THE ISBA BULLETIN

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A MESSAGE FROM THE PRESIDENT

- Steve MacEachern -
ISBA President, 2016
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"Bayesians are a contentious lot." – source unknown (to me)

It was with great delight that my brother read this quote to me, or something much like it, a few years ago. He had found it in a book written for the popular press about the rise of quantitative reasoning and its impact on the world. According to him, the chapter went on to detail some of the controversies surrounding Bayesian methods and told a few quirky anecdotes.

The quote is wonderful, as it captures the essence of work on the foundations of Statistics–the source of much controversy between Bayesians the non-Bayesians–and highlights the community's unwavering commitment to a sound axiomatic development of our field. The willingness Bayesians to speak about the mathematical underpinnings of inference has indeed produced controversy, but the controversy has generated paths forward, as witnessed by the extraordinary developments of the past few decades. There is scarcely a scientific or corporate community which has not been impacted by Bayesian methods. Interest in Bayes is at an all-time high. In my experience, the interest in Bayesian methods is too-often accompanied by either a naïve view of what our methods are, or views that are flat-out wrong. A sampling of views that I have heard is that "Bayes is merely another tool", describing Bayes as a mere technique and conveying the sense that there is nothing to set Bayesian methods apart from, say a multivariate analysis or a time-series analysis; that "Bayes = shrinkage", and quickly sliding to the position that any method that can be vaguely described as producing shrinkage inherits all of Bayes' benefits; and that "Bayes is magic", and from this, the suggestion that every Bayesian analysis, no matter how preposterous, is a good analysis. Misunderstandings such as these generate an important part of ISBA's future agenda: the need for the society to have a greater impact on education about Bayesian methods. The initiative that Alexandra Schmidt, the society's Past President, has called for is a must-do for us as a society. She continues her tireless work in support of ISBA and this initiative in particular. Stay tuned for more on "contentiousness" and some commentary on refereeing in the next President's column.

ISBA World Meeting: The ISBA World Meeting is soon coming to Sardinia. The conference runs from June 13–17, 2016, with more information available at http://www.corsiecongressi.com/isba2016/. (Continued p. 2)

In this issue

There was enormous demand for the conference, with record-breaking numbers of submissions of sessions, talks, and posters. Kudos to the members of the Program Committee, led by Michele Guindani, for their hard work in assembling the program. While it is too late to find a spot on the program for the conference, it is never too late to attend.

This meeting will feature two special, inaugural lectures. Persi Diaconis will present the de Finetti lecture. Those of you familiar with the Joint Statistical Meetings, held annually in North America, know of the longstanding tradition of the Fisher Lecture where a leading Statistician is invited to speak about their work. Connections to R.A. Fisher's remarkable body of work are always a highlight of the lecture, and the perspective conveyed in the lecture is often as interesting as the technical work. The de Finetti Lecture is a chance for Bayesians to establish a similar tradition, connecting more current work to timeless work from the Bayesian past. We will, no doubt, hear of the intellectual coherence of Bayesian statistics in the lecture. James Scott will present the Susie Bayarri Lecture. This lecture is dedicated to the memory of Susie and her many contributions to the Bayesian community. In addition to her contributions to research and her long-standing involvement with the Valencia meetings and ISBA, her strong support of junior colleagues is recognized by this lecture. The lecture is to be delivered by a young member of ISBA. Further events surround the World Meeting. June 12 is dedicated to an extensive set of short courses, to be held at the University of Caligari, close to (but not at) the conference venue. The courses span much of Bayesian statistics. Knowing most of the speakers, I can assure you that they will be lively. For details, see the conference web site.

The University of Pavia will host a conference in honor of Eugenio Regazzini on June 10 and 11. The conference celebrates Professor Regazzini's remarkable contributions to Statistics in its broadest sense and will highlight the remarkable impact he has had on the Bayesian community in Italy. Details on the conference are available at http://www-dimat.unipv.it/eugenioconference/. For more on the World Meeting and surrounding events, see the sections in this bulletin from the Program Council and on the Named Lectures.

Truly a World Society: I write from Korea, where there is a small, but active Bayesian community. My travels here have been delightful, and in a few days, I will have the chance to participate in the Bayesian Section of the Korean Statistical Society's meeting. There is also a growing community in China as well as Japan which hosted the World Meeting in Kyoto in 2012. These communities augur well for the forthcoming ISBA Chapter devoted to East Asia, and we all look forward to great growth in this region in the near future. ISBA committees have traditionally had a strong and diverse membership that reflects the society. Interestingly, the most recent Presidents, past and future, span four continents: Europe (Sonia Petrone), South America (Alexandra Schmidt), North America (me), and Australia or Oceania (Kerrie Mengersen). A scan of the various Section and Chapter officers shows that we truly span the globe. Wherever you may be, I hope that you will participate fully in ISBA. I hope to see you all in Sardinia.

A MESSAGE FROM THE EDITOR

- Beatrix Jones -
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As this is my first issue as editor of the bulletin, allow me to introduce myself. After a childhood in Michigan and undergraduate education at Johns Hopkins in Baltimore, I obtained my PhD in Statistics from the University of Washington in Seattle. After short stints at Penn State and Duke, I immigrated to New Zealand and took up a position at the Auckland campus of Massey University. I was the Associate Editor for the Annotated Bibliography section of the Bulletin 2007-2011, and am a current associate editor for the Australian and New Zealand Journal of Statistics. Living so far from my roots I appreciate the ability of publications like the ISBA Bulletin to keep us in touch and on the same page as ISBA members, even when we are on different continents. My hope is to continue to publish all the information you need, but also to include some features in each issue that are intriguing and pleasurable to read.

To this end, I have brought on a team of Associate Editors. Xinyi Xu from Ohio State will be looking after News of the World; Anton Westveld from the Australian National University will be inviting and editing the Software highlight: this

issue he has arranged for Peter Hoff to write about the AMEN R package for looking at social network data. Shinichiro Shirota from Duke University will supervise the student's corner; he will continue the theme of 'student voices,' this quarter with a contribution from Olanrewaju Akande, a Nigerian statistician now studying at Duke. After years of dedicated service in the Student's corner, Isadora Antoniano has moved on to organising interviews with some of our most interesting members. The first is not quite ready, but is something to look forward to in June.

In addition to the regular sections and announcements, this issue contains three conference reports. If you need any help getting excited about the upcoming meeting in Sardinia, have a look at these for a vicarious experience of how enjoyable and intellectually stimulating getting together with other ISBA members can be.

Finally, I would like to thank the past editor Feng Liang and our past president Alexandra Schmidt who have been very helpful in setting up the new editorial team and producing this issue. As always, you are welcome to participate in the Bulletin by emailing suggestions/contributions to me or to any member of the Editorial Board.

NAMED LECTURES

THE BRUNO DE FINETTI LECTURE - THE ISBA EXECUTIVE BOARD -

On the occasion of the 30th anniversary of his death, ISBA has decided to honor the revolutionary role of Bruno de Finetti (1906–1985) in Probability, Statistics and in interdisciplinary areas, by including a Bruno de Finetti Lecture at the ISBA 2016 World Meeting that will be held in Sardinia, Italy, from June 13th to June 17th, 2016. See the June 2015 issue of the ISBA Bulletin for an early announcement of the event.

We are now very proud to announce that the Bruno de Finetti Lecture will be one of the highlighted events also at future ISBA World Meetings. Indeed, an endowment fund of more than 30,000 USD has been collected by now and, according to the ISBA bylaws, the proposed lecture is established as a permanent ISBA Named Lecture.
We would like to express our deep gratitude to the generous donors who have crucially contributed to the success of the initiative, namely: Department of Decision Sciences, Bocconi University; Department of Economics and Management and Department of Mathematics "Felice Casorati", University of Pavia; ESOMAS Department, University of Torino; DEAMS Department "Bruno de Finetti", University of Trieste; Collegio Carlo Alberto, Moncalieri; Fondazione "Franca e Diego de Castro", Torino. Those who still wish to contribute to the de Finetti Lecture fund, may do so through the dedicated website.

The first de Finetti Lecture will be delivered at the ISBA 2016 World Meeting by Persi Diaconis (Stanford University).

THE SUSIE BAYARRI LECTURE

ISBA is honoring the late Susie Bayarri for her work for Bayesian Statistics, ISBA, and particularly her support of junior researchers, with the Susie Bayarri Lecture at ISBA 2016. This is to be given by an outstanding young researcher under 35 years old. The 2016 lecture will be given by James Scott, Associate Professor in the McCombs Business school at the University of Texas, Austin (USA). A PhD graduate of Duke University, he is a Savage award winner and recipient of a CAREER award from the US National Science Foundation. His methodological work includes Bayesian computation via data-augmentation, multiple testing, and Bayesian machine learning, with applications in fields ranging from neuroscience to astronomy.

ISBA hopes to make the Bayarri Lecture a permanent fixture of ISBA meetings; donations toward the required endowment can be made at https://bayesian.org/civicrm/contribute/transact?reset=1&id=33.

FROM THE PROGRAM COUNCIL

- CHRIS HANS -
CHAIR OF THE PROGRAM COUNCIL
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ISBA 2016 World Meeting: Final preparations are under way for the ISBA 2016 World Meeting! The meeting will be held at the Forte Village Resort Convention Center in Sardinia, Italy, from June 13th to June 17th, 2016. Preliminary program information is now available at the conference web site, http://www.isba2016.org, which also contains useful information about travel to Cagliari, as well as up-to-date deadlines regarding local accommodation and registration.

As reported in the last Bulletin, the response to the call for poster presentations at the World Meeting was substantial; in the end, over 350 abstracts were received. In order to accommodate as many of the posters as possible, a fourth poster session was added to the program, to be held after the ISBA Fellow Ceremony on Monday evening. The evening plenary poster sessions at the World Meetings are generally considered to be highlights of the conferences, and, based on the submitted abstracts, this year's sessions will no doubt live up to the reputation.

ISBA Junior Travel Support: As announced in the previous issue of the Bulletin, ISBA has secured sponsorships from Google, Stata and RStudio to support the travel of PhD students and early-career researchers to attend the conference. We are also pleased to announce that the U.S. Office of Naval Research Global (ONR Global) has recently awarded a grant that will support junior researcher travel to the conference. The Program Council would like to acknowledge and thank Scientific Committee member David Rossell for his work writing and submitting the funded proposal. Based on funding from these sources, ISBA is currently planning to support travel for over 100 junior researchers. This travel support for junior researchers is separate from the six travel awards (ISBA Lifetime Members Junior Researchers Awards, ISBA New Researchers Travel Awards, and the Pilar Iglesias Travel Award) that were announced in the last issue of the Bulletin.

Short Courses: Short courses will be held at Palazzo Baffi, at University of Cagliari (note, that this is **not** the meeting venue) on **Sunday, June 12th, 2016**. The following courses will be offered:

Full Day courses:

1. *Nonparametric Bayesian inference and machine learning*, by **Peter Orbanz**, Columbia University and **Tamara Broderick**, MIT.
2. *Computational methods in Bayesian statistics* by **Abel Rodriguez**, University of California Santa Cruz.

Morning courses (9:00-12:00):

3. *Big Data*, by **David Dunson**, Duke University.
4. *Recent advances in Bayesian adaptive clinical trial design* by **Brian Hobbs**, UT M.D. Anderson Cancer Center.
5. *Introduction to STAN* by Sebastian Weber, Novartis, Basel.

Afternoon courses (14:00-17:00)

6. *Time series Modeling*, by **Sylvia Fruwirth-Schnatter**, W.U. Vienna.
7. *Bayesian Demography*, by **Adrian Raftery**, University of Washington.
8. *Introduction to JAGS and NIMBLE*, by **Chris Paciorek**, University of California Berkeley.
9. *Teaching Bayes – the essential parts*, by **Rebecca Steorts** and Abbas Zaidi, Duke University.

We thank the instructors for agreeing to teach those courses. We expect the courses to fill quickly and will accept participants by order of enrollment. Capacity is limited by the class room sizes. There will be buses to the Forte Village to transfer participants to the conference venue for ISBA 2016 at the end of the afternoon courses.

Registration and fees: Fees are intended only to cover the costs of organizing the courses. The fees are all-day and include the lunch organized at the University facility. You will be required to select the courses of interest (1 full day course, or up to 2 half-day courses) at the time of registration:

- Registered participants to the ISBA World Meeting: 50 euro

- Students, Faculty and other personnel of the University of Cagliari: Free
- Others: contact the Organizing Secretary for details (isba2016@corsiecongressi.com)

Registrations to the Short Courses are available at http://www.corsiecongressi.com/isba2016/corso.asp. Registration is open until May 31.

ISBA Co-sponorships: 2016 marks the beginning of **new procedures for requesting ISBA co-sponsorship of conferences, meetings (including the Sections' meetings) and other events**.

All requests for co-sponsorships need to be received by May 30th of each year for conferences organized at any date between January 1st and December 31st of the following year. Please, note that **this holds true also for Section and Chapter meetings!**

The full policy was published in the March 2015 edition of the Bulletin, and it is now available online at https://bayesian.org/meetings/planning.

The policy includes also precise rules for the use of the funds, which should be used only for junior travel support. In addition, the funds may be used to establish one or a maximum of two ISBA New Researcher Travel Awards, which are awarded on a competitive basis to junior researchers. A junior researcher is a graduate student in a current degree program or someone who has received a PhD or equivalent in the last 5 years. The full description of the new types of travel grants is available at http://bayesian.org/awards/StudentTravelAward.

ISBA Events in 2016: We would like to highlight several recent or upcoming meetings that have been endorsed or sponsored by ISBA:

- Sixth IMS-ISBA Joint International Meeting BayesComp at MCMSki V, January 5-7, 2016, Lenzerheide, Switzerland, section Meeting. The BayesComp Section of ISBA provided funds for 29 travel support grants to support students with a PhD earned in 2012 and later. See the report in this issue of the Bulletin on this unique and stimulating conference.
- 13th Edition of the Brazilian Meeting on Bayesian Statistics (EBEB) http://www.redeabe.org.br/ebeb2016, February 22-24, 2016, Belo Horizonte, Brazil, co-sponsored and chapter meeting. See the report in this issue of the Bulletin on this exciting conference.
- ENVR/EnviBayes Workshop on Bayesian Environmetrics http://community.amstat.org/envr/events/bayesenvr, March 31-April 2, 2016, Columbus, OH, USA, chapter meeting.
- NSF-CBMS 2016 Regional Conference: Topological Data Analysis https://stat.utexas.edu/training/cbms-2016, May 31-June 4, 2016, Austin, TX, USA, endorsed meeting.
- Advances in Statistics, Probability and Mathematical Physics http://www-dimat.unipv.it/eugenioconference, Conference in Honour of Eugenio Regazzini, June 10-11, 2016, Pavia, Italy, endorsed meeting.
- The 13th World Meeting of ISBA (ISBA 2016) http://www.corsiecongressi.com/isba2016, June 13-June 17, 2016. Short Courses on June 12th, 2016.
- The Third Bayesian Young Statisticians Meeting, BAYSM2016 http://web.mi.imati.cnr.it/conferences/BAYSM2016, June 19-21, 2016, Florence, Italy, endorsed meeting.
- The 10th ICSA International Conference on Global Growth of Modern Statistics in the 21st Century and the first Meeting of the East Asian Chapter of ISBA http://www.math.sjtu.edu.cn/conference/2016icsa/Default.aspx, December 19-22, 2016, Shanghai, China, co-sponsored and chapter meeting.

Program Council Changes: The Program Council would like to welcome its newest member, Clair Alston-Knox, who was appointed to the council in January. Welcome, Clair! We would also like to acknowledge Ramses Mena, whose three-year term on the council ended in 2015. Thank you, Ramses, for your hard work over the past few years!

BA UPDATE

From the BA Editor

- Bruno Sansó -
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I am deeply honored to be the new Editor in Chief of Bayesian Analysis. I would like to thank the publication committee who put their trust in me. I also thank Marina Vannucci for making the transition really easy. More generally, I'd like to thank her for the outstanding work that she has done as EiC for the last three years. During Marina's tenure, the journal has run very smoothly, and has consolidated its reputation, brilliantly fulfilling its mission of disseminating Bayesian ideas.

BA is the result of the effort of a large number of people. We have about 40 associate editors, 10 editors, a managing editor, a production editor, a system managing editor and an editor in chief. To this we add a large number of referees who contribute their expertise to the success of the journal. BA is completely open access. You can access forthcoming, current and past issues on the web site https://projecteuclid.org/info/euclid.ba, at no cost. But this does not mean that producing the journal is free. In fact the annual budget for the journal amounts to several thousands dollars a year, and the bill is paid by ISBA. Also, we do not have a printed version, but our new production and managing contract includes costs per page. With this I have two requests for authors: if you have funds available, please consider paying publication charges; and, please keep your manuscripts crisp and concise. It benefits the readability of the journal and helps the bottom line.

Publishing in BA gives your work a great deal of visibility, as BA is a great showcase of good quality papers. Such visibility can be enhanced in several ways, namely:

- Discussion papers. The editorial board selects one discussion paper per issue. The paper is published with the discussions and a rejoinder. Authors can submit papers for discussion, explicitly;

- ISBA invited session. Since ISBA-2014, BA organizes an invited session around a discussion paper, that is then published in the September issue following the meeting;

- JSM invited session. The EiC organizes an invited session, sponsored by ISBA and SBSS, with a sample of the best papers published in BA during the year prior to the meeting;

- Finally, the Lindley Prize is awarded for innovative research in Bayesian Statistics that is presented at an ISBA World Meeting and accepted for publication in a special issue of BA.

The March and the June issues of Bayesian Analysis are published and available in https://projecteuclid.org/euclid.ba/1451507323 and https://projecteuclid.org/euclid.ba/1457127030 respectively. The March issue contains 11 papers. The issue features a discussion paper by Page and Quintana, on "Spatial Product Partition Models". Gaetan, Padoan and Prünster, Reich and Fuentes, and Gramacy and Lee have contributed three discussions to the paper. The June issue contains 12 papers. No discussion paper in that issue.

I am happy to announce that the editorial board has selected the paper "Efficient Metropolis-Hastings Proposal Mechanisms for Bayesian Regression Tree Models", by Pratola, for discussion at the ISBA 2016 meeting. Also, the Lindley Prize committee has been appointed and it will be selecting one of the papers published in the December issues as the winner. This will be announced at the ISBA 2016 this summer. See you all there!

CONFERENCE REPORTS

MCMski

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A few comments for the Bulletin about MCMski, with the warning that, as a member of the scientific and organising committees as well as an avid skier, I am hopelessly biased.

First, the official name of the conference may confuse you (as it should!) because this is the fifth version of this conference about Bayesian computing methods located at or near a ski resort. (The first joint IMS-ISBA meeting took place in Isla Verde, Puerto Rico, in July 2003.) Since this conference is now the official conference of the recently created BayesComp section of ISBA, this installment of MCMski is also the first BayesComp conference. This superposition of tags makes me suggest we should scrap all labels and start afresh with a new name like Advances in Bayesian Computing, making no mention of MCMC (the scope is broader than that) or of skiing (since this only appeals to a minority of participants).

The meeting took place in Lenzerheide, in the first week of January, and started with a well-suited plenary talk by Steve Scott on consensus Monte Carlo; I say well-suited because the issue of large and complex data and the ensuing (re)quest for acceptable shortcuts were central to this MCMC meeting. It was followed up with a rather large round-table in the early evening on the computing challenges raised by ?big data? and explosive model complexity. This may not have been the most adequate spot for recovering from a day of travel and potential jetlag; the conference room was, however, packed and a large part of the audience went into the night, the snow and the cold for an organised walk with mulled wine by the lake! Two mostly computing-related notions that came out the discussion [for me] are asynchronicity and subsampling. The later seems to mean many things, judging from the discussion from both the panel and the audience.

The first talk the next morning was a plenary by Michael Jordan about his incorporation of complexity constraints on the convergence of an MCMC variable selection algorithm. This was most interesting, with an incorporation of complexity constraints and ultra-fast convergence of the sampler. After much pondering which parallel session to pick (a recurrent and frustrating dilemma ?throughout the entire meeting) I attended a Bayesian molecular biology session with an impressive talk by Jukka Corander on evolutionary genomics with novel ABC aspects. And then a Hamiltonian Monte Carlo session with two deep talks by Sam Livingstone and Elena Akhmatskaya on the convergence of HMC, followed by an amazing entry into Bayesian cosmology by Jens Jasche (with a slight drawback that MCMC simulations took about a calendar year, handling over 107 parameters). Swiss efficiency saw me skiing sunny slopes an appreciable amount of time despite the moderately long noon break. And I completed the day on more "classical" MCMC convergence results and techniques, with talks about forgetting time, stopping time (an undervalued alternative to convergence controls), and CLTs. Both poster sessions were after dinner, busy if not overcrowded, and quite animated (and not only because of the free drinks!). As I presented a poster about mixture reparameterisation on the first night I could not tour the other posters, which all sounded related to my interests. But I did have great exchanges with the conference participants.

The second day was almost equally busy with David Dunson giving a plenary talk on various approaches to approximate MCMC solutions, with a broad overview of the potential methods and of the need for better solutions. The first parallel session I attended included Marc Suchard, who used continued fractions to find a closed form likelihood for the SIR epidemiology model, and Donatello Telesca who studied non-local priors to build a regression tree. In the afternoon, I skipped the skiing interlude and I (obviously) went to the

intractable likelihood session, with talks by Chris Oates on a control variate method for doubly intractable models, Brenda Vo on mixing sequential ABC with Bayesian bootstrap, and Gael Martin on our consistency paper. I later attended a session on exact Monte Carlo methods that was pleasantly homogeneous. With talks by Paul Jenkins on the exact simulation of the Wright-Fisher diffusion, Anthony Lee on designing perfect samplers for chains with atoms, Chang-han Rhee and Sebastian Vollmer on extensions of the Glynn-Rhee debiasing technique I previously discussed on my blog. The second poster session (after a quick home-made pasta dish with an exceptional Valpolicella!) was almost universally great – in particular the Breaking News! posters of Giacomo Zanella, Beka Steorts and Alexander Terenin–with just the right number of posters to go around all of them in the allotted time

The last day was the toughest one with an extra session in the afternoon, plus a tutorial by Art Own on quasi Monte-Carlo. Krys Latunszynski started with a plenary on exact methods for discretised diffusions, with a foray in Bernoulli factory problems. Then I went to a neat session on adaptive MCMC methods that contained a talk by Chris Sherlock on delayed acceptance, where the approxi- mation to the target was built by k-nn trees. It was wonderful that Art Owen accepted to deliver a tutorial at MCMski on quasi-random Monte Carlo. Great tutorial, with a neat coverage of the issues most related to Monte Carlo integration. Since quasi-random sequences have trouble with accept/reject methods, a not-even-half-baked idea that came to me during Art's tutorial was that the increased computing power granted by qMC could lead to a generic integration of the Metropolis-Hastings step in a Rao-Blackwellised manner. Art mentioned he was hoping that in a near future one could switch between pseudo- and quasi- random in an almost automated manner when running standard platforms like R. This would indeed be great, especially since quasi-random sequences seem to be available at the same cost as their pseudo-random counterpart. During the following qMC session, Art discussed the construction of optimal sequences on sets other than hypercubes (with the surprising feature that projecting optimal sequences from the hypercube does not work). Mathieu Gerber presented the quasi-random simulated annealing algorithm he developed with Luke Bornn. The session also had a talk by Lester Mckey who relies Stein's discrepancy to measure the value of an approximation to the true target. This was quite novel, with a surprising connection to Chris Oates' talk and the use of score-based control variates. Another great session was the noisy MCMC one organised by Paul Jenkins, with again a coherent presentation of views on the quality or lack thereof of noisy (or inexact) versions, with an update from Richard Everitt on inexact MCMC, Felipe Medina Aguayo on sufficient conditions for noisy versions to converge (and counterexamples), Jere Koskela on a pseudo-likelihood approach to the highly complex Kingman?s coalescent model in population genetics (of ABC fame!), and Rèmi Bardenet on the tall data approximations techniques discussed in a recent post. Having seen or read most of those results previously did not diminish the appeal of the session.

Reminiscing about the conference, I found the scientific program very exciting, with almost uniformly terrific talks, and a coverage of the field of computational Bayesian statistics that is perfectly tuned to my own interests and presumably to those of a large portion of the participants, if judging from the steady attendance. In that sense, MCMski is my "top" conference! While some of the talks were about papers I had already if quickly read, others brought new vistas and ideas. If one theme is to surface from this meeting it has to be the one of approximate and noisy algorithms, with a wide variety of solutions and approaches to overcome complexity issues. Overall, a fantastic program (thus says one member of the scientific committee). Furthermore, as with previous MCM- ski meetings, I enjoyed the unique ambiance of the meeting, which feels more relaxed and friendly than other conferences of a similar size, maybe because of the après-ski atmosphere or the special coziness provided by wooden mountain hotels. This particular hotel was particularly pleasant, with non-guests like myself able to partake of some of their facil-

ities. A massive thank you to Antonietta Mira for arranging so meticulously and cheerfully all the details of such a large meeting!!! I am even more grateful when realising this is the third time Anto takes over the heavy load of organising MCMski. Grazie mille, Anto! And thanks as well to the Swiss National Supercomputing Centre for sponsoring the Data Science round table discussion and the welcoming reception, to the Inter-Disciplinary Institute of Data Science for local organization and registrations, to USI Universit'a della Svizzera italiana for sharing its ski instructors with us, and to Blossom ski for offering a pair of skis for the winner of the Tweedie ski race!

Since this is *the* BayesComp conference, the current section program chair and board have now called for proposals to organise BayesComp 2018 (BC2018). See News from the World in this issue of the *Bulletin* for the full call!

Bayes on the Beach

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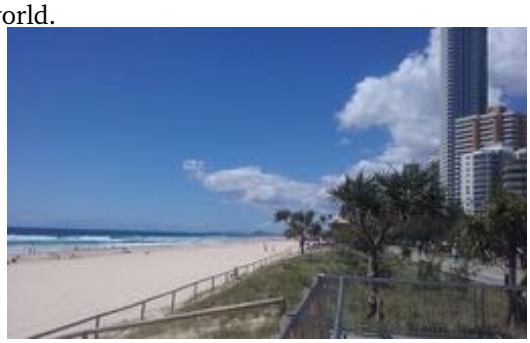
Bayes on the Beach 2015 was held at Surfers Paradise (Gold Coast, Australia, December 7th to 9th 2015). BoB is an annual conference held in Australia organised by the Bayesian Research & Applications Group in collaboration with ARC Centre of Excellence for Mathematical & Statistical Frontiers; the Australasian chapter of the International Society for Bayesian Analysis; the Statistical Society of Australia, Inc. Bayesian Statistics Section; the Commonwealth Scientific and Industrial Research Organisation (CSIRO); and Queensland University of Technology. Started in 2005 by ISBA president elect Professor Kerrie Mengersen, the meeting is an intentionally small gathering of Bayesians from across Australia and around the world.



This year, there were over 60 delegates including from the UK, Italy and New Zealand. The conference comprised keynotes, tutorials, presentations, workshops and poster sessions. Keynotes were given by Professor Fabrizio Ruggeri on new classes of priors based on stochastic orders and distortion functions, Professor Antonietta Mira on inference in statistical and mechanistic network models, Professor Richard Boys on parameter inference for stochastic kinetic models of polyglutamine proteins, and Professor Dianne Cook on the interface between statistical inference and visualisation. There were a wide ranging series of presentations ranging from inferential models used to guide the search for MH370 to respiratory hospital admissions in Glasgow, Scotland which exhibits the highest mortality rate in the UK. Interactive workshops were also conducted on the ranking publication impact, spatio-temporal analysis of air quality, and Bayesian Network model of PhD completion time. Program presentations can be found at https://botb2015.wordpress.com/.

XIII Brazilian Meeting on Bayesian Statistics (EBEB)

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The XIII Brazilian Meeting on Bayesian Statistics (EBEB) was held at Universidade Federal de Minas Gerais, in Belo Horizonte, Brazil, on 22nd - 25th February, 2016. The EBEB meetings happen every other year and are organised by ISBrA, the Brazilian Chapter of ISBA. Its 13th edition had 147 participants, including undergrad-

uate and postgraduate students, researchers and professors from Brazil and abroad. The Scientific Committee was composed by: Dani Gamerman, Flávio Gonçalves (ISBrA President), Marcos Prates (ISBrA Secretary), Rosangela Loschi, Francisco Louzada and Márcia Branco. The Organising Committee was: Flávio Gonçalves, Marcos Prates, Vinícius Mayrink (ISBrA Treasurer), Rosangela Loschi, Glaura Franco, Fábio Demarqui, Luis Sánchez.

Following the tradition of the Meeting, this year's EBEB had an excellent scientific program with the presence of leading researchers on Bayesian Statistics worldwide. The talks consisted of cutting edge research in both theoretical and applied Bayesian Statistics. The list of plenary speakers was:

- Mike West (Duke University)
- Fernando Quintana (PUC ? Chile)
- Raquel Prado (University of California, Santa Cruz)
- Helio S. Migon (Universidade Federal do Rio de Janeiro)
- Stephen Walker (University of Texas)
- Emily Fox (University of Washington)
- Carlos A. B. Pereira (Universidade de São Paulo)
- Sujit K Sahu (University of Southampton)
- Steven Scott (Google)
- Gareth Roberts (University of Warwick).

The scientific program also included two short courses:

- Introduction to nonparametric Bayesian inference, by Vanda Inácio (PUC-Chile);
- Financial Risk Management, Actuarial Science and Bayesian Statistics, by Manuel Mendoza (ITAM, México);

and six short talks by Brazilian young researchers:

- Lilia C. C. Costa (Universidade Federal da Bahia)
- Thaís V. Paiva (Universidade Federal de Minas Gerais)
- Rafael Izbicki (Universidade Federal de São Carlos)
- Osvaldo Anacleto (University of Edinburgh)
- Thais C. O. Fonseca (Universidade Federal do Rio de Janeiro)
- Vinícius D. Mayrink (Universidade Federal de Minas Gerais).

Participants had the chance to present their work in oral and poster presentations. Another highlight of the meeting was the tribute to Professors Carlos Pereira and Helio Migon to celebrate their 70th Birthday this year. Professors Pereira and Migon are two of the main pillars of Bayesian Statistics in Brazil. Social events included a welcome cocktail sponsored by Google and a conference dinner in a traditional Brazilian churrascaria. The meeting was mainly funded by Brazilian research funding agencies. Apart from that, ISBA provided travel grants to a number of students and young researchers. More details like title and abstract of all the talks can be found at http://www.redeabe.org.br/ebeb2016/. The videos of most of the talks will soon be available at the Meeting's homepage. Finally, a special edition to the Brazilian Journal of Probability and Statistics with invited and contributed papers from the Meeting will be edited by Dani Gamerman and Flávio Gonçalves. The ISBrA Executive Committee would like to thank all the participants from the XIII EBEB and would like to invite all the Bayesian International community to our future meetings.

NEWS FROM THE WORLD

Announcements

ISBA 2016 World Meeting is coming up soon in Sardinia, Italy on June 13-17, 2016!

The ISBA 2016 World Meeting will be held at Forte Village Resort, a unique resort set on the seashore of South Sardinia, laying on a spectacular white sandy beach and is about 40km from

Cagliari. This meeting is the continuation of the traditional Valencia/ISBA Meetings regularly held since 1979. They represent a unique event where the Bayesian community gathers together to discuss recent advances and the future of our profession, at the same time looking back to our roots and traditions, following the footsteps of those who laid the foundations of where we are now.

Regular registration is now open. Detailed information including the preliminary scientific program, accommodation and transportation can be found at http://www.corsiecongressi.com/isba2016/index.asp.

The EnviBayes section of ISBA will provide a small cash award of $200 for two posters presentations at ISBA 2016. The posters will be selected from those that connect to topics of interest in Environmental Sciences and its applications.

Call for proposals on BayesComp 2018 (BC2018).

The Bayesian Computation Section of ISBA is soliciting proposals to host its flagship meeting, BayesComp 2018 (BC2018). The expectation is that the meeting will be held in January 2018, but the scientific committee will consider proposals for other dates through January 2019. The tradition was to hold MCMski meetings in ski resorts, but as suggested by the name change, applications from any venue that could support BC2018 are encouraged.

A three-day meeting is planned, perhaps with an additional day or two of satellite meetings and/or short courses. One page proposals should address feasibility of hosting the meeting including:

1. Proposed dates;
2. Transportation for international participants (proximity of major airports and transportation to/from the venue);
3. Conference facilities;
4. Availability and rates of hotels, including low cost options;
5. Proposed local organizing committee and collective experience in organizing international meetings;
6. Expected or promised financial contributions from the host organization, host country, and industrial partners towards running the meeting and supporting young researchers.

Proposals should be submitted to Nicolas Chopin (Program Chair) at nicolas.chopin@ensae.fr no later than May 31, 2016. The Board of Bayesian Computing Section will evaluate the proposals, choose a venue, and appoint the Program Committee for BC2018.

Call for Pre-Proposals on Meeting of the Bayesian Nonparametrics Section, 2019.

The Bayesian Nonparametrics Section (BNP) of ISBA is inviting pre-proposals for the 12th Conference on Bayesian Nonparametrics, to be tentatively held in June, 2019.

Interested groups and organizations should designate a main reference person and local chair as well as a tentative list of members of the local organizing committee. The local organizing committee has primary responsibility for usual organizational tasks and local funding of the meeting. Given the size attained by this type of conferences, the local organizing committee should plan for venues able to host 200+ attendees, in locations easily accessible to a large proportion of our membership around the world. Submitted proposals should provide as much detail as possible at this time regarding airport and conference facilities, expected expenses, expected participant costs, and sources of revenue (including their proposed use to fund the conference). Prior experience in organizing conferences should also be reported. The planning of the meeting should follow the ISBA guidelines for Section Meetings (http://bayesian.org/meetings/planning/planning-section-meeting), in particular the meeting should be revenue neutral.

Proposals need to be submitted by May 15th, 2016. All submissions will be reviewed by a Selection Committee that may contact submitting groups and organizations for requesting further information, when needed. The winning proposal will be announced during the Section Meeting to be held during the 2016 ISBA World Meeting. Proposal submissions or related queries should be sent to Fernando Quintana, Program Chair of the BNP section of ISBA, at fernando.a.quintana@gmail.com

Meetings and conferences

Workshop on Bayesian Environmetrics, The Ohio State University, Columbus OH. March 31-April 2, 2016.

This workshop is the next biennial workshop of the Section on Statistics and the Environment (ENVR) of the ASA and the first meeting of the new Section on Environmental Sciences (EnviBayes) of ISBA. It will bring together environmetricians from across the world to discuss state-of-the-art Bayesian statistical methods applied to problems ranging from climate sciences to ecology to environmental health to natural resources management. The aim is to have a diverse collection of participants from academia, government, and industry, with a large number of students and junior researchers in attendance.

More information about the conference can be found at the conference webpage: http://community.amstat.org/envr/events/bayesenvr

Conference on Information-Theoretic Methods of Inference, Clare College, Cambridge, UK. April 1-2, 2016.

This workshop aims to study new methods of statistical inference based on information-theoretic methods. The conference tentative program is available online at https://www.american.edu/cas/economics/info-metrics/conference/Info-Metrics-Spring-2016-conference.cfm.

Meeting of International Society for Business and Industrial Statistics (ISBIS), Barcelona, Spain. June 8-10, 2016.

Bayesians who are traveling to Sardinia for the ISBA 2016 World Meeting may want to extend their European stay by attending the ISBIS meeting immediately before. Barcelona is a great city, and the ISBIS conference promises to be great as well.

ISBIS focuses upon statistical applications in business and industry, but its scope is very broad. It would be of special interest to members of the ISBA Sections on Industrial Statistics, on Economics, Finance and Business, and on Biostatistics and Pharmaceutical Statistics. More details about the ISBIS meeting are at www.stat.duke.edu/~banks/barcelona.

Conference on Advances in Statistics, Probability and Mathematical Physics, Pavia, Italy. June 10-11, 2016.

The conference is in honor of Eugenio Regazzini. It is right before the ISBA World meeting in Sardinia and represents an ideal occasion to extend your stay in Italy. Note that from Milano it takes about half an hour to get to Pavia by train. Moreover, low cost companies fly from Milano to Cagliari (Sardinia), allowing for a smooth combination of the two conferences. Registration is free, though compulsory, with deadline May 31, 2016 at http://www-dimat.unipv.it/eugenioconference/registration.html.

3rd Bayesian Young Statisticians Meeting (BAYSM), Florence, Italy. June 19-21, 2016.

BAYSM is dedicated to Ph.D. Students, M.S. Students, Post-Docs, Young and Junior Researchers working in the field of Bayesian statistics, providing an opportunity to connect with the Bayesian community at large. Senior discussants will be present at each session, providing participants with advise and comments to their work. Recognized figures of the Bayesian community will also participate as keynote and plenary speakers, making an altogether exciting program. It will include social events, providing the opportunity to get to know other junior Bayesians, while enjoying the beautiful city of Florence.

While the meeting is organized for and by Junior Bayesians, attendance is open to anyone who may be interested. Registration is now open and will be available with an early bird discount until April 15. For more information, please visit the conference website http://web.mi.imati.cnr.it/conferences/BAYSM2016.

Sixth Annual WinBUGS workshop Bayesian Modeling for Cognitive Science, University of Amsterdam. August 15-19, 2016.

This workshop is meant for researchers who want to learn how to apply Bayesian inference in practice. Most applications we discuss are taken from the field of cognitive science. Because the workshop is based on a set of book chapters and concrete exercises of varying difficulty, the course material is appropriate for researchers with a wide range of prior knowledge and interests. Although some basic knowledge of Bayesian inference is an advantage, this is not a prerequisite. In the course WinBUGS will be used in combination with R or

Matlab (the choice is yours), and therefore some basic knowledge of either R or Matlab is also an advantage.

All information can be found on the conference website at http://bayescourse.socsci.uva.nl.

13th edition of the ABS (Applied Bayesian Statistics) summer school on BAYES, BIG DATA, AND THE INTERNET, Villa del Grumello, Como, Italy. August 29-September 2, 2016.

The lecturer of this year's summer school will be Steve Scott, Senior Economic Analyst at Google, USA (https://sites.google.com/site/stevethebayesian/)

The summer school webpage is: web.mi.imati.cnr.it/conferences/abs16.html. Registration is now open.

8th edition of International Conference on Probabilistic Graphical Models, Lugano, Switzerland. September 6-9, 2016.

The site of the conference is http://pgm.idsia.ch. It welcomes contributions on all aspects of graphical models including probabilistic reasoning, decision making, learning and data mining. It welcomes both theoretical and applied contributions.

The conference proceedings will be published in the proceedings track of the Journal of Machine Learning Research (JMLR). Selected papers will be invited to be extended and then submitted to a special issue of the International Journal of Approximate Reasoning (IJAR).

Workshop on Flexible Statistical Modeling: past, present and future, Ghent, Belgium. September 15-16, 2016.

This workshop brings together international researchers in the field of flexible modeling to share their latest results. The purposes are to stimulate research in this field, identify interesting new problems and applications, and foster dialogue and future research collaborations.

The program includes plenary talks, invited talks and young researcher talks. A poster storming and viewing session will also be organized and the organizers are making a call for contributed posters. Contributed posters dealing with any aspects of flexible modeling are welcome. More information about the workshop can be found at http://www.fsm16.ugent.be/.

STUDENTS' CORNER

Shinichiro Shirota
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Hello everyone! I am a third year PhD student in the Department of Statistical Science, Duke University. This year we plan to continue "Student Voices," introducing current graduate students, young researchers and their academic lives. The Students' Corner also features dissertation abstracts. Issuing abstracts provides a good opportunity to find collaborators. If you are willing, don't hesitate to send your dissertation abstract to my email address.

Student Voices

Olanrewaju Akande
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I am a PhD student and research assistant in the Department of Statistical Science, Duke University. I got an MS in Statistical and Economic Modeling from Duke in 2015, and a BSc in Mathematics and Statistics from the University of Lagos (UNILAG), Nigeria in 2010. Before coming to Duke, I worked as an analyst in the internal audit, risk and compliance services unit at KPMG professional services, Nigeria. My working experience spans about 21 months in academia, finance, accounting, internal audit, and risk management. My research interests include Bayesian models for multiple imputation, missing data, hierarchical modeling, and Dirichlet process mixture models for modeling survey and census data. I am currently working on developing a Bayesian edit-imputation method for nested data (e.g., individuals nested within households) with Professor Jerry Reiter in the Department of Statistical Science. We also worked together on another project (submitted manuscript): *An Empirical Comparison of Multiple Imputation Methods for Categorical Data* with Professor Fan Li in the same depart-

ment. I am from Lagos, Nigeria, one of the largest states in Africa and moving to a quieter place like Durham was a major challenge at first. Before coming to the US in 2013, I had only lived in Nigeria, making it harder to adjust initially. Nigeria is a beautiful and fairly diverse country with over 200 different ethnic groups and 500 different languages, thus moving to the US was always going to be a challenging experience. Life as an international graduate student has been very exciting though–mostly due to cultural and climatic differences–and the change has been interesting. I enjoy sightseeing and exploring the beautiful scenery in and around North Carolina, in places like Asheville and Wilmington. I also enjoy the opportunity to mix and connect with other graduate students at Duke. Duke is also somewhat diverse and having the opportunity to interact with so many students from different backgrounds is itself an exciting experience. I also have great passion for and enjoy teaching, learning and research. My experiences in the educational system back home have spurred me to pursue a career path geared towards improving the standard of education and research in Nigeria. I have always loved and really enjoyed teaching and thus, my career choice feels very natural. I am excited to be able to pursue my dream of obtaining a PhD in statistics at Duke and I absolutely enjoy working with Professor Jerry Reiter. He has been a great mentor and advisor, affording me the opportunity to work at my own pace while providing the necessary guidance to enhance my creativity and ability to think on my feet.

SOFTWARE HIGHLIGHT

AMEN: Regression Modeling Software for Dyadic Network Data

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Dyadic data on pairs of objects, such as relational or social network data, often exhibit strong statistical dependencies. Certain types of second-order dependencies, such as degree heterogeneity and reciprocity, can be well-represented with additive random effects models. Higher-order dependencies, such as transitivity and stochastic equivalence, can often be represented with multiplicative effects. The `amen` package (Hoff et al., 2015) for the R statistical computing environment provides estimation and inference for a class of additive and multiplicative random effects models for continuous, binary, ordinal and other types of dyadic data. The package also provides methods for missing, censored and fixed-rank nomination data, as well as longitudinal dyadic data. This article illustrates some of the capabilities of the `amen` package via an example, and gives a brief overview of other capabilities. A more complete tutorial is available in the R-vignette for the package (Hoff, 2015), upon which this article is based.

Social Relations Regression

Dyadic data for a population of n objects, individuals or nodes may be represented as a *sociomatrix*, an $n \times n$ square matrix Y with an undefined diagonal. The i,jth entry of Y, denoted $y_{i,j}$, gives the value of the variable for dyad $\{i,j\}$ from the perspective of node i, or in the direction from i to j. Dyadic data often exhibit certain types of statistical dependencies. For example, it is often the case that observations in a given row of the sociomatrix are similar to or correlated with each other. This should not be too surprising, as these observations all share a common "sender," or row index. If a sender i_1 is more "sociable" than sender i_2, we would expect the values in row i_1 to be larger than those in row i_2, on average. Anther type of dependence is referred to as *reciprocity*, which describes the within-dyad correlation between $y_{i,j}$ and $y_{j,i}$.

A seminal approach to analyzing such within-node and within-dyad dependence is the *social relations model*, or SRM (Warner, Kenny and Stoto, 1979), a type of ANOVA decomposition that describes variability among the entries of the sociomatrix Y in terms of within-row, within-column and within-dyad variability. A normal random-effects version of the SRM has been studied by Wong (1982) and Li and Loken (2002),

among others, and takes the following form:

$$y_{i,j} = \mu + a_i + b_j + \epsilon_{i,j}$$
$$\{(a_1,b_1),\ldots,(a_n,b_n)\} \sim \text{i.i.d. } N(0,\Sigma_{ab})$$
$$\{(\epsilon_{i,j},\epsilon_{j,i}) : i \neq j\} \sim \text{i.i.d. } N(0,\Sigma_e),$$

where

$$\Sigma_{ab} = \begin{pmatrix} \sigma_a^2 & \sigma_{ab} \\ \sigma_{ab} & \sigma_b^2 \end{pmatrix} \text{ and } \Sigma_\epsilon = \sigma_\epsilon^2 \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix}.$$

Often we wish to quantify the association between a particular dyadic variable and some other dyadic or nodal variables. In this case it is useful to extend the covariance model of the SRM with linear regression terms, yielding the *social relations regression model* (SRRM):

$$y_{i,j} = \beta_d^T \mathrm{x}_{d,i,j} + \beta_r^T \mathrm{x}_{r,i} + \beta_c^T \mathrm{x}_{c,j} + a_i + b_j + \epsilon_{i,j},$$

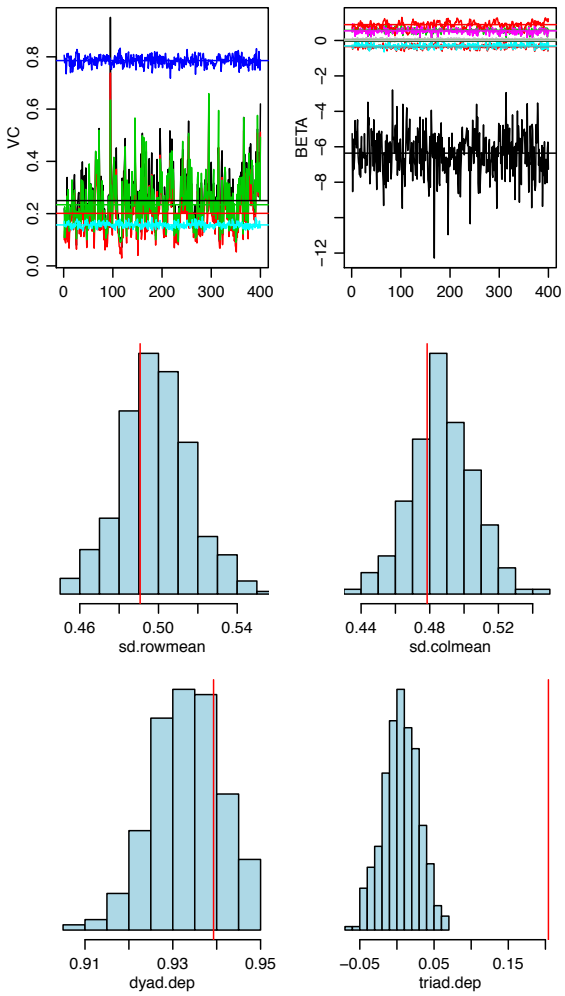
where $\mathrm{x}_{d,i,j}$ is a vector of characteristics of dyad $\{i,j\}$, $\mathrm{x}_{r,i}$ is a vector of characteristics of node i as a sender, and $\mathrm{x}_{c,j}$ is a vector of characteristics of node j as a receiver.

The `amen` package provides Bayesian inference for this model via an MCMC algorithm, based primarily on Gibbs sampling. To illustrate, we fit this model to a dataset on international trade volumes between 30 countries. Nodal covariates include (log) population, (log) GDP, and polity, a measure of democracy. Dyadic covariates include the number of conflicts, (log) geographic distance between countries, the number of shared IGO memberships, and a polity interaction (the product of the nodal polity scores). The fit is obtained using the `ame` command, as shown below:

```
fit_srrm<-ame(Y,Xd=Xd,Xr=Xn,Xc=Xn)

> summary(fit_srrm)

Regression coefficients:
                 pmean   psd z-stat p-val
intercept       -6.405 1.254 -5.109 0.000
pop.row         -0.330 0.132 -2.502 0.012
gdp.row          0.567 0.150  3.770 0.000
polity.row      -0.015 0.020 -0.788 0.431
pop.col         -0.302 0.126 -2.389 0.017
gdp.col          0.537 0.147  3.650 0.000
polity.col      -0.006 0.019 -0.309 0.757
conflicts.dyad   0.076 0.042  1.829 0.067
distance.dyad   -0.041 0.007 -6.122 0.000
shared_igos.dyad 0.883 0.186  4.756 0.000
polity_int.dyad -0.001 0.001 -1.662 0.097

Variance parameters:
    pmean   psd
va  0.264 0.105
cab 0.212 0.097
vb  0.250 0.099
rho 0.785 0.019
ve  0.157 0.011
```

AME Models

A graphical summary of the MCMC algorithm, along with posterior predictive goodness-of-fit plots, is available via the `plot` command, as shown in the figure below. The plot in the bottom-right panel of the figure indicates lack of fit of the model in terms of a summary statistic that describes triadic dependency in the data.

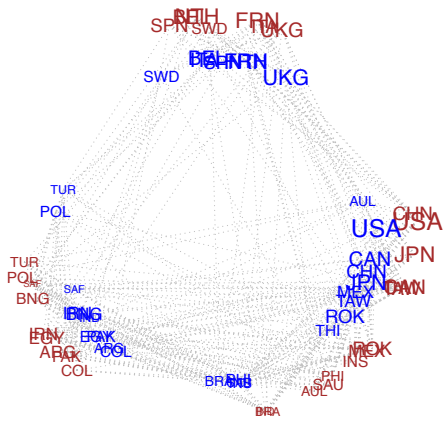


As described in Hoff (2005) and Hoff (2008*a*), such patterns can often be represented with multiplicative factors, suggesting the following model:

$$y_{i,j} = \beta_d^T \mathrm{x}_{d,i,j} + \beta_r^T \mathrm{x}_{r,i} + \beta_c^T \mathrm{x}_{c,j} + a_i + b_j + \mathrm{u}_i^T \mathrm{v}_j + \epsilon_{i,j}.$$

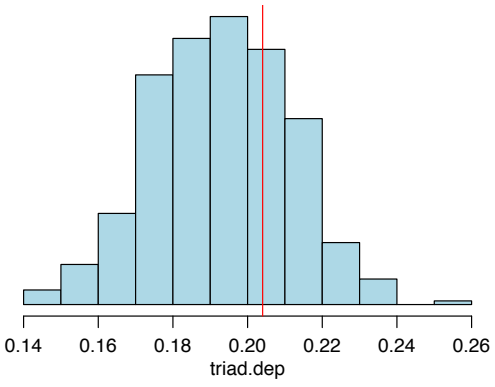
Here, u_i is a vector of latent, unobserved factors or characteristics that describe node i's behavior as a sender, and similarly v_j describes node j's

behavior as a receiver. In this model, the mean of $y_{i,j}$ depends on how "similar" u_i and v_j are (i.e., the extent to which the vectors point in the same direction) as well as the magnitudes of the vectors. We call a model of this form an *additive and multiplicative effects* model, or AME model for network and dyadic data. An AME model essentially combines two models for matrix-valued data: an *additive main effects, multiplicative interaction* (AMMI) model (Gollob, 1968; Bradu and Gabriel, 1974) - a class of models developed in the psychometric and agronomy literature; and the SRM covariance model that recognizes the dyadic aspect of the data. An AME model can be fit using the `ame` command in `amen` with a command such as




```
fit_ame2<-ame(Y,Xd,Xn,Xn,R=2),
```

where `R` denotes the dimension of the latent factors. A goodness of fit plot for this model, shown below, indicates that adding the two-dimensional latent factors eliminates the triadic lack-of-fit of the SRRM, at least in terms of this particular statistic.



Estimates of latent factors can also be extracted from the fitted model object and further analyzed. For example, clustering algorithms may be applied to the nodes in order to identify groups of nodes that have similar positions in the network, after accounting for the covariate effects with the regression component of the model. A visual display of the factors can be made using the `circplot` command, as shown below.

Binary and Ordinal Outcomes

Many network datasets include binary dyadic measurements, in which case the sociomatrix is an adjacency matrix of a graph. Other common types of discrete dyadic data include counts and ordinal outcomes. The Gaussian AME model described above can be extended to accommodate such data by using a probit model, in which the observed outcomes are assumed to be some non-decreasing function of latent relational variables that follow a Gaussian AME model. This ordinal AME model is given by

$$\begin{aligned} z_{i,j} &= \beta_d^T \mathrm{x}_{d,i,j} + \beta_r^T \mathrm{x}_{r,i} + \beta_c^T \mathrm{x}_{c,j} + \\ &\quad a_i + b_j + \mathrm{u}_i^T \mathrm{v}_j + \epsilon_{i,j} \\ y_{i,j} &= g(z_{i,j}), \end{aligned}$$

where g is a non-decreasing function. For example, letting $g(z)$ be the indicator that $z > 0$ yields a probit AME model. The `amen` package provides an MCMC routine for obtaining posterior inference for such models. For non-binary ordinal data, the g-function is treated semiparametrically, and only the ranks of the ordinal relations are used to obtain inference for the model parameters (Hoff, 2007, 2008*b*).

Fixed Choice Nomination Data

Data on human social networks are often obtained by asking members of a study population to name a fixed number of people with whom they

are friends, and possibly to rank these friends in terms of their affinities to them. Such a survey method is called a *fixed rank nomination* (FRN) scheme, and is commonly used in studies of institutions such as schools or businesses. For example, the National Longitudinal Study of Adolescent Health (AddHealth, Harris et al. (2009)) asked middle and high-school students to nominate and rank up to five members of the same sex as friends, and five members of the opposite sex as friends.

Data obtained from FRN schemes are similar to ordinal data, in that the ranks of a person's friends may be viewed as an ordinal response. However, FRN data are also censored in a complicated way. Consider a study where people were asked to name and rank up to and including their top five friends. If person i nominates five people but doesn't nominate person j, then $y_{i,j}$ is censored: The data cannot tell us whether j is i's sixth best friend, or whether j is not liked by i at all. On the other hand, if person i nominates four people as friends but could have nominated five, then person i's data are not censored - the absence of a nomination by i of j indicates that i does not consider j a friend.

A likelihood-based approach to modeling FRN data was developed in Hoff et al. (2013). Similar to the approach for ordinal dyadic data described above, this methodology treats the observed ranked outcomes Y as a function of an underlying continuous sociomatrix Z of affinities that is generated from an AME model. Letting m be the maximum number of nominations allowed, and coding $y_{i,j} \in \{m, m-1, \ldots, 1, 0\}$ so that $y_{i,j} = m$ indicates that j is i's most liked friend, the FRN likelihood is derived from the following constraints that the observed ranks Y tell us about the underlying dyadic variables Z:

$$y_{i,j} > 0 \quad \Rightarrow \quad z_{i,j} > 0 \qquad (1)$$

$$y_{i,j} > y_{i,k} \quad \Rightarrow \quad z_{i,j} > z_{i,k} \qquad (2)$$

$$y_{i,j} = 0 \text{ and } d_i < m \quad \Rightarrow \quad z_{i,j} \leq 0. \qquad (3)$$

Constraint (1) indicates that if i ranks j, then i has a positive relation with j ($z_{i,j} > 0$), and constraint (2) indicates that a higher rank corresponds to a more positive relation. Letting $d_i \in \{0, \ldots, m\}$ be the number of people that i ranks, constraint (3) indicates that if i could have made additional friendship nominations but chose not to nominate j, they then must not consider j a friend. On the other hand, if $y_{i,j} = 0$ but $d_i = m$ then person i's unranked relationships are censored, and so $z_{i,j}$ could be positive even though $y_{i,j} = 0$. In this case, all that is known about $z_{i,j}$ is that it is less than $z_{i,k}$ for any person k that is ranked by i.

The `amen` package provides an MCMC routine that provides posterior inference for AME model parameters for FRN and related data schemes. For example, in some studies the participants are asked to nominate up to a certain number of friends, but not to rank them. Such *fixed choice nomination* data can be viewed as censored binary data, is accommodated in `amen` in a manner similar to that of FRN data.

Other Functionality

The `amen` package also provides methods for the analysis of other common types of dyadic data. In particular, the methods described above all have versions that can be applied to undirected dyadic data, where the values $y_{i,j}$ and $y_{j,i}$ are equal by design. The package also has versions of the above methods that accommodate repeated measures dyadic data. This permits rudimentary longitudinal modeling of dyadic data by inclusion of lagged network values in the regression model.

The `amen` package is available on the CRAN website and also at github:

`https://github.com/pdhoff/amen`

A detailed tutorial on dyadic data analysis with the `amen` package is available as a package vignette and is also on arXiv:

`http://arxiv.org/abs/1506.08237`

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