird Learning Workshop'04*, Utah.

▷ Attias, H. and Beal, M.J. (2004)
Tree of Latent Mixtures for Bayesian Modelling and Classification of High Dimensional Data
Invitation-only *Snowbird Learning Workshop'04*, Utah.

▷ Beal, M.J., Teh, Y.W. and Jordan, M.I. (2004)
Infinite hidden Markov model via the Hierarchical Dirichlet Process
Invitation-only *Snowbird Learning Workshop'04*, Utah.

▷ Attias, H. and Beal, M.J. (2002)
Learning intractable latent trees
Invitation-only *Snowbird Learning Workshop'02*, Utah.

▷ Beal, M.J., Ghahramani, Z. (2001)
Variational Inference for Bayesian Structure Learning
Workshop in Statistical Mixtures and Latent-Structure Modelling, March 28 - March 30, 2001, Edinburgh.

INVITED TALKS . . . .

Fourth Workshop on Bayesian Inference in Stochastic Processes, Varenna, Italy [June 05]
Efficient Sampling Strategies for the Hierarchical Dirichlet Process: with Application to the Infinite Hidden Markov Model and its Variants.

Applied Mathematics Dept., SUNY Buffalo [February 05]
Hierarchical Dirichlet Processes: Sharing data amonst groups.

Buffalo Center for Biomedical Computing, SUNY Buffalo [December 04]
Basic Concepts: Towards a wider understanding of Biology and Genomics,
    Biostatistics and Informatics, and the Computer Sciences.

American Statistical Association (ASA) Buffalo-Niagara Chapter, NY [September 04]

Toyota Technological Institute (TTI) Chicago, IL [April 04]

Google Labs, Mountain View, CA [April 04]

Snowbird'04 Learning Workshop, Utah [April 04]
Y.W. Teh, M.I. Jordan, M.J. Beal, D.M. Blei, "Hierarchical Dirichlet Processes".

CS & Engineering Department, SUNY Buffalo, NY [April 04]

Department of Statistics, UC Irvine, CA [March 04]
Variational Bayesian Model Selection.

Thomas J. Watson Research Center, IBM (Hawthorne), NY [March 04]
Variational Bayesian Scoring of Graphical Model Structures.

CS Dept. University of Toronto, Canada [February 04]
Guest lecture in Geoff Hinton's graduate course CSC2535: Computation in Neural Networks.

Neural Information Processing Systems Workshops, Whistler BC [December 03]
Nonparametric Bayesian Methods and Infinite Models (workshop organiser).

Bayesian Statistics 7, Tenerife [June 02]
Variational Bayesian Structure Learning (presented by Z. Ghahramani).

Machine Learning and Applied Statistics group (MLAS), Microsoft Research Redmond [May 02]
Graphical Models, Structure Learning, and Multimedia Fusion.

Computer and Information Sciences Dept., University of Pennsylvania [May 02]
Bayesian Learning of Model Structure Using Variational Methods.

Snowbird'02 Learning Workshop, Utah [April 02]
Learning Intractable Latent Trees (presented by H. Attias)

Institute for Adaptive and Neural Computation, Division of Informatics, Edinburgh University [March 02]
The Infinite Hidden Markov Model.

Centre for Automated Learning and Discovery (CALD), Carnegie Mellon University [February 02]
Speaker Tracking Using Audio-Visual Statistical Models.

Interface of Computer Science and Statistics Workshop, Haifa [December 01]
The Infinite Hidden Markov Model.

Neural Information Processing Systems Workshops, Breckenridge CO [December 01]
Multi-Sensory Perceptive Systems Workshop: Bayesian Combination of Audio and Video Modalities.

Statistical mixtures and latent-structure modelling workshop, Edinburgh [March 01]
Variational Inference for Bayesian Structure Learning.

Foundations of Statistical Inference, Jerusalem [December 00]
Variational Learning in Conjugate-Exponential Models - Variational State-Space Models.

Machine Learning & Perception group (MLAS), Microsoft Research Cambridge UK [September 00]
Unsupervised Learning of Environments.

Inference Group, Dept. Physics, University of Cambridge [August 00]
Variational Inference in the Conjugate-Exponential Family.

UNIVERSITY AT BUFFALO, SUNY: TEACHING AND SERVICE ....

Tenure-track **Member of the Graduate Faculty** of the University at Buffalo [November 04 – present]

Teaching: CSE 4/574, Introduction to Machine Learning [Fall 04]
      CSE   714, Advanced Topics in Machine Learning [Spring 05]
      Awarded Distinguished Teacher Award by CSE Graduate Student Association [February 05]

Service: CSE dept. Facilities Committee, Graduate Affairs Committee. [04 – 05]

PROGRAMMING SKILLS ....

Languages: expert in MATLAB, LATEX 2_ε, HTML, Fortran90, and familiar with Octave, C++, R, Perl.

Platforms/Operating systems: UNIX, MAC (OSX), and all MS-Windows (98,NT,2000,XP).

Software: expert in Microsoft Word, Excel, Access, Powerpoint, Frontpage, and Adobe Illustrator.