

Ioana Ada Cosma

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EDUCATION

October 2005 - July 2009 **Doctor of Philosophy (DPhil)**
Department of Statistics, University of Oxford, UK
Title: *Dimension reduction of streaming data via random projections*
Supervisor: Dr. Peter Clifford

We develop probabilistic algorithms for efficiently estimating various characterizations over streaming data: cardinality, l_α distances and Shannon entropy. These algorithms combine techniques of statistical inference with algorithmic approaches such as data sketching and random projections to the stable distribution.

Sept. 2003 - June 2005 **Master's in Statistics**, Dean's Honour List
Dept. of Mathematics and Statistics, McGill University, Canada
Title: *Principle of detailed balance and simulated annealing*
Supervisor: Dr. Masoud Asgharian

We introduce a novel convergence assessment criterion for MCMC algorithms based on the principle of detailed balance. The criterion is a one-dimensional statistic, similar to Pearson's goodness-of-fit statistic. We apply this criterion to assess the convergence of two MCMC algorithms on simulated data: Metropolis-Hastings and slice sampling.

Sept. 1998 - June 2003 **B.Sc.** with first class honours in Pure Mathematics and
Minor in Philosophy, McGill University, Canada

PROFESSIONAL EXPERIENCE

Aug. 2009 - present **Postdoctoral Research Fellow/Associate**
Statistical Laboratory, University of Cambridge, UK

Current interests: data sketching with application to real-time analysis of seismic signals, classification and regression trees and random forests for predicting offender risk (interdisciplinary project with the Institute of Criminology, University of Cambridge), MCMC convergence and regenerative simulation, Bayesian variable selection in large p , small n problems, sequential Monte Carlo algorithms.

SCHOLARSHIPS and AWARDS

- 2010 **College Research Associate**, 3 years, Jesus College, Cambridge, UK
2008 **P.E.O. Scholar Award**, 1 year, P.E.O. International, USA
2007 **Jesus College Graduate Scholarship**, 1 year, Jesus College, Oxford
2006 **Overseas Research Student Award**, 2 years, University of Oxford
2005 **Teaching Assistant Bursary**, 3 years, Department of Statistics, University of Oxford
2001 **Undergraduate Student Research Award**, 2 years
Natural Sciences and Engineering Research Council of Canada
1998 **McConnell Entrance Scholarship**, 4 years, McGill University, Canada

PUBLICATIONS and WORKING PAPERS

Peter Clifford and Ioana A. Cosma (2012) *A statistical analysis of probabilistic counting algorithms*, Scandinavian Journal of Statistics, 39 (1), 1-14. (preprint on arXiv:0801.3552)

Masoud Asgharian, Ioana A. Cosma, and Vahid Partovi Nia (2011) *On convergence assessment in Bayesian clustering* (submitted to the Canadian Journal of Statistics)

Peter Clifford and Ioana A. Cosma (2010) *A simple sketching algorithm for entropy estimation* (in preparation, preprint on arXiv:0908.3961)

Peter Clifford and Ioana A. Cosma (2008) *Efficient l_α distance approximation for high dimensional data using α -stable projection*. In Proceedings in Computational Statistics (COMPSTAT2008), Porto, Portugal (contributed paper, available on arXiv:0801.3559)

SEMINARS and PRESENTATIONS

- 2012 Seminar, Dept. of Statistics, The Wharton School of the University of Pennsylvania, Feb.
Seminar, RAND Corporation, Feb.
Seminar, Department of Mathematical Sciences, University of Copenhagen, Jan.
Seminar, Department of Mathematical and Statistical Sciences, Univ. of Alberta, Jan.
Seminar, Department of Statistics and Actuarial Science, University of Waterloo, Jan.
Seminar, Department of Mathematics, Université du Québec à Montréal, Jan.
- 2011 Seminar, Signal Processing and Communications Laboratory, Department of Engineering, University of Cambridge, Nov.
Seminar, Department of Mathematics and Statistics, University of Ottawa, Oct.
Seminar, Department of Mathematics and Statistics, McGill University, Sept.
- 2010 9th Valencia International Meeting on Bayesian Statistics, and 2010 World meeting of the ISBA, Benidorm, Spain, June. (poster)
- 2009 Reading group, Statistical Laboratory, University of Cambridge, Nov.
Seminar, Department of Mathematics and Statistics, Lancaster University, Jan.

- 2008 COMPSTAT 2008 - International Conference on Computational Statistics, Porto, Portugal, Aug.
 Seminar, Computational and Biological Learning Lab, Department of Engineering, University of Cambridge, Feb.
 Seminar, Department of Statistics, University College London, Jan.
Contemporary Frontiers in High-Dimensional Statistical Data Analysis, Isaac Newton Institute, University of Cambridge, January. (poster)
- 2007 Machine Learning Summer School, Max Planck Institute, Tübingen, Germany, August.
 Graduate seminar, Department of Statistics, University of Oxford, February.
- 2006 *Recent Advances in Monte Carlo Based Inference*, Isaac Newton Institute, University of Cambridge, November. (poster)

RESEARCH SKILLS

Statistical software: R, WinBUGS.

Programming: C, C++ (with GSL, the GNU Scientific Library) and Python.

Platforms: Linux, Windows. Other: \LaTeX , HTML.

TEACHING EXPERIENCE

- 2011 - present **Lecturer**, Statistical Laboratory, University of Cambridge.
 courses: Applied statistics (fourth year undergraduate), Statistical modelling (third year undergraduate), Sequential Monte Carlo methods (graduate)

I was involved, to a large extent, in personally designing and writing these courses, and/or in setting assignments and exam questions. For example, the graduate course was a novel course that I designed and wrote from scratch.

- 2010 **Lecturer**, African Institute for Mathematical Sciences, Cape Town, South Africa. postgraduate course: Markov Chains and Monte Carlo methods

I lectured this course jointly with Dr. Ludger Evers from the University of Glasgow. We produced detailed lecture notes, set assignments and gave practical classes in R to complement the lectures.

- 2005 - 2009 **Teaching Assistant**, Department of Statistics, University of Oxford.
 undergraduate courses: Applied statistics (second year), Statistical inference (third year), and Further statistical inference (third year).

- 2007 - 2009 **College tutor**, Jesus College, Brasenose College, and Exeter College, Oxford.
 undergraduate courses: Moderations Statistics and Probability (first year), Part A Statistics and Probability (second year)

I gave weekly tutorials to groups of 2-3 students, and, in addition, I was interviewer for undergraduate admissions in mathematics at Jesus College.

2006 - 2008 **M.Sc. Supervisor**, Department of Statistics, University of Oxford.
(supervision of four students per academic year)

The supervision consisted of regular meetings to discuss progress, e.g., to assess performance on assignments and practical projects, and to answer questions on course material.

2004 **Teaching Assistant**, Department of Mathematics and Statistics, McGill University. undergraduate course: Introduction to statistics (first year).

SCIENTIFIC INVOLVEMENT

Co-organizer of the Cambridge Statistics Initiative Special One-Day Meeting, Isaac Newton Institute, University of Cambridge, 26 September 2011.

Organizer of the Oxford Statistics Discussion Group, Department of Statistics, University of Oxford, 2008-2009.

Organizer of the Math Help Desk, Department of Mathematics and Statistics, McGill University, 2004-2005.

Reviewer for *Statistics and Computing* (2011).

ADMINISTRATIVE INVOLVEMENT

Student representative on Departmental Committee, Department of Statistics, University of Oxford, 2008 - 2009.

Third and fourth year PhD student representative on Graduate Liaison Committee, Department of Statistics, University of Oxford, 2007 - 2009.

Treasurer of Jesus College Middle Common Room, Jesus College, Oxford, 2006 - 2007.

LANGUAGES

Romanian (native), English, French (fluent), Italian (intermediate), Spanish and German (beginner).

PROFESSIONAL MEMBERSHIP

Royal Statistical Society (RSS), American Statistical Association (ASA), International Society for Bayesian Analysis (ISBA).

REFERENCES

Available upon request from the following: Dr. Masoud Asgharian, Dr. Peter Clifford, Prof. A. P. Dawid, and Prof. Steffen Lauritzen.