

Curriculum Vitae – Robin David Morris

Research Scientist, RIACS, NASA Ames Research Center

Personal Particulars

Name	Robin David MORRIS		
Address	NASA Ames Research Center, MS 269-2 Moffett Field, CA 94035 USA	Date of birth	15 December 1969
		Nationality	British
Telephone	+1 650 324 4712 (Home) +1 650 604 0158 (Office)	email	rdm@ptolemy.arc.nasa.gov
Fax	+1 650 604 3594	url	http://www-sigproc.eng.cam.ac.uk/~rdm

Teaching and Work Experience

Research

- March 1998 - present: **Research Institute for Advanced Computer Science, NASA Ames Research Center, Moffett Field, California.** (RIACS is a division of the Universities' Space Research Association), Staff Scientist Position. I am Technical Coordinator for an ongoing project in three-dimensional superresolution from multiple satellite images. Early results from this project have demonstrated the feasibility of performing three dimensional surface inference in a strongly Bayesian manner, treating the problem as the inference of a surface model from the data contained in multiple images of the surface [1,16]. Research is continuing to build a fully working system [14].
- January 1997 - March 1998: **United States National Research Council Research Associateship at the NASA Ames Research Center.** Research into improved image models and related computational methods. I have developed improved algorithms for simulating a wide class of higher-order Markov Random Fields [15].
- November 1995 - October 1996: **Postdoctoral position at INRIA, Sophia Antipolis.** Research into improved methods of satellite image segmentation. Motivated by the growing realisation that some commonly used models have serious flaws [19], I have studied a number of new Markov Random Field models, based on hierarchical structures [3] and larger neighbourhoods [5,9,10] to improve the segmentation quality. I have also researched associated parameter estimation problems [2,4,8,17,18].
- October 1994 - November 1995: **Junior Research Fellowship at Trinity College, Cambridge.** Continued research begun in my PhD into motion picture restoration [11,12], image modeling and Markov chain Monte Carlo methods [20].

Teaching

- 1991 - 1995 Tutorials for first and second year undergraduate students in the electrical circuits, linear systems, control, communications and probability courses.

Industry

- July 1990 - August 1990 : Salford Electrical Instruments Ltd. (a division of the General Electric Company). Investigated the cause of discontinuities in the frequency-temperature characteristics of quartz crystal oscillators (the 'band break' phenomenon). Developed modifications to the manufacturing process of the quartz crystals which eliminated this defect from production units.
 - July 1989 - August 1989 : Salford Electrical Instruments Ltd. I was responsible for automating the final production-line test procedure for automotive radio-frequency electronic units. This involved specifying hardware, programming, validation, operator training and documentation of a complete test system to ensure that customer quality assurance standards were met.
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Education

1991-1995 : Trinity College, Cambridge

PhD degree in the Engineering Department. Thesis title ‘Image Sequence Restoration via Gibbs Distributions’. I developed algorithms for the detection and removal of ‘dirt and sparkle’ [23,24] and ‘line scratches’ [21] from degraded motion-pictures and a new motion estimation method more suited to these problems [22]. These algorithms were based on Markov Random Field image models and the associated numerical techniques of Markov chain Monte Carlo. I also found application for the numerical techniques in the area of artificial neural networks [13].

1988-1991 : Trinity College, Cambridge

Bachelor of Arts with Honours, first class in the Electrical and Information Sciences Tripos.

Awards

1997 Awarded a Research Associateship by the United States National Research Council, a branch of the National Academy of Sciences, a fully-funded research grant, tenable in a US government laboratory.

1995 One year grant under the Human Capital and Mobility scheme of the Commission of the European Communities. Provides grants for young researchers to spend extended periods in other EC countries.

1994 Elected, for a period of four years, to a Junior Research Fellowship, Trinity College, Cambridge. This is a fully-funded postdoctoral position awarded on the basis of a competition between students of all disciplines.

1992 Cambridge University Engineering Department, Arthur Shercliff Traveling Scholarship

1991 Trinity College, Cambridge: Research Scholarship

1990 Trinity College, Cambridge: Senior Scholarship

1989 Trinity College, Cambridge: Junior Scholarship

Research Interests

Image Modeling; Bayesian Inference; Computer Vision; 3D Surface Reconstruction; Markov Random Fields; Markov Chain Monte Carlo; Motion Picture Restoration;

Research Publications

Technical Reports and Dissertations

1. R.D. Morris, P. Cheeseman, V.N. Smelyanskiy and D.A. Maluf “A Bayesian Approach to High Resolution 3D Surface Reconstruction from Multiple Images”, RIACS Technical Report 99.02, NASA Ames Research Center, May 1999
2. R. Morris, X. Descombes and J. Zerubia “Fully Bayesian Image Segmentation - an Engineering Perspective” Rapport de recherche No 3017, INRIA, Sophia Antipolis, October 1996
3. R. Morris, X. Descombes and J. Zerubia “An Analysis of Some Models Used in Image Segmentation” Rapport de recherche No 3016, INRIA, Sophia Antipolis, October 1996
4. X. Descombes, R. Morris, J. Zerubia and M. Berthod “Estimation of Markov Random Field Prior Parameters Using Markov Chain Monte Carlo Maximum Likelihood” Rapport de recherche No 3015, INRIA, Sophia Antipolis, October 1996

5. X. Descombes, R.D. Morris and J. Zerubia “Quelques ameliorations a la segmentation d’images bayesienne” Rapport de recherche No 2916, INRIA, Sophia Antipolis, June 1996
6. R.D. Morris “Image Sequence Restoration using Gibbs Distributions” A thesis submitted to the University of Cambridge for the degree of Doctor of Philosophy, May 1995
7. R.D. Morris “Image Sequence Restoration via Gibbs Distributions” A dissertation submitted to the Trinity College Research Fellowship Competition, August 1994

Refereed Journal Papers

8. X. Descombes, R. Morris, J. Zerubia and M. Berthod “Estimation of Markov Random Field Prior Parameters Using Markov Chain Monte Carlo Maximum Likelihood” *IEEE Transactions on Image Processing*, July 1999
9. X. Descombes, R.D. Morris and J. Zerubia “Quelques améliorations à la segmentation d’images bayésienne: Première partie: modélisation” *Traitement du Signal*, **14**, 1997
10. X. Descombes, R.D. Morris and J. Zerubia “Quelques améliorations à la segmentation d’images bayésienne: Seconde partie: classification” *Traitement du Signal*, **14**, 1997
11. A.C. Kokaram, R.D. Morris, W.J. Fitzgerald and P.J.W. Rayner. “Detection of Missing Data in Image Sequences”. *IEEE Transactions on Image Processing*, November 1995
12. A.C. Kokaram, R.D. Morris, W.J. Fitzgerald and P.J.W. Rayner. “Interpolation of Missing Data in Image Sequences”. *IEEE Transactions on Image Processing*, November 1995
13. R.D. Morris and A.D.M. Garvin. “Fast Probabilistic Self-structuring of Generalised Single Layer Networks”. *IEEE Transactions on Neural Networks*, July 1996

Conference Papers

14. V.N. Smelyanskiy, P. Cheeseman, D.A. Maluf and R.D. Morris “Bayesian Super-Resolved Surface Reconstruction from Images” To appear in *Proceedings of the International Conference on Computer Vision and Pattern Recognition*, Hilton Head Island, June 2000
15. R.D. Morris “Auxilliary Variables for Markov Random Fields with Higher Order Interactions” In *Proceedings of the International Workshop on Energy Minimization methods in Computer Vision and Pattern Recognition*, York, July 1999
16. R.D. Morris, P. Cheeseman, V.N. Smelyanskiy and D.A. Maluf “A Bayesian Approach to High Resolution 3D Surface Reconstruction from Multiple Images” In *Proceedings of the IEEE Signal Processing Workshop on Higher-Order Statistics*, Caesarea, June 1999
17. R.D. Morris, X. Descombes and J. Zerubia “Fully Bayesian image segmentation – an engineering perspective” In *Proceedings of IEEE International Conference on Image Processing*, Santa Barbara, October 1997
18. X. Descombes, R.D. Morris, J. Zerubia and M. Berthod “Maximum Likelihood estimation of Markovian prior parameters using Markov chain Monte Carlo” In *Proceedings of the International Workshop on Energy Minimization methods in Computer Vision and Pattern Recognition*, Venice, 1997
19. R.D. Morris, X. Descombes and J. Zerubia “The Ising/Potts model is not well suited to segmentation tasks”. In *Proceedings of IEEE Digital Signal Processing Workshop*, Loen, September 1996
20. R.D. Morris, W.J. Fitzgerald and A.C. Kokaram. “A sampling based approach to line scratch removal from motion picture frames”. In *Proceedings of IEEE International Conference on Image Processing*, Lausanne, September 1996
21. R.D. Morris and W.J. Fitzgerald “Detection and removal of line scratches from motion picture frames using reversible jump MCMC sampling”, a poster presented at the *Workshop on spatial statistics, image analysis and stochastic geometry*, Amsterdam, November 1995

22. R.D. Morris and W.J. Fitzgerald. "Discontinuous Motion and Occlusion Estimation - Theory and Application". In *Proceedings of the International Conference for Young Computer Scientists*, Beijing, July 1995
 23. R.D. Morris and W.J. Fitzgerald. "Stochastic and Deterministic Methods in Motion Picture Restoration". In *Proceedings of International Workshop on Image Processing*, Budapest, June 1994
 24. R.D. Morris and W.J. Fitzgerald. "Replacement Noise in Image Sequences, Detection and Interpolation by Motion Field Segmentation". In *Proceedings of International Conference on Acoustics, Speech and Signal Processing*, Adelaide, April 1994
 25. R.D. Morris and W.J. Fitzgerald. "Detection and Correction of Speckle Degradation in Image Sequences Using a 3D Markov Random Field". In *Proceedings of International Conference on Image Processing: Theory and Applications*, San Remo, June 1993
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Referees

- Dr. P. Cheeseman, NASA Ames Research Center, MS 269-2, Moffett Field, CA 94035-1000, USA
Tel +1 650 604 4946, Fax +1 604 3594, email cheesem@ptolemy.arc.nasa.gov
 - Dr. J. Zerubia, INRIA, 2004, route des Lucioles, BP93, 06902 Sophia Antipolis Cedex, France.
Tel +33 (0)4 93 65 78 57, Fax +33 (0)4 93 65 76 43, email zerubia@sophia.inria.fr
 - Dr. W.J. Fitzgerald, Lecturer, Department of Engineering, University of Cambridge, Trumpington Street, Cambridge CB2 1PZ, England
Tel +44 1223 33 2719, Fax +44 1223 33 2662, email wjf@eng.cam.ac.uk
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