Power of FBST: Standard Examples

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ABSTRACT

The Full Bayesian Significance Test (FBST) introduced by Pereira & Stern (1999) is the Bayesian alternative for the Classical significance test. The evidence evaluation of the FBST corresponds to the p-value computation. The present paper presents, for standard examples, an empirical calculation of the power of the FBST and compares it with the power of the corresponding classical test.

Jeffrey's Rule: An alternative procedure to model uncertainty

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ABSTRACT

We review the Jeffrey's Rule for the updating of probabilities and some recent developments in Bayesian Inference using this rule. The concept of Jeffrey – independence and its link with the commutativity of Jeffrey's

Rule will be discussed. The concept of Jeffrey-conjugacy and the predictivistic approach for Jeffrey's Rule are shown.
We also point out some fundamental aspects of this updated rule: the consequence of disobeying Cromwell's Law and the inexistence of a likelihood function to update the prior distribution. We apply Jeffrey's Rule to the Three Prisoner Paradox given new insight to the paradox.

Hierachical Bayesian Models for Stochastic Frontier

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ABSTRACT

In this paper a Bayesian approach is used to model stochastic production functions. Among the advantages of the Bayesian paradigm, the following are stressed: it provides exact finite sample results to any quantity of interest and it fully takes into account parameter uncertainty. Some new developments on stochastic frontiers are reported. The efficiency is modelled through a random component with an asymmetric distribution, characterized by one or two parameters. The one parameter case includes the half-normal, the exponential and the lognormal distributions. Except the later, they all produce a monotonically decreasing shape for the inefficiency. The observational distribution is assumed either normally distributed or, alternatively, a heavy tail distribution like the Student-t with small number of degrees of freedom, in order to allow outlying observations. The rate of return, or the total elasticity, can be assumed equal for all the decision making units or can be assumed exchangeable among the cross sections of units. The developed models are applied to a real data set and the results illustrated and commented. These models are estimated from a Bayesian point of view using Markov chain Monte Carlo methods and their potentiality assessed via different measures for model selection.

RESAMPLING-BASED HYPOTHESIS TESTS FOR ACCELERATED DATA WITH A LOG-NON-LINEAR STRESS-RESPONSE RELATIONSHIP

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ABSTRACT

Time and cost efficient reliability industrial experiments consist of submitting items to levels of stress higher than the usual working conditions, and then obtaining measures of the reliability of the devices under the usual working conditions via data obtained under stress levels, leading to the accelerated life tests. In this paper we consider an accelerated life tests model with a log-non-linear stress-response relationship. The advantage of such a formulation is that the general framework accommodates several stress-response relationship usually considered on accelerated life tests, while is flexible enough for fitting the data that cannot be accommodate by a simple log-linear stress-response relationship. A problem however is that classical tests to assess significance of the model parameters often run into problems once the tests can be non nested. In this context we present an alternative direct approach to overcome this disadvantage. The central idea is bootstraping the test statistics in order to obtain their empirical distribution. We establish the adequacy of the bootstrap tests based on the likelihood ratio statistics and on a modified score statistics for small and moderate sample sizes by simulating their size and power via a Monte Carlo study.

ACCURACY INDEX OF STATISTICAL MODELS: AXIOMATIC APPROACH

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ABSTRACT
In this paper we deal with the problem of model selection from a very foundational perspective. In order to compare models, an accuracy measure is assumed and then, we elaborate on the properties of such a measure. Specifically, we propose a set of axioms to characterize any accuracy index and, as our main result, we show that, for the case of a discrete random variable with a finite sample space, a general expresion for the index is available.
It is also shown that the popular Kullback-Leibler divergency measure is just a particular case of our family of indexes.

Factor stochastic volatility with time-varying loadings

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ABSTRACT

In this article we use factor models to describe a certain class of covariance structure for financial time series models. More specically, we concentrate on situations where the factor variances are modelled by a multivariate stochastic volatility structure. We build on previous work by allowing the factor loadings, in the factor model structure, to have a time-varying structure and to capture changes in asset weights over time motivated by applications with multiple time series of daily exchange rates. We explore and discuss potential extensions to the models exposed here in the prediction area. This discussion leads to open issues on real time implementation and natural model comparisons.

BAYESIAN METHODOLOGY FOR MODELING PARAMETERS IN THE TWO PARAMETER EXPONENTIAL FAMILY

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ABSTRACT

In this paper we propose a Bayesian methodology to model orthogonal or non orthogonal parameters of distributions belonging to two parameter exponential family. This methodology extends the Bayesian methodology proposed in Cepeda and Gamerman(2001) to model variance heterogeneity in normal regression analysis, which is based on the orthogonality between the mean, M and variance, ¾2. We model the mean and the shape parameters in gamma distribution, and the mean and the dispersion parameter of Beta distribution.
We show results of the simulated studies and a few applications.

INFERENCES ON THE RATIO OF NORMAL MEANS AND OTHER RELATED PROBLEMS

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ABSTRACT

The problem of making inferences about the ratio of two parameters has been addressed, both from the frequentist and Bayesian perspectives, by many authors over the last fifty years. Most of this work is concerned with the ratio of two normal means. In this paper, we review the most relevant results regarding the Bayesian analysis of the normal case as well as some related, more general, problems.

EXPLORING COMMON STRUCTURE IN MULTIPLE TIME SERIES VIA STRUCTURED PRIORS FOR AUTOREGRESSIVE PROCESSES

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ABSTRACT

We present structured prior modeling in multiple time series, focusing on latent component structure for a collection of autoregressive processes. Similar to the univariate case, the state-space representation of these vector processes implies that each univariate time series can be decomposed into simple underlying components.
Such components may have a common structure across the series that define the vector process. The prior specification proposed here extends the class
of prior distributions for univariate autoregressions presented in Huerta and West (1999) to a multivariate context. Additionally, this approach allows the consideration of uncertainty on the number of latent processes across the multiple series and consequently, it handles model order uncertainty in the vector autoregressive framework. Posterior inference and implementation are developed via customized Markov chain Monte Carlo (MCMC) methods. Issues related to inference and exploration of the posterior distribution are discussed. Illustrative data analyses are presented.

ACCURACY OF THE GIBBS SAMPLING IN CAPTURE-RECAPTURE MODELS

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ABSTRACT

This article presents two Bayesian models of capture-recapture taking into account informative and non informative priors for the models parameters. For both models to determine exact Bayesian estimates of the size, N, of the population request a considered computational effort. As a suggestion, the Gibbs sampling algorithm is used as a alternative approach. Exact and Monte Carlo estimates based on the simulated Gibbs samplers of N are calculated considering three different data set. In the first data set, where the capture probabilities in all occasions of sampling are all small, the exact and the approximate estimates are very close, whereas in those cases where the capture probabilities are greater than 0.35 the obtained results practically show a coincidence between both methods.