The official newsletter of the International Society for Bayesian Analysis.

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The ISBA NEWSLETTER
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ISBA is a newly created International Scientific Society with the objective of interfacing between Bayesian Statistic methods,and scientific areas such as Engineering, Chemistry, Physics, Economics, Business, Astronomy, Earth Sciences, Education, Psychology, Government Policy-Making, Medicine, and Sociology.

New Members:

If you are interested in joining ISBA (a newly formed international society which interfaces between Bayesian methods, and a spectrum of scientific areas) then please send your name affiliation, address, and E-mail address together with your annual membership fee of $25 to:

Professor Gordon M. Kaufman
Treasurer, ISBA
MIT School of Management
Room 53-375
Massachusetts Institute of Technology
Cambridge, MA 02139, USA

CALL FOR NOMINATIONS FOR ISBA OFFICERS

The ISBA Business Meeting, held in San Francisco on August 6, during the first ISBA meeting, appointed a nominating committee, of 5 persons (J. Bernardo, D. Fong, S. Geisser, M. Mouchart (Chairman), and S.J. Press) to be responsible for organizing the first election of the Board of ISBA. It was decided that this Board be composed of a President, Vice President, Treasurer, Secretary, and 12 International Advisors.

This Nominating Committee decided to organize the Election in two steps:

FIRST STEP: Every Member of ISBA is invited to send to the Chairman of the Nominating Committee a Slate of Nominees for each of the 16 positions, to be received not later than October 31,1993. Every nominee must be an ISBA member. The slate of nominees should be sent by mail, E-mail, or FAX to:

Michel Mouchart
Institut De Statistique
Voie du Roman Pays 34
B-1348 Louvain-La-Neuve
Belgium
E-mail: MOUCHART@STAT.UCL.AC.BE
FAX:32.10.47.30.42

SECOND STEP: Every member will receive a ballot by mail for the final voting on the candidates by the end of November 1993.

The nominating committee recommends that the first elected board be responsible for providing the Society with a written constitution.

FROM OUR MAILBAG

* Following Tom Leonard's survey article in the first issue, HERMAN VAN DIJK (Tinbergen Institute) wrote to send us the original introduction of importance sampling in Bayesian analysis, by T. Kloek and himself. This article (Econometrica, vol. 46, 1978) preceded Zellner and Rossi's famous application to the linear logistic model (Journal of Econometrics, 1984) by some six years. Thank you, Herman! Can any of our members predate 1978 on this important idea?

* IRVING LAVALLE (Tulane University) sent us some papers on expected utility [Lavalle and Fishburn, Journal of Risk Uncertainty (1991 and 1992)]. He still likes the Savage Axioms, but agrees that natural conjugate priors are probably outdated.

* MARIO DE BACCO (Bologna) sent us a copy of his paper with Giuliana Regoli (Perugia) containing an interesting alternative approach to Expected Utility Theory.

* RICHARD BARLOW (Berkeley) wrote with some brief comments on the advantages of the De Finetti approach to Bayesian ideas.

* ROBERT RAUTENBERG (California) wrote to encourage our first ISBA conference.

THE FIRST WORLD MEETING OF ISBA (August 6-7) Hotel Nikko, San Francisco, California.

Our first world meeting was a great success, with nearly 200 participants packing into the Hotel Nikko in San Francisco. Congratulations to organizer Rob McCulloch, on a wonderful meeting. Thanks to Chase-Manhattan Bank, Electric Power Research Institute, and H.G.B. Alexander Research Foundation for their financial support. The invited sessions included a large amount of lively discussion, and comprised:

Bayesian Analysis and the Environment (chaired by George Judge)

Papers on energy related environment issues and ecological risk assessment were presented by Stephen Peck and Robert Wolpert.

Applications (Howard Edwards)

Projections of the AIDS Epidemic, Point Spreads in Rugby League, and Purchase Behavior of the Infrequent Shopper, were discussed by Wally Gilks, William Griffiths, and Greg Allenby.

Bayesian Computation (Sudip Bose)

Importance Sampling, Commercial Software and Non-Parametric Inference were discussed by Ming-Hui Chen, Dale Nesbitt, and Paul Ramgopal.

Bayesian Analysis in the Earth Sciences (J.K. Ghosh)

Earthquakes and nuclear monitoring were highlights of these papers by Mark Matthews and Robert Shumway, and Gordon Kaufman contributed to a lively discussion.

Bayesian Education (George Duncan)

Teaching Bayes using Minitab, Undergraduate Education, and teaching comparative statistics and econometrics, were the topics of papers presented by James Albert, Giovanni Parmigiani, and Dale Poirier.

Time Series Analysis (Enrique de Alba)

A variety of Bayesian techniques were proposed by S. Chib, W. Gersch, and R. Kohn.

Bayesian Analysis in Econometrics (Dale Poirier)

Consistent Aggregation and Mixture Models in Marketing were discussed by Garth Holloway and G.M. Allenby, and the discussion was led by Jeff Perloff and Sid Chib.

Bayesian Nonparametrics (Malay Ghosh)

Bayesian inference for probability distributions and regression models was investigated by Michael Lavine, Peter Lenk, and Michael West.

Applications 2 (John Monahan)

Image Restoration, Forecasting Tornado Intensity, and Deformable Templates, were subjected to the Bayesian paradigm by Ali-Mohammed-Djafari, John Monahan, and David Phillips.

Inference 1 (Andrew Gelman)

Generalized Linear Models, Conflict, and MANOVA, were discussed by Prakash Laud, Tom Lucas, and J.K. Ghosh.

Bayesian Analysis on Wall Street (Jean-Francois Angers)

Stochastic Volatility Models and Global Portfolio Performance were analyzed by Eric Jacquier and Bluford Putnam, and the discussion was led by Ehsan Soofi.

Bayesian Analysis in Psychology (James Berger)

In one of the keynote sessions, Normative Bayesian Theory and Bayesian Networks were described by Robert Bordley and Ward Edwards and the discussion was led by Jay Kadane.

Hierarchical Models (John Wakefield)

In a lively and well chaired session, Ed George talked about variable selection for Lindley-Smith regression, and Tom Leonard reported new results by Li Sun and Irwin Guttman, which confirm some unexpected properties of M-group

regression.

Bayesian Analysis and Government and Firm Policy-Making (Steve Fienberg)

Jose Bernardo, James Valverde, and C.H. Whiteman presented papers on Government Policy, Resolving Policy Disputes, and Policy Analysis.

Bayesian Analysis in Physics and Astronomy (Mark Berliner)

In one of two exciting sessions relating Bayesian methods to Physics, Hal Lewis discussed Physics without data, and Tom Loredo gave a splendid talk on inference in Astrophysics. Larry Bretthorst lead the discussion.

Image Processing (Shanti Gupta)

Julian Besag (who arranged several good social sessions) talked about his ongoing approach to Image analysis. Valen Johnson was concerned with the estimation of medical images and physicist John Skilling presented a paper on Entropy without bars.

Reliability (John Deely)

A.P. Basu, Ehsan Soofi, and Vicki Bier presented papers on Stress Strength Systems, Reliability Modelling, and Perfect Aggregation.

Inference Problems 2 (D.K. Dey)

Adrian Raftery, X-L Meng, and R. Scozzafava presented interesting papers on Model Selection, Frequency Properties, and Qualitative Inference.

Statistical Inference:Views from Physics (Seymour Geisser)

In perhaps the most fascinating session of the whole conference, Larry Bretthorst presented a paper on behalf of Ed Jaynes, and surveying Ed's maximum entropy approach. R.N. Silver and H.F. Martz showed that Bayesian roughness penalty approaches to the smoothing of probability densities, are closely related to the theories of Quantum Physics.

SPECIAL NOTE: Professor Jaynes was unable to attend the conference due to poor health. We would like to wish him a speedy recovery. He is nearing completion of his book on Maximum Entropy, and Larry Bretthorst has a copy of his writings on disc.

Bayesian Analysis in Engineering and Reliability (Dale Nesbitt)

Dick Barlow and Nozer Singpurwalla gave very coherent presentations (in a Bayesian sense) on Bayesian analyses in these areas.

Inference 3 (Ron Christansen)

John Deely, Yoel Haitovsky, and Stephen Blyth (with Adrian Smith) presented papers on Partially Exchangeable Models, Binary Data, and Full Meta Analysis.

Inference 4 (Joseph Ibrahim)

Lyle Broemeling, Don Rubin, and Robert Weiss concluded a magnificent conference, with papers on Selection and Ranking, Multiple Sequence Methods, and Influential Observations.

At a historic conference dinner on Saturday August 7, 1993, at the Hotel Nikko, acting president Arnold Zellner announced that the Second World Meeting will take place in Valencia next year, following the International Bayesian Meeting organized by Jose Bernardo.

We were honored with the presence of J. Stuart Hunter, President of the Amer. Stat. Assoc., who gave an entertaining after dinner speech and encouraged our new Scientific Society. S. James Press also gave a speech thanking everybody who had helped either with the conference or in creating the Society. The Hotel Nikko showered us with hospitality. The manager was even persuaded to bring us a bottle of his personal wine.

AN INTERESTING RESULT FROM ENTROPY THEORY

[As described during the conference by Larry Bretthorst (Washington University), and John Skilling (University of Cambridge)].

The assumption of independence of observation vectors is most frequently justified by randomization at the design stage. However, suppose that you know the (marginal) distributions of each of your observation vectors, but have no further information regarding their joint distribution. Then you can choose the joint distribution which minimizes the entropy

distance between this and the true distribution, but subject to your constraints on the marginals. Quite interestingly, the minimum entropy distance distribution is just the product of the marginals. Therefore, even if you haven't randomized at the design stage, Jaynes' entropy approach tells us that we can analyze the results as if randomization had indeed occurred.

Furthermore, if your residuals are correlated but you have no specific information regarding the correlation structure, then you should analyze your data as if the residuals were independent.

Any comments from the readership regarding these properties of information theory?

DEBATE REGARDING THE POSSIBILITY OF A JOURNAL INTERFACING WITH THE SCIENCES

Most of our members who have discussed this issue believe that a journal would not only be a success, but would also provide substantial motivation for our Society, which would otherwise just end up as an umbrella organization for various Bayesian conferences.

The key issue, first raised by Dennis Lindley at the Minneapolis-St. Paul 1991 NSF meetings, is whether this would affect the acceptability of Bayesian papers in mainstream statistics journals (JASA, Annals of Statistics, JRSSB).

In Minneapolis-St. Paul, a slight majority voted in favor of a journal. The following year, in Valencia, the majority voted against. It is not clear whether the vote was against a Bayesian Statistics journal (which is clearly unnecessary) or whether the discussion concerned a broader Bayesian journal, interfacing across disciplines and encouraging the use of our techniques.

At the San Francisco business meeting a handsome majority voted to ask Seymour Geisser and anybody interested to "look into the possibility" of a journal along these lines and to report back to future meetings. Some members are extremely keen to start a journal. Please write the Newsletter with your opinions.

UPCOMING CONFERENCES:

October 9-11, 1993. Workshop on Case Studies of Bayesian Statistics in Science and Technology, Pittsburgh, PA., U.S.A. Contact: Rob Kass, Department of Statistics, Carnegie Mellon University. E-mail: kass@stat.cmu.edu.

The ISBA Newsletter would like to publish a report of this conference if an attendee will send one in. E-mail: leonard@stat.wisc.edu or jdorfman@agecon.conner.uga.edu

The Second Annual ISBA Meeting is scheduled for June 10-11, 1994 in Alicante Spain (a Mediterranean resort city). This will immediately follow the annual Valencia Bayesian Statistical Conference. Program chair for the 1994 ISBA Meetings is Michel Mouchart. Contact him for more information (his address is on the front of the newsletter).

RENEWAL REMINDER

Anyone wishing to renew their membership should send $25.00 to Professor Gordon M. Kaufman, address on the front of the newsletter. The deadline is January 31, 1994.

THE ILL-ADVISED BAYESIAN

Roger M. Cooke
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November 24, 1992

This note illustrates problems of combining expert subjective probability distributions from a Bayesian perspective, taking account of past performance. Uncertain quantities X_i take values in $\mathbb{R}$. Advisers Eff and Gee give cumulative distribution functions F_i and G_i for X_i. A decision maker intends to observe X_1 and wishes to use the information provided by F_1, G_1 and X_1 in combining the advisers' opinions for X_2, etc. Initially the distributions F_i and G_i are unknown and are treated as random functions. A Bayesian model for updating the decision maker's distribution for X_2 on the information F_1, G_1 and X_1 will have to specify the joint distribution P on $\{F_1,F_2,G_1,G_2,X_1,X_2\}$.

Two models have explicitly tried to incorporate Bayesian updating in this context, Morris (1974, 1977) and Mendel and Sheridan (1989). Both models assume that the random variables $F_i(X_i)$ i = 1,2 are

exchangeable, when both F_i and X_i are uncertain. De Finetti arguments are used to show that under reasonable conditions as $n \rightarrow \infty$;

where the conditioning is done over realizations of X_i and F_i.

The problem with this type of model is that we never learn X_i and F_i simultaneously. We typically learn F_i first, and our updating on realizations[1] $x_1, \ldots x_n$ occurs after our beliefs are already conditionalized on the F_i. Why else consult advisers? Exchangeability is generally not preserved under conditionalization, and the derivation of the above limit will generally not go through if *P* is replaced by $P(\bullet \mid F_i, i=1, \ldots n+1)$. In fact, it will follow from the proposition given below that exchangeability after conditionalization on the advisers' distributions is not a feasible modeling assumption. Let "~" denote equality of distributions in the proposition given below.

Proposition 1: Suppose that the joint distribution *P* over $\{F_1,F_2,G_1,G_2,X_1,X_2\}$ is continuous and invertible in $F_i(X_i)$ and $G_i(X_i)$, i = 1,2; and that Prob{F_i and G_i are invertible, i - 1,2} = 1. Then $fF_2(X_2) \sim F_1G_1^{-1}gG_2(X_2)$

where

Proof: By definition, for all $r \in [0,1]$:

Since the inverses of the F_i and G_i exist *P*-almost surely,

The distribution of $F_i(X_i)$ determines how 'well-calibrated' the decision maker believes adviser Eff to be for variable X_i; if $F_i(X_i)$ has a uniform distribution under *P*, then Eff is perfectly calibrated for this variable. Proposition 1 shows that the decision maker's calibration of Eff on X_2 is constrained by his/her beliefs about Gee and about Eff's assessment for X_1. A Bayesian updating model will have to specify *P*, and the choice of model is constrained by Proposition 1, as illustrated in the following corollaries.

Corollary 1: If the variables $F_i(X_i)$ are exchangeable under *P* and the variables $G_i(X_i)$ are exchangeable under *P*, then f≡1 and g≡1.

Corollary 2: If *P* is concentrated on $\{F_1, F_2, G_1, G_2\}$, then

Proof: It suffices to note that

Combining these two, if the variables $F_i(X_i)$ are exchangeable after conditionalizing *P* on $\{F_1, F_2, G_1, G_2\}$, and if $G_i(X_i)$ are exchangeable after conditionalizing *P* on $\{F_1, F_2, G_1, G_2\}$, then necessarily $F_2 = F_1G^1G_2$. If the latter relation does not hold, exchangeability in the conditionalized distributions is not possible. More generally, if the functions f and g are the same for all variables $F_i(X_i)$ and $G_i(X_i)$, then for any k, $F_kG^1 = f^{-1}F_1G^1g$.

The problem is that conditional on the advisers' distributions, the variables $F_i(X_i)$ and $G_i(X_i)$ are simply reparametrizations of X_i, about which the decision maker already has a prior opinion. Updating the decision maker's opinion about Eff and Gee can never be more than updating this reparametrized prior,

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1 We do not use lower case to denote realizations of the CDF's, as this would invite confusion with standard notation for densities.

for which the advisers are not necessary at all.

References:

Mendel, M. and Sheridan, T. (1989) "Filtering Information from Human Experts" *IEEE Trans. on Systems, Man and Cybernetics*, vol. 19 no. 1.

Morris, P. (1974) "Decision Analysis Expert Use" *Management Science*, vol 23, 1233-1241.

Morris, P. (1977) "Combining Expert Judgements: A Bayesian Approach" *Management Science*, vol. 23, 679-693.