THE ISBA BULLETIN

Vol. 17 No. 2 June 2010

The official bulletin of the International Society for Bayesian Analysis

A MESSAGE FROM THE PRESIDENT

Peter Müller
ISBA President, 2010
pm@odin.mdacc.tmc.edu

Thanks to everyone who helped to make the 10th ISBA World Meeting a great success! Particular thanks to our program council, Alex Schmidt (chair), Herbie Lee (program chair 2009) and Igor Prünster (program chair 2011) who worked hard to put together a great program. We very much appreciate the speakers for the three ISBA tutorials, Sonia Petrone, Ramses Mena and Lurdes Inoue – thanks! The tutorials were very well attended. Thanks to Sonia, Ramses and Lurdes for contributing with their expertise and effort to make the conference more accessible to everyone.

ISBA gave over 70 travel awards to support applicants from different locations in the world, e.g. Singapore, South Africa, Chile, Brazil, Spain, Portugal, UK, USA. These awards were possible because we received grants from SBSS/ASA, NSF, NIH, NCI, ONRG, Pilar Iglesias and ISBA Lifetime Members Junior Researcher Awards.

ISBA World Meeting 2012: Besides an outstanding scientific program the ISBA World Meeting also was an opportunity to carry out some ISBA business. The ISBA Board of Directors met on Saturday, June 5, to discuss pending business. The Executive Committee reported to the membership during the General Body meeting on Sunday, June 6. The perhaps most important agenda item was the selection of the venue for ISBA 2012. We were in the lucky situation of having three excellent proposals to choose from. The Board approved the following recommendation: The 11th ISBA World Meeting will be held in June 2012 in Kyoto, Japan. See you in 2012 in Kyoto! The 12th ISBA World Meeting will be held in June 2014 in Cancun, Mexico. Please start planning.

Prizes: This year's *Savage award* for an outstanding doctoral dissertations in Bayesian econometrics and statistics go to Emily Fox, Duke University (Applied Methodology) and James Scott, University of Texas, (Theory and Methods). Honorable mentions go to Matthew Taddy, University of Chicago (Applied Methodology) and Ryan Adams, University of Toronto (Theory and Methods).

In this issue

MESSAGE FROM THE PRESIDENT, *Continued from page 1. ...*

The *de Groot Prize* for a published book in statistical science was awareded to two books this year: *Decision Theory - Principles and Approaches*, by Giovanni Parmigiani and Lurdes Inoue; and *Gaussian Processes for Machine Learning* by Carl Edward Rasmussen and Christopher K. I. Williams.

The *Mitchell Prize* for an outstanding applied Bayesian paper goes to Ricardo Lemos and Bruno Sanso for their paper "A Spatio-Temporal Model for Mean, Anomaly and Trend Fields of North Atlantic Sea Surface Temperature (with discussion)", JASA, 2009.

We congratulate all prize winners to their achievements. Please see the ISBA homepage (*www.bayesian.org*) for more details.

Sections: ISBA has its first section! In early June the Board of Directors approved the *Section on Bayesian Nonparametrics*. The main activity of the new section will be the organization of the biennial workshop on Bayesian Nonparametrics. Please see the ISBA homepage (click "ISBA business", "sections") for details. A petition for a second section, on Objective Bayes, is currently under consideration by the Board. We welcome the new sections as a wonderful way to strengthen ISBA's presence and visibility in some of the most exciting Bayesian conferences.

Membership and Finance: One of the issues that we discussed in the ISBA Board Meeting was the continued development of ISBA membership. The mandate of the current ad-hoc membership committee is expiring by the end of 2010. We are looking for smart interested members who could contribute some creative ideas on how to expand our membership and how to make ISBA (even) more relevant to our current members. Anyone willing to chip in please get in touch with me! One member already volunteered – thanks! We are looking for some more. It should not be excessive work.

Money: We are doing fine. In the Board meeting we discussed the formation of an ad-hoc finance committee to advise the treasurer on alternative investment choices for our general funds and various prize endowments. Carlos Carvalho, University of Texas, has kindly agreed to be part of this commitee. We are looking for members who might enjoy to join Carlos in this ad-hoc committee. Again, this should be a minimal time commitment, involving only occasional advise to the treasurer.

I have to make an important *correction*. In the ISBA General Body meeting and the ISBA Board meeting I included in the financial report a payment from the organizers of the ISBA 2008 World Meeting in Australia. I falsely stated that this was in repayment of an earlier loan by ISBA. This was wrong. The money was a surplus from the 2008 meeting. Thanks to the organizers of the 2008 meeting. The money goes into the ISBA general fund and will be used to support future meetings.

Finally, one more very special announcement. The Board of Directors has confered a special Honorary Life Membership on *Dennis Lindley* in recognition of his pioneering leadership and foundational contributions to Bayesian statistics and decision sciences. Thanks Dennis! ▲

A MESSAGE FROM THE EDITOR

Manuel Mendoza
mendoza@itam.mx

As it happens every two years, last months have been particularly busy. Only a couple of weeks ago, the *Valencia International Meeting on Bayesian Statistics* and the *World Meeting of the International Society for Bayesian Analysis* were held in Spain. The joint conference was a complete success and the brief reports, by the Program Council (*ISBA Meeting*), and Prof. José M. Bernardo (*Valencia Meeting*) will provide you a good description of the intense activity we had there. Also, a number of important decisions were announced and here, several notes describe their implications. In addition, in this number, you will find most of the usual sections. In this occasion, I would like to call your attention to the Interview Section by Donatello Telesca. His conversation with Prof. Adrian Raftery is particularly interesting and enlightening. Again, I want to encourage all members of ISBA to contribute with their suggestions, manuscripts and announcements. Please do not hesitate to contact me or any member of the Editorial Board. ▲

BAYESIAN ANALYSIS - A MESSAGE FROM THE EDITOR

UPDATE FROM BA

Herbie Lee
Editor-in-Chief
herbie@ams.ucsc.edu

The June issue of Bayesian Analysis starts with a somewhat different article, a review by Christian Robert of the recent book, The Search for Certainty by Krzysztof Burdzy, and discussions from Larry Wasserman, Andrew Gelman, and Krzysztof Burdzy. This book and the discussions take a new direction in considering some of the fundamental mathematical and philosophical aspects of probability, and hence the underpinnings of Bayesian statistics. This issue also contains seven other fine articles ranging from foundational issues to computational methods to a variety of methodological innovations with applications in areas such as finance and microarrays.

Bayesian Analysis is accepting submissions through August 16 of papers presented at ISBA 2010 (as contributed talks or posters) for consideration for a special issue of Bayesian Analysis. Please submit through the regular process, but be sure to specify in your submission comments that your paper was presented at ISBA 2010. Papers will undergo the standard review process, and those which are accepted are eligible for consideration for the Lindley Prize.

▲

FROM THE PROGRAM COUNCIL

ISBA NEWS

Alexandra M. Schmidt, Herbie Lee & Igor Pruenster

Report on the ISBA 2010 World Meeting

The ISBA 2010 World Meeting was held in conjunction with the Ninth Valencia International Meeting on Bayesian Statistics from June 2 to June 8, 2010 in Benidorm, Spain. Following the tradition of the Bayesian meetings we had an exciting program. It started with three very nice tutorials given by

- Sonia Petrone (Bocconi University, Italy)
  Introduction to Bayesian inference
- Ramsés Mena (IIMAS-UNAM, Mexico)
  Some topics on Bayesian nonparametric mixture models
- Lurdes Inoue (University of Washington, USA)
  A quick tour of the principles and approaches of decision theory

Sonia, Ramsés and Lurdes, thank you! The pdf files of the tutorials are available from the website of the meeting at http://www.bayesian.org/events/isba2010/schedule.html.

The program comprised 36 contributed talks covering a wide range of subjects. There were more than 350 posters presented in five sessions, every evening from June 3rd through June 7th. The quality of the talks and posters were really outstanding. We would like to thank the scientific committee for all the reviews. A big thank to Cathy Chen (Taiwan), Andres Christen (Mexico), Simon Godsill (UK), Aparna Huzurbazar (USA), Herbie Lee (USA), Xiao-Li Meng (USA), Kerrie Mengersen (Australia), Peter Mueller (USA), Sonia Petrone (Italy), Gareth Roberts (UK), and Alexandra Schmidt (Brazil).

For the first time ISBA held a Student Video Competition. The challenge was for students to create a video describing their PhD research that would appeal to undergraduate students interested in a career in statistics. The eight finalists were shown on the beginning of each ISBA contributed talk session. These movies will be available from the homepage of the meeting http://www.bayesian.org/events/isba2010/index.html

There were two co-winners: Georgios Vlasakakis and Susanna Cramb, and three honorable mentions: Chris Drovandi, Marian Farah, and Silvia Liverani. They received travel grants to attend the meetings. We would like to take this opportunity and thank Kerrie Mengersen, Nicole White, and the judges, for their work in bringing this together.

This year ISBA and the Valencia Conference together supported over 70 travel awards for junior researchers. Some of the awards are mini-travel grants for young researchers from within Europe. We thank ASA/SBSS (American Statistical Association, Section for Bayesian Statistical Science) for the substantial financial support in the form of 10 travel awards for young investigators. In particular, SBSS supported the travel awards for two Savage Prize finalists. We thank NSF (National Science Foundation) for supporting 13 young US investigators. We thank NIH/NCI (National Institutes of Health/National Cancer Institute) for supporting 7 young US investigators who presented work related to cancer research. We thank ONR Global (Office of Naval Research) for supporting 10 young investigators who presented work related to ONR goals. Finally, two junior researchers were supported by the ISBA Lifetime Members Junior Researchers Award and two travel awards were supported by the Pilar Iglesias fund.

ISBA 2012 World Meeting

The Program Council received 3 excellent proposals from Mexico, Japan and India, to hold the ISBA 2012 World Meeting. We would like to thank Andrés Christen (Mexico), Hajime Wago and Yasuhiro Omori (Japan) and Satyanshu K. Upadhyay (India) for submitting their wonderful proposals. It is very important for ISBA that we receive such nice proposals to host the World Meetings.

It was very difficult for the Program Council to make a recommendation, and after extensive discussion we recommended that the ISBA World Meeting in 2012 should be held in Kyoto and the ISBA World Meeting in 2014 should be held in Cancun. Varanasi will hold a ISBA Regional Meeting in December 2012. The ISBA Board has approved these recommendations.

We would like to invite you to plan to attend the next ISBA World Meeting, to be held in Kyoto, in June of 2012. It is worth mentioning that in 2012 will be ISBA's 20th birthday, and we plan to have a special celebration for this special occasion. The organizing committee has already started preparing the program and we can mention at this point that there are some nice cultural activities already planned.▲

VALENCIA 9

9TH VALENCIA INTERNATIONAL MEETING ON BAYESIAN STATISTICS

by José Miguel Bernardo
jose.m.bernardo@uv.es

Sponsored by the University of Valencia (Spain) the first global meeting on Bayesian statistics was held in Las Fuentes, some kilometers north of Valencia, in June 1979. By today's standards, this was really an small workshop, with only 93 delegates, but this small number included almost all know specialists in the world.

The recognized success of that meeting suggested its periodic celebration. This started the series of the Valencia International Meetings on Bayesian Statistics which, together with its corresponding Proceedings (published since 1988 by Oxford University Press) became a necessary pointer for any researcher interested in Bayesian statistics.

The Valencia meetings appeared at a moment in time where Bayesian statisticians felt like an oppressed minority: in conventional conferences it was necessary to use half your allocated time to apologize for being a Bayesian, publication required tedious discussions with unsympathetic referees, official agencies would simply refuse to accept a Bayesian analysis. Thirty one years later, there are somewhere in the planet several international conferences each year on specific topics within Bayesian statistics, all relevant professional journals have or have had Bayesian Editors and/or Associated Editors, ISO norms begin to include Bayesian elements, and clinical trials are now routinely analysed from a Bayesian perspective. The use of the Bayesian methodology in applications have seen an exponential growth in all fields, and their authors do not even feel that it is necessary to have the adjective Bayesian in their titles. A learned society, the International Society for Bayesian Analysis (ISBA,www.bayesian.org) promotes and coordinates since 1992 the development and applications of Bayesian methods in the solution of theoretic and applied problems in the sciences, the industry and the government. Since Valencia 5 (1994), the Valencia meetings have been held jointly with the ISBA world meetings.

In view of all this, the promoters of the Valencia meetings decided four years ago that this long series has already fulfilled its historical rôle (its best known precedent the Berkeley Symposia only had six editions) and that Valencia 9 would be the last Valencia meeting.

The story of the first eight Valencia meetings may be read in the Valencia Story, published within the ISBA Bulletin (www.uv.es/bernardo/ValenciaStory.pdf). Valencia 9, the Ninth Valencia International Meeting on Bayesian Statistics, was held in Benidorm (Alicante) June 3rd–June 8th 2010. As all other Valencia meetings this was a seaside residential conference. In spite of the crisis, which seriously affected the usual funding mechanisms, the conference was attended by 530 delegates from 37 countries. About 40% of those were young statisticians who were in a Valencia meeting for the first time, which provides a a hint on the present potential of the Bayesian paradigm.

The invited Valencia 9 programme included 24

lectures, each followed by an invited discussion. The 2010 ISBA programme included 36 oral contributions, preceded by three postgraduate tutorials. The scientific programme was completed with 350 contributions presented in poster form in the hugely successful evening plenary sessions which, from Valencia 2, had constitutes an identity sign of the Valencia meetings.

The complete invited Valencia 9 programme is listed below and you are invited to visit the conference webpage www.uv.es/valenciameeting, from where the pdf which contains the abstracts of all presentations and the complete text of the invited talks may be downloaded.

- Bernardo, José M. (Universitat de València, Spain) Integrated objective Bayesian estimation and hypothesis testing.
  Discussant: Pericchi, Luis (Universidad de Puerto Rico, Rio Piedras, Puerto Rico)
- Carvalho, Carlos (University of Chicago and University of Texas at Austin, USA) Dynamic stock selection strategies: A structured factor model framework.
  Discussant: Mendoza, Manuel (ITAM, Mexico)
- Chopin, Nicolas (ENSAE, France) Free energy sequential Monte Carlo, application to mixture modelling.
  Discussant: Green, Peter (University of Bristol, UK)
- Consonni, Guido (Università di Pavia, Italy) On moment priors for Bayesian model choice with applications to directed acyclic graphs.
  Discussant: Smith, James Q. (University of Warwick, UK)
- Dunson, David (Duke University, USA) Nonparametric Bayes classification and testing on manifolds.
  Discussant: Griffin, James (University of Kent, UK)
- Frühwirth-Schnatter, Sylvia (Johannes Kepler Universät Linz, Austria) Bayesian variable selection for random intercept modeling of Gaussian and non-Gaussian data.
  Discussant: Brown, Philip (University of Kent, UK)
- Goldstein, Michael (University of Durham, UK) External Bayesian analysis for computer simulators.
  Discussant: Paulo, Rui (Universidade Técnica de Lisboa, Portugal)
- Huber, Mark (Claremont McKenna College, USA) Using TPA for Bayesian inference.
  Discussant: Roberts, Gareth (University of Warwick, UK)
- Ickstadt, Katja (Technische Universität Dortmund, Germany) Nonparametric Bayesian networks.
  Discussant: Jordan, Michael (University of California, Berkeley, USA)
- Lee, Herbie (University of California, Santa Cruz, USA) Optimization under unknown constraints.
  Discussant: Holmes, Christopher (University of Oxford, UK)
- Lopes, Hedibert (University of Chicago, USA) Particle learning for sequential Bayesian computation.
  Discussant: Pitt, Michael (University of Warwick, UK)
- Loredo, Tom (Cornell University, USA) Rotating stars and revolving planets: Bayesian exploration of the pulsating sky.
  Discussant: Müller, Peter (MD Anderson Cancer Center, Texas, USA)
- Louis, Tom (Johns Hopkins University, USA) Association tests that accommodate genotyping uncertainty.
  Discussant: Dukic, Vanja (University of Chicago, USA)
- Madigan, David (Columbia University, USA) Bayesian methods in pharmacovigilance.
  Discussant: DuMouchel, William (Phase Forward Inc., USA)
- McCallum, Andrew (University of Massachusetts, USA) Probabilistic programming with imperatively-defined factor graphs.
  Discussant: Ghahramani, Zoubin (University of Cambridge, UK)
- Meek, Christopher (Microsoft Research, USA) Improved approximate sum-product inference using multiplicative error bounds.
  Discussant: Mira, Antonietta (Università dell'Insubria, Italy)
- Meng, Xiao-Li (Harvard University, USA) What's the H in H-likelihood: A Holy Grail or an Achilles' Heel?
  Discussant: George, Edward (University of Pennsylvania, USA)
- Polson, Nicholas (University of Chicago, USA) Shrink globally, act locally: Sparse Bayesian regularization and prediction.
  Discussant: Clarke, Bertrand (University of Miami, USA)
- Richardson, Sylvia (Imperial College London, UK) Bayesian models for sparse regression analysis of high dimensional data.
  Discussant: Mallick, Bani (Texas A&M University, USA)
- Richardson, Thomas (University of Washington, USA) Transparent parametrizations of models for potential outcomes.
  Discussant: Fienberg, Stephen (Carnegie-Mellon University, USA)
- Schmidt, Alexandra (Universidade Federal do Rio de Janeiro, Brazil) Modelling multivariate counts varying continuously in space.
  Discussant: Boys, Richard (University of Newcastle, UK)
- Tebaldi, Claudia (Climate Central, USA, and University of British Columbia, Canada) Characterizing uncertainty of future climate change projections using hierarchical Bayesian models.
  Discussant: Ferreira, Marco (University of Missouri, USA)
- Vannucci, Marina (Rice University, USA) Bayesian models for variable selection that incorporate biological information.
  Discussant: Berzuini, Carlo (University of Cambridge, UK)
- Wilkinson, Darren (University of Newcastle, UK) Parameter inference for stochastic kinetic models of bacterial gene regulation: a Bayesian approach to systems biology.
  Discussant: Kou, Samuel (University of Harvard, USA)

From now on, world Bayesian conferences will be organize by ISBA every two years. The next venues will be Kyoto (Japan) in 2012 y Cancún (México) in 2014. It is an honour for me to pass the torch.▲

ISBA HONORARY LIFE MEMBERSHIPS

DENNIS VICTOR LINDLEY

by Mike West
mw@stat.duke.edu

In May 2010, the ISBA Board of Directors established the new membership category of Honorary Life Member. The Board resolved that "Honorary Life Membership is to be bestowed very rarely on individuals whose lifetime contributions to Bayesian analysis have substantially influenced the field in line with ISBA goals and mission."

It was announced at the ISBA 10 World Meeting in Spain that, by resolution of the Board of Directors, ISBA has conferred Honorary Life Membership of ISBA on Dennis V. Lindley in recognition of his pioneering leadership and foundational contributions to Bayesian statistics and decision sciences.

Lindley, currently retired and living in England, is a long-term ISBA member and now the first Honorary Life Member. As one of the real founders of modern Bayesian analysis and a current grandfather-figure in our field, Lindley stands among a small number of true innovators and leaders. His pioneering and sustained work to develop, promote and defend Bayesian thinking as the foundation of statistics and decision analysis was central to the (re-)emergence of Bayesian statistics in the mid-to-late 20th century, and influenced others who followed to help to define the modern Bayesian era.▲

A NEW ISBA SECTION

BAYESIAN NONPARAMETRICS SECTION

Stephen Walker
S.G.Walker@kent.ac.uk

The Bayesian Nonparametric community is now officially a section of ISBA. From conference origins in Belgirate, Italy, in 1997, to the next meeting in Veracruz, Mexico, in June 2011, the interest and diversity of attendees has only grown. Currently, interactions of BNP methodologies with other disciplines are continuously being discovered, yielding frontier applications. The impact of this is evident as BNP contributions play an important role in many areas, including Bioinformatics, Genomics, Finance and Economics, Machine Learning, Medicine, Population Genetics, Probability and Stochastic processes, to name just a few.

With meetings occuring roughly every two years, surviving unavoidable non–uniformity when an Isaac Newton Programme on Bayesian Nonparametrics was held in Cambridge, in 2007, the global gatherings include Reading 1999 (UK), Ann Arbor 2001 (USA), Rome 2004 (Italy), Jeju 2006 (South Korea), Cambridge 2007 (UK) and Turin 2009 (Italy).

The Isaac Newton meeting was a special event and one of the outcomes was a book edited by the organizers (Hjort, Holmes, Müeller and Walker) and including the tutorial talks given by leading exponents of Bayesian Nonparametic methodology and practice, including Ghosal, Dunson, Lijoi & Pruenster, and Teh. As it is, the book with the obvious title is available at all good book stores, real and electronic, for the maximum price of a bargain £35.

We hope to shortly develop a web page dedicated to Bayesian Nonparametrics; including news on events and members as well as other relevant matters. Preliminary information on the section, including bylaws, can be found at
http://www.bayesian.org/business/sections.html

So we are delighted to be a section of ISBA. Being separated from Bayesians by a few parameters; we should ponder the words of the universal icon, Buzz Lightyear, "Lets go to infinity and beyond, together". ▲

ANNOTATED BIBLIOGRAPHY

BAYESIAN MULTIPLE TESTING

James Scott
james.scott@mccombs.utexas.edu

The multiplicity problem in statistics can be stated very simply: how should we adjust our standard of impressiveness if we give a data set more than one crack at impressing us? Flip a coin ten times, and a run of ten heads is impressive. Flip that same coin 100,000 times, and a run of ten heads is nearly guaranteed. Somewhere between ten and 100,000 flips, there is room for doubt. How can that doubt be quantified?

This fundamental problem of "multiplicity adjustment"—in the sense of adjusting one's tolerance for surprise as the set of potentially surprising events grows large—arises in all manner of modern high-throughput experiments. These include microarrays, functional magnetic-resonance imagery, environmental sensor networks, combinatorial chemistry, proteomics, and many more besides. These experiments share a common inferential goal: to filter lower-dimensional signals from higher-dimensional noise. Discoveries, moreover, typically require subsequent validation, and too many Type-I errors will mean too many expensive wild-goose chases. Hence the case for a testing procedure that displays good frequentist properties is very compelling.

But so too is the case for a model-based Bayesian procedure. These experiments may involve thousands of separate tests, and such a large volume of data often allows the distributional properties of "signals" and "noise" to be characterized quite precisely. Ignoring this information means forfeiting discriminatory power.

Luckily, there exist conceptually simple, general-purpose Bayesian solutions to many kinds of multiplicity problems. These solutions usually involve nothing more than the appropriate choice of prior model probabilities, and need not come at the expense of inflated Type-I-error rates.

As a simple illustration of the these ideas, suppose we observe $y = (y_1, \ldots, y_N)$, where the y_i arise independently from normal densities $y_i \sim \mathrm{N}(\theta_i, \sigma^2)$. The y_i's, for example, may be the observed log-fold-change values from a microarray, with the θ_i's representing the mean differential expression levels for each of many thousands of genes. The multiple-testing problem is to assess whether each θ_i is zero or nonzero.

Most work on Bayesian multiplicity adjustment focuses on situations where Bayesian answers are both readily available and quite different from classical solutions. These are:

Multiple tests in exchangeable settings, as in the simple mixture model above. The primary goal is to flag which y_i are signals and which are noise, with the second goal often being to estimate the size of the signals. Motivating contexts include microarrays, fMRI scans, and quantitative-trait-loci mapping in genetics.

Multiple tests in linear models, where structural relationships between a response y and a basket of predictors $\{x_j\}_{j=1}^p$ are of primary interest.

Multiple associations of the kind that arise in fitting structured low-dimensional models to describe high-dimensional joint distributions—for example, Gaussian graphical models.

These three kinds of multiplicity arise in a wide variety of applied contexts, but are united by at least three features. The object of inferential interest is usually high-dimensional. Under an appropriate parametrization, this object is sparse, in the sense that some of its components are zero or essentially zero. Finally, the extent of this sparsity is unknown. A recognition of this third fact, along with a willingness to let the data itself characterize the prevailing rate of sparsity, is the core of the Bayesian approach to multiplicity adjustment.

To begin our bibliography we include two very useful reviews:

- Gopalan, R. and Berry, D. (1998), "Bayesian multiple comparisons using Dirichlet process priors," *Journal of the American Statistical Association*, 93, 1130–1139. These authors identify at least ten common kinds of multiplicity. Some of these—e.g. the use of several different test statistics on the same data—have no analogue in Bayesian inference. Others, such as interim analyses of sequentially collected data, are not a source of concern to Bayesians, for whom stopping rules are irrelevant. Still others are equally vexing to Bayesians and non-Bayesians, and seem to admit no general solution. For example, publication bias and analysis bias, which is the tendency of practitioners to analyze only those data sets that have already been flagged as interesting ahead of time, pose difficulties in all schools of statistical thought.

- Park, J. and Ghosh, J.K. (2010). "A Guided Random Walk Through Some High Dimensional Problems." *Sankhya*, 72A:1, 81–100.

History and background

In this section we describe a few classic references in detail.

- Jeffreys, H. (1961), *Theory of Probability*, Oxford University Press, 3rd edition.

Any understanding of multiple testing must begin simply with testing—and the classic statement on modern Bayesian testing is due to Harold Jeffreys in 1939 (this 1961 reference is a subsequent edition). Jeffreys imagined testing whether the mean θ in a normal sampling model was zero or nonzero, and wondered what sort of default prior $\pi(\theta)$ one should adopt for this mean under the assumption that it was nonzero.

Most immediately relevant for the multiple-testing problem is Jeffreys' recognition that testing often required the use of priors that are conventional in some sense, and that a well-behaved test boils down to the choice of a suitable conventional prior. This has come to be recognized as an important consideration in multiple-testing problems, where the sheer number of tests being done usually precludes, from a practical standpoint, both a full elicitation and a full study of posterior robustness to subjectively chosen priors. Jeffreys, moreover, clearly anticipated the modern understanding of multiplicity correc-

tion, which he called "correcting for selection." Relevant passages occur on pages 253 and 278.

- Waller, R. and Duncan, D. (1969), "A Bayes rule for the symmetric multiple comparison problem," *Journal of the American Statistical Association*, 64, 1484–1503, and

- Duncan, D. B. (1965), "A Bayesian Approach to Multiple Comparisons," *Technometrics*, 7, 171–222.

These two references are representative of a series of papers Duncan authored in the 1960's that introduced and refined Bayes rules for comparing individual responses in the usual one-way ANOVA setting. They address multiple comparisons, a second common form of multiplicity for which a quite different set of methodologies has evolved. The first explicitly model-based Bayesian approach to multiple comparisons seems to be that of Duncan; indeed, these seem to be the first systematic, model-based Bayesian treatments of any multiplicity problem. (Jeffreys' earlier approach, by contrast, was fairly ad hoc.)

The key innovations of these early papers were threefold: using hierarchical models for multiple comparisons; phrasing the issue in terms of a formal decision-theoretic framework as a way of adjudicating the debate over controlling "experiment-wise" versus "comparison-wise" error rates; and adapting to apparent heterogeneity (or lack thereof) in the data, since the procedure depended upon the F statistic. These broad themes were soon to be echoed in subsequent Bayesian developments on the multiple-testing problem.

These papers can be viewed as offering a loose Bayesian justification for controlling the comparison-wise error rate rather than the experiment-wise error rate, since the number of comparisons performed enters the decision rule only insofar as it affects estimates of parameters at the top level of a hierarchical model for a group of related parameters.

- Berry, D. (1988), "Multiple Comparisons, Multiple Tests, and Data Dredging: A Bayesian Perspective," in *Bayesian Statistics 3*, edited by J. Bernardo et. al. Oxford University Press.

Berry seems to be the first author to discuss the now-familiar "two-groups" model (where each mean is either nonzero with probability w, or zero with probability $1 - w$) as a possible Bayesian solution to the simultaneous-testing problem. He framed the discrete mixture model as a natural extension of empirical-Bayes methodology, and many subsequent authors have fleshed out these ideas.

Core Bayesian work on multiplicity

The following papers contain many of the technical details characterizing the behavior of the Bayesian two-groups model in multiple-testing scenarios. Many further references can be found therein.

- Scott, J. G. and Berger, J. O. (2006), "An exploration of aspects of Bayesian multiple testing," *Journal of Statistical Planning and Inference*, 136, 2144–2162.

- Bogdan, M., Ghosh, J. K., and Tokdar, S. T. (2008a), "A comparison of the Benjamini-Hochberg procedure with some Bayesian rules for multiple testing," in *Beyond Parametrics in Interdisciplinary Research: Festschrift in Honor of Professor Pranab K. Sen*, vol. 1, pp. 211–30, Institute of Mathematical Statistics.

- Do, K.A., Muller, P., and Tang, F. (2005), "A Bayesian mixture model for differential gene expression," *Journal of the Royal Statistical Society, Series C*, 54, 627–44. These authors provide an interesting variation on the Bayesian two-groups model, wherein the nonzero means are modeled nonparametrically using Dirichlet processes.

- A similar model to that of Do et. al. is studied by Dahl, D. B. and Newton, M. A. (2007), "Multiple Hypothesis Testing by Clustering Treatment Effects," *Journal of the American Statistical Association*, 102, 517–26. These authors observe that discriminatory power can be improved in multiple testing by clustering nonzero means.

- Scott, J.G. (2009), "Nonparametric Bayesian multiple testing for longitudinal performance stratification." *The Annals of Applied Statistics*, 3:4, pp. 1655–1674. This paper describes a framework for flexible multiple hypothesis testing of autoregressive time series and other functional data.

- Bogdan, M., Chakrabarti, A., and Ghosh, J. K. (2008), "Optimal rules for multiple testing and sparse multiple regression." This techical report available from the first author's website proves some important theoretical results regarding the asymptotic behavior of Bayesian multiple-testing rules.

Connections with classical methods

- Benjamini, Y. and Hochberg, Y. (1995). "Controlling the false discovery rate: a practical and powerful approach to multiple testing." *J. Roy. Statist. Soc. Ser. B*, 57, 289–300. This paper is not itself Bayesian, but many subsequent authors have described the relationship between Bayesian multiple testing and classical approaches that control the FDR. These include:
- Berry, D. and Hochberg, Y. (1999), "Bayesian perspectives on multiple comparisons," *Journal of Statistical Planning and Inference*, 82, 215–277.
- Muller, P., Parmigiani, G., and Rice, K. (2006), "FDR and Bayesian Multiple Comparisons Rules," in *Proceedings of the 8th Valencia World Meeting on Bayesian Statistics*, Oxford University Press.
- Efron, B. (2008), "Microarrays, Empirical Bayes and the two-groups model" (with discussion), *Statistical Science*, 1, 1–22.

The following two papers give Bayesian versions of traditional multiplicity penalties involving p-values, which differ from Bayesian approaches that make use of the now-dominant discrete-mixture approach.

- Westfall, P. H., Johnson, W. O., and Utts, J. M. (1997), "A Bayesian perspective on the Bonferroni adjustment," *Biometrika*, 84, 419–27. These authors give conditions under which Bonferroni-adjusted p-values can approximate a Bayesian analysis in one-sided multiple-testing problems.
- Meng, C. and Dempster, A. (1987), "A Bayesian approach to the multiplicity problem for significance testing with binomial data," *Biometrics*, 43, 301–11. These authors argue that *post-hoc* adjustment of p-values may not even be necessary under the assumption of exchangeability among the treatment means, with adjustment provided automatically by the resulting "Bayesian p-values."

While the focus here is on fully Bayesian versions of multiplicity adjustment, many of the same issues also come up in empirical-Bayes analysis:

- Johnstone, I. M. and Silverman, B. W. (2004), "Needles and Straw in Haystacks: Empirical-Bayes estimates of possibly sparse sequences," *The Annals of Statistics*, 32, 1594–1649.
- Scott, J.G. and Berger, J.O. (2010). "Bayes and empirical Bayes multiplicity adjustment in the variable selection problem." *The Annals of Statistics*, to appear, preprint available. This paper draws attention to subtle but important differences between full Bayes and empirical-Bayes multiplicity adjustment in the context of variable selection.▲

INTERVIEW

ADRIAN RAFTERY

by Donatello Telesca
donatello.telesca@gmail.com

Adrian E. Raftery is Blumstein-Jordan Professor of Statistics and Sociology, at the University of Washington in Seattle. He was born in Ireland, and obtained a doctorate in mathematical statistics in 1980 from the Universite Pierre et Marie Curie in Paris, France under the supervision of Paul Deheuvels. He was the founding Director of the Center for Statistics and Social Sciences (1999-2009). Raftery has published over 100 refereed articles in statistical, sociological and other journals. His research focuses on Bayesian model selection and Bayesian model averaging, model-based clustering, inference for deterministic sim-

ulation models, and the development of new statistical methods for sociology, demography, and the environmental and health sciences.

He is a member of the United States National Academy of Sciences, a Fellow of the American Academy of Arts and Sciences, a Fellow of the American Statistical Association, a Fellow of the Institute of Mathematical Statistics and an elected Member of the Sociological Research Association. He has won the Population Association of America's Clifford C. Clogg Award, the American Sociological Association's Paul F. Lazarsfeld Award for Distinguished Contribution to Knowledge, and the Jerome Sacks Award for Outstanding Cross-Disciplinary Research from the National Institute of Statistical Sciences. He is also a former Coordinating and Applications Editor of the Journal of the American Statistical Association and a former Editor of Sociological Methodology. He was identified as the world's most cited researcher in mathematics for the decade 1995-2005 by Thomson-ISI.

Twenty-one students have obtained Ph.D.'s working under Raftery's supervision. Of these, eleven now hold university faculty positions, and eight hold research positions in industry or the nonprofit sector.

I met Adrian as a student at the University of Washington and it was a pleasure to reconnect for this interview.

1. *First of all congratulations on your recent election to the National Academy of Sciences! Was it a nice surprise or was it something you knew was coming?*

   No, I really didn't expect it at all. I got the call just before 6am. Actually, my son was living in Belgium and had called me a few times too early in the morning, forgetting the time difference. So I was about to growl into the phone when the news was announced, changing my mood immediately!

2. *You are certainly one of the few statisticians I know who is active and can claim a professorship in a second discipline (I guess Fisher was also known as a geneticist, if you allow the comparison). What was your first love, Statistics or Sociology and which one do you like best? (I wont ask you about which colleagues you like best.*

   Actually, there are quite a few statisticians with faculty appointments in other disciplines as well as Statistics. For example, in my own department, Elena Erosheva with Social Work and Adrian Dobra with Nursing, at Chicago both Mary Sara McPeek and Matthew Stephens are Professors of Human Genetics as well as Statistics, while at Berkeley Ken Wachter is joint with Demography and Bin Yu with Electrical Engineering. This is natural because our discipline is so collaborative.But I am a statistician first, who got involved in sociology. I love being in both departments - it's enriching. Sociologists are different from statisticians, in perspectives, interests and personalities, and diversity is a spark to creativity. I have learned a lot of what I know about science from my sociologist colleagues.

3. *Your contributions in statistics span an impressive range of fields. To make matters more depressing for an assistant professor like myself, you seem to also impact substantive fields in a profound and often radical way. Recent examples are the practice of ensemble weather forecasting and methods used by the UN in HIV projections. How do you do it?*

   I've been lucky to have outstanding colleagues and graduate students to work with at the University of Washington Statistics department, as well as strong scientists in other departments at the UW (including Sociology). It's important to approach other fields with humility. As statisticians we can make real contributions to other fields, but we have to learn the basics of their disciplines and remember that our contributions are on the margins. It's a good idea to go to meetings of the fields one is working with, to get a feeling of what matters most to them.

4. *You had a prolific advising career. Among your students we can name people like: Samantha Bates, Michael Newton and our very own Raphael Gottardo (I am sure Manuel, our new editor, will forgive a little nostalgia). How important do you think is the role of advising in an academic career?*

   Working with graduate students is what I enjoy the most. I have had the good luck to advise many wonderful doctoral students, including the ones you mention. Many stu-

dents have started working with me as research assistants. I would ask them to help with some problem and over a series of meetings we would try to develop a solution. After a while, the student often points out that my own ideas weren't the best, and suggests a better approach. That's one of the most satisfying moments - I know then that the student is on his or her way.

5. *Do you know any good jokes about Bayesians and Frequentists? I have a feeling you might have some material here!*

   Well, not so many jokes. But I did come up with a song: http://www.biostat.umn.edu/~brad/songbook.pdf (page 42).

6. *What are you currently working on? Can we expect new revolutions in the way we think about the things we think about?*

   A lot of my current work is on probabilistic prediction in areas where prediction is often done deterministically: meteorology and demography. These are disciplines that rely on systems of deterministic differential equations, where statisticians hadn't been very involved. I'm trying to introduce more statistical ideas, combining them with the differential equations rather than replacing them. These are areas with great opportunities for statisticians - lots of low-hanging fruit.For example, the United Nations is planning to base its 2011 projections of the populations of all the world's countries on a Bayesian hierarchical model for fertility that Leontine Alkema and I developed. These projections are used throughout the United Nations system, by most governments, and by many researchers. This is the first time a statistical model (let alone a Bayesian one) will have been used for this purpose.

Thanks to Adrian, for his exquisite availability!▲

SOFTWARE HIGHLIGHT

BAYESIAN SPARSE VARIABLE SELECTION IN HIGH DIMENSIONAL DATA SETS

Leonardo Bottolo
Imperial College London, UK
l.bottolo@imperial.ac.uk

Marc Chadeau-Hyam
Imperial College London, UK
m.chadeau@imperial.ac.uk

&

Sylvia Richardson
Imperial College London, UK
sylvia.richardson@imperial.ac.uk

High-throughput technologies in biological sciences and the large quantity of data that have been produced have revolutionised the work of the statistician in the last couple of years. The dimensions and diversity of available genetic, genomics and other 'omics data sets pose new theoretical and computational problems. Moreover biological questions involving the combined analysis of two or more types of genomics data sets are arising. The Bayesian modelling paradigm is particularly well suited to address complex questions regarding structural links between different pieces of data, for building in hierarchical relationships based on substantive knowledge, for adopting prior specifications that translate expected sparsity of the underlying biology and for uncovering a range of alternative explanations.

Starting from the univariate case, we built a set of algorithms based on the linear regression model that progressively consider more complicated structures for the responses.

Single and multiple responses: ESS algorithm

Our software, Evolutionary Stochastic Search (ESS) (1), performs Bayesian variable selection for linear Gaussian regression models based upon Evolutionary Monte Carlo and it is de-

signed to work under the "large p, small n" paradigm, thus making fully Bayesian multivariate analysis feasible, for example, in genetics/genomics experiments. Multiple chains are run in parallel at different "temperatures" in order to flatten the posterior density with two distinct types of moves: (i) local moves aimed at updating the binary latent vector $\gamma = (\gamma_j, 1 \leq j \leq p)$ in every chain and (ii) global moves (crossover and exchange operators) that try to exchange part or the whole configuration of the binary latent vector for selected chains. Global moves are important because they allow the algorithm to escape from local modes, while a detailed exploration is left to the local moves. While global moves are computationally inexpensive, the local ones could be time costly (e.g. full Gibbs sampling over all the predictors is prohibitive). In ESS, a fast-scan Metropolis-within-Gibbs scheme for updating a set of binary latent indicators γ_j, $1 \leq j \leq p$ is proposed, which includes an additional probability step to choose the indices where to perform the Metropolis-with-Gibbs update based on current model size and temperature.

One of the advantages of the ESS algorithm is the possibility to deal with multiple outcomes (2) in an automatic way. In this set-up, the ESS algorithm detects the multivariate nature of the responses and switches to the suitable marginal likelihood. Apart from the hyperparameters of the multivariate error variance distribution, all the other hyperparameters remain the same as the single response case, and all them can be specified in a parameter file which is loaded along with the response(s) and covariates matrices.

The set-up of the ESS algorithm is highly customisable by the user. Apart from the *a priori* expected value and the variance of the number of predictors, it is possible to define: the number of chains and their initial distance in the geometric scale, the type of prior density for the beta coefficients (g-prior or independent prior), if an hyperprior on the regression coefficient is required and the parameters for the evolutionary part of the algorithm such as the proportion of local and global moves or the proportion between different types of global moves. Moreover it is possible to specify the number of sweeps before a complete time consuming Gibbs-type scan is performed and the number of sweeps that defines a "batch" where the acceptance rate of the Metropolis-with-Gibbs moves is monitored for the adaptation of the proposal standard deviation.

The C++ implementation of ESS is open source. Its natural object-oriented structure favours community-based alterations and improvements. For instance all the MCMC moves, are defined and parametrized in an object. It is easy to create a new move and include it in the existing code, making the most of the existing structures. The ESS–C++ algorithm is particularly memory efficient and can be run, even for very large data sets, on a desktop computer. However, when thousands of observations are collected, the calculation of the marginal likelihood, which relies on costing linear algebra operations (QR decomposition, matrices multiplication), becomes rate-limiting. To overcome this issue, CUDA (Compute Unified Device Architecture) parallel computing architecture, has been used.

ESS algorithm has been applied so far successfully in a genetics problem related to the Quantitative Trait Loci (QTL) mapping of gene expression profiles available from multiple tissues (2). Testing these on a set of 2,000 genes in four tissues, we demonstrated that our algorithm is able to detect signals that would have been missed otherwise by traditional approaches in revealing the true complexity of the QTL landscape at the systems-level. This is also confirmed in a simulation study that we carried out in order to investigate the power of our approach as compared with a generalised Lasso-type algorithm which also considers multiple regression and is specifically designed to borrow information across correlated responses.

ESS output is rich, comprehensive and highly customisable. By default it provides the posterior marginal probability of inclusion for each variable, and the list of models visited (along with the Bayes Factor) ranked according to their posterior probability together with the number of models evaluated before reaching it. Optional output helping in monitoring the convergence of the algorithm are also available: for instance, the trace of the logposterior probability for each chain, the temperature placement during the burn-in stage and the acceptance rate (and a detailed history) of each move.

Large number of responses: HESS algorithm

The second class of algorithms, Hierarchical Evolutionary Stochastic Search (3), HESS, considers the task of building efficient regression models for sparse multivariate analysis of high dimensional data sets. In particular it focuses on cases where the numbers q of responses $Y = (\mathrm{y}_k, 1 \leq k \leq q)$ and p of predictors $X = (\mathrm{x}_j, 1 \leq j \leq p)$ to analyse jointly are both large with respect to the sample size n. The analysis of such data sets arise commonly in genetical genomics, with X linked to the DNA characteristics and Y corresponding to measurements of fundamental biological processes such as transcription, protein or metabolite production.

In HESS, parallel regressions of y_k on the set of covariates X are linked in a hierarchical fashion, in particular through the prior model of the binary latent indicator γ_{kj}, which indicates among the covariates x_j those which are associated to the response y_k in each multivariate regression. However the generic framework of hierarchical related sparse regressions is built upon the Bayesian variable selection set-up for the linear model and the associated efficient MCMC algorithms described above (ESS). The core engine to perform variable selection, namely the marginal likelihood, is the same as ESS and it inherits the CUDA architecture.

To perform inference for these models in high dimensional set-ups, HESS proposes a novel adaptive MCMC algorithm: as sparsity is paramount and most of the associations expected to be zero, the algorithm progressively focuses on part of the responses, where the most interesting associations occur. Since at each sweep HESS performs parallel regressions on a subset of interesting y_k, scalability is the key point and distributed computing enables HESS to perform this task in an efficient way with considerable gains in terms of computational time.

The input of the algorithm is similar to the one described for ESS with some extra options for the different ways the parallel regressions are linked in an hierarchical fashion through $\omega_{kj} = \Pr(\gamma_{kj} = 1)$. Some other options refer to the adaptive selection of the relevant responses: apart from the possibility of disabling this feature altogether (with equal probability assigned to each y_k), the proportion of the responses where to perform variable selection at each sweep can be specified. Finally, if the adaptive selection is chosen, the speed of adaptation can be tuned, allowing enough flexibility to the user with respect to the type and size of the data set to be analysed.

The output of HESS can be divided into two categories: one, local, is similar to ESS providing posterior inference (marginal probability of inclusion and best model visited) about each single response y_k, while the second, global, provide evidence of "hot spots" e.g. predictors that are associated with many responses. Finally the Maximum a Posteriori (MAP) configuration of associations is provided, showing the overall best model encountered during the MCMC exploration.

Source code availability

The beta version of ESS algorithm, written in C++ and partly optimised for CUDA architecture, in available upon request writing to `m.chadeau@imperial.ac.uk`, while the beta version of second algorithm HESS party written in Matlab code and in C++ are available upon request from `l.bottolo@imperial.ac.uk`.

References

[1] Bottolo, L. and Richardson, S. (2009). Evolutionary Stochastic Search for Bayesian model exploration. http://arxiv.org/abs/1002.2706

[2] Petretto, E., Bottolo, L., Langley, S.R., Heinig, M., McDermott-Roe, C., Sarwar, R., Pravenec, M., Hübner, N., Aitman, T.J., Cook, S.A. and Richardson, S. (2010). New insights into the genetic control of gene expression using a Bayesian multi-tissue approach. *PLoS Comput Biol.*, 6:e1000737

[3] Richardson, S., Bottolo, L. and Rosenthal, J.S. (2010). Bayesian models for sparse regression analysis of high dimensional data. In *Bayesian Statistics 9: Proc. Ninth Int. Meeting*. (J. M. Bernardo, M. J. Bayarri, J. O. Berger, A. P. Dawid, D. Heckerman, A. F. M. Smith and M. West, eds), Oxford University Press.▲

STUDENTS' CORNER

Luke Bornn
l.bornn@stat.ubc.ca

This Students' Corner features the dissertation abstracts of INRA MIG, Université Paris Dauphine, and CREST-LS graduate Aude Grelaud and MIT graduate Emily Fox. If you are newly graduated and would like to publish your thesis abstract, don't hesitate to contact me.

Dissertation Abstracts

LIKELIHOOD FREE METHODS APPLIED TO DETECT THE EFFECTS OF DARWINIAN SELECTION AND TO PREDICT PROTEINS 3D STRUCTURE

by Aude Grelaud
agrelaud@stat.rutgers.edu
Department of Statistics and Biostatistics, Rutgers University
PhD Supervisors: Christian P. Robert / François Rodolphe

Recent methods based on rejection algorithms have been developed to perform Bayesian inference without evaluating the likelihood. This thesis presents two applications of these techniques to problems of genomics for which computing the likelihood is an issue.

We first evaluate the effects of the darwinian selection on a gene. The aim is to estimate some parameters of a model of sequence evolution, the remaining ones being considered as nuisance parameters. We propose a simulation procedure to generate datasets easily under this model; using likelihood free inference is thus of particular interest. Our estimation procedure relies on the ABC-SMC algorithm.

We then propose a method aimed at predicting the 3D structure of a protein. In statistical terms, it is a model choice problem among a set of Gibbs random fields. Each model has its own neighbourhood structure, corresponding to a candidate 3D structure. We propose a general likelihood free procedure dedicated to model choice and show that its application to Gibbs random fields is of particular interest, as a sufficient statistic is available.

BAYESIAN NONPARAMETRIC LEARNING OF COMPLEX DYNAMICAL PHENOMENA

by Emily Fox
fox@stat.duke.edu
Department of Statistical Science, Duke University
PhD Supervisor: Alan Willsky

Markov switching processes, such as hidden Markov models (HMMs) and switching linear dynamical systems (SLDSs), are often used to describe rich classes of dynamical phenomena. They describe complex temporal behavior via repeated returns to a set of simpler models: imagine, for example, a person alternating between walking, running and jumping behaviors, or a stock index switching between regimes of high and low volatility.

Traditional modeling approaches for Markov switching processes typically assume a fixed, pre-specified number of dynamical models. Here, in contrast, we develop Bayesian nonparametric approaches that define priors on an unbounded number of potential Markov models. Using stochastic processes including the beta and Dirichlet process, we develop methods that allow the data to define the complexity of inferred classes of models, while permitting efficient computational algorithms for inference. The new methodology also has generalizations for modeling and discovery of dynamic structure shared by multiple related time series.

Interleaved throughout the thesis are results from studies of the NIST speaker diarization database, stochastic volatility of a stock index, the dances of honeybees, and human motion capture videos.▲

NEWS FROM THE WORLD

CALL FOR ANNOUNCEMENTS

Sebastien Haneuse
haneuse.s@ghc.org

I would like to encourage those who have any announcements or would like to draw attention to an up-coming conference, to get in touch with me and I would be happy to place them here.

Meetings and conferences

CBMS Regional Conference - Bayesian Nonparametric Statistical Methods: Theory and Applications, Santa Cruz, CA. 16-20th August, 2010.

Bayesian nonparametric (BNP) methods combine the advantages of Bayesian modeling (e.g., ability to incorporate prior information, full and exact inference, ready extensions to hierarchical settings) with the appeal of nonparametric inference. In particular, they provide data-driven, albeit model-based, inference and, importantly, more reliable predictions than parametric models.

Theoretical research on BNP methods and their applications has grown dramatically in the last fifteen years. This has produced a massive body of scattered literature, which can be daunting for newcomers and hard to follow even for specialists. This CBMS conference, to be held between August 16th and August 20th, 2010, aims at providing a comprehensive introduction to the field for new researchers, and in particular graduate students postdocs and junior researchers.

Additional information can be found at http://www.ams.ucsc.edu/CBMS-NPBayes.

66th Annual Deming Conference on Applied Statistics, Atlantic City, NJ. 5-10th December, 2010.

The purpose of the three-day conference is to provide a learning experience on recent developments in statistical methodologies in twelve three-hour tutorials. Attendees receive bound proceedings of the presentations. The conference is followed by two parallel short courses on (1) Bayesian Adaptive Clinical Trials by Prof. Brad Carlin, University of Minnesota and Scott Berry, Berry Consultants; and (2) SAS for Mixed Models by Profs. Ramon Littell, University of Florida and Walter Stroup, University of Nebraska. The conference makes the books on which the conference is based available for sale at about a 40% discount.

The full program and online registration will available soon on www.demingconference.com.

Adapski III: Advances in Monte Carlo, Park City, UT, 3-4th January, 2011.

Following an enthustiastic reponse to the earlier editions of the workshop in 2005 and 2008, this workshop is intended to provide an updated snapshot of the methodological and theoretical advances in Monte Carlo methods with an emphasis on adaptive Monte Carlo methods in the broad sense (adaptive MCMC, adaptive population Monte Carlo, and various breeds of adaptive importance sampling amongst others), that is algorithms that attempt to automatically optimise their performance to a given task.

The workshop will consist of 4 half-day sessions on 3rd and 4th January and one or two poster sessions and will be held at The Canyons. There will be breaks on both afternoons in order to allow both informal discussions and relaxation (skiing!).

Additional information can be found at http://www.maths.bris.ac.uk/%7Emaxca/adapskIII/

MCMCSki III: Markov Chain Monte Carlo in Theory and Practice, Snowbird, UT, 5-7th January, 2011.

A central theme of the conference will be Markov chain Monte Carlo (MCMC) and related methods and applications in the 21 years since the publication of Gelfand and Smith (1990, JASA), the paper that introduced these methods to mainstream statisticians. The conference will also feature three plenary speakers (Nicky Best, Mike Newton, and Jeff Rosenthal) and six invited sessions from internationally known experts covering a broad array of current and developing statistical practice. As with the first joint IMS-ISBA meeting in Isla Verde, Puerto Rico,and the second and third joint meeting in Bormio, Italy,

nightly poster sessions will offer substantial opportunity for informal learning and interaction.

Additional information can be found at
http://madison.byu.edu/mcmski/

Short courses and workshops

2010 Summer Program on Semiparametric Bayesian Inference: Applications in Pharmacokinetics and Pharmacodynamics, Research Triangle Park, North Carolina. 12-23rd July, 2010.

The purpose of this program is to bring together a mix of experts in pharmacokinetics (PK) and pharmacodynamics (PD) modeling, nonparametric Bayesian inference, and computation. The aims of the program and workshop are (i) to identify the critical new developments of inference methods for PK and PD data; (ii) to determine open challenges; and (iii) to establish inference for PK and PD as an important motivating application area of non-parametric Bayes.

The program will begin with a week of tutorials and workshop activities. There will be extended, tutorial-style talks during morning sessions, and contributed and invited research talks during the afternoons. Afternoon talks will be selected to complement topics covered in the morning sessions. At the end of the first week workshop research working groups will be formed. The working groups will tackle particular research problems in the area. Working group activities can include workshop-style presentations by group members to stimulate discussion on specific issues

A detailed description of activities, along with application information is available at http://www.samsi.info/programs/2010bayes-summer-program.shtml.

8th Workshop on Bayesian Nonparametrics, Veracruz, Mexico. 26-30 June, 2011.

The workshop aims at presenting the latest developments on Bayesian nonparametric statistics, covering a wide range of theoretical, methodological and applied areas. The workshop will feature tutorials on hot topics, invited and contributed talks and poster sessions.

Scientific committee: David B. Dunson, Subhashis Ghosal, Jim Griffin, Nils L. Hjort, Michael I. Jordan, Yongdai Kim, Antonio Lijoi, Ramses H. Mena, Peter Müller, Luis E. Nieto, Igor Pruenster, Fernando A. Quintana, Yee W. Teh and Stephen G. Walker.▲