Statistique bayésienne: projet

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Instructions:
(1) The project must be done by groups of two students. (2) The project should be about 5 pages (plus code), with reasonable font size and margins. (3) It is an applied project. Each group has to choose a statistical application or simulation and then analyse it with Bayesian methods related to the material seen in class. You are free to choose to work either with a real data set or with simulated data. You can consider a statistical problem that you have already analysed with frequentist procedure in another class or during an internship. (4) Before starting to work on a project it must be approved by me. So, please email me (anna.simoni@ensae.fr): the names of the participants of the group and a short description of the project so that I can validate it. (5) You can use any language among Python, R or Matlab for the programming. (6) The due date of the project is January 23rd 2020. By the due data please send

- your report as a pdf,
- a zipped folder containing your code and a detailed readme file with instructions to run the code

to anna.simoni@ensae.fr.

A possible structure of the project is: (1) definition of the problem under study and explanation of why it is interesting, (2) choice of the appropriate Bayesian technique (you should explain the methodology used and the motivation why you have chosen it), (3) description of the computational method used and difficulties encountered, (3) explanation and interpretation of the results. You can also compare the results you find with the results that you find with a frequentist approach.
If you prefer, you can develop a project based on an academic article (below it is a partial

list or you can propose an article). In this case you can, for instance, replicate and extend the simulations in the paper, or find a real data set and apply the method of the paper to it, or develop a simulation study if the paper does not contain it. An article can be chosen only by one group on the first-in-first-out basis. So, if you want to choose an article among the ones proposed below please email me the titles of three articles in order of preference and I will assign you the first article that is still available in your list.

Proposed topics

Computations:

1. Tanner, M.A. and W.H. Wong, (1987). Calculation of Posterior Distributions by Data Augmentation. *Journal of the American Statistical Association*, Vol. 82, n. 398, pp. 528 – 540.

2. Chib, S. (1995), Marginal Likelihood from the Gibbs Output. *Journal of the American Statistical Association*, Vol. 90, n. 432, pp. 1313 – 1321.

3. Albert, J. and S. Chib, (1993). Bayesian Analysis of Binary and Polychotomous Response Data. *Journal of the American Statistical Association*, 88, 669 – 679.

4. Chib, S. and I. Jeliazkov, (2001). Marginal Likelihood from the Metropolis-Hastings Output. *Journal of the American Statistical Association*, 96, 270 – 281.

Partial Identification:

5. Moon, R.H. and F. Schorfheide, (2012). Bayesian and Frequentist Inference in Partially Identified Models, *Econometrica*, 80, 755 – 782.

6. Norets, A. and X. Tang, (2014). Semiparametric Inference in Dynamic Binary Choice Models, *Review of Economic Studies*, 81, 1229 – 1262.

7. Chen, X., Christensen, T. and E., Tamer, (2018). Monte Carlo Confidence Sets for Identified Sets, *https://arxiv.org/abs/1605.00499.*

Other topics and applications:

8. Muller, U. and A. Norets, 2016. Coverage Inducing Priors in Nonstandard Inference Problem, *Journal of the American Statistical Association*, 111, 1233 – 1241.

9. Goldsmith-Pinkham, P. and G.W. Imbens (2013). Social Networks and the Identification of Peer Effects. *Journal of Business & Economic Statistics*, Vol. 31, n. 3, pp. 253 – 264.

10. Hirano, K. (2002). Semiparametric Bayesian Inference in Autoregressive Panel Data Models. *Econometrica*, 70, 781 – 799.

11. Kottas, A. and A.E., Gelfand (2001). Bayesian Semiparametric Median Regression Modeling. *Journal of the American Statistical Association*, 96, 1458 – 1468.

12. Belitser, E. and S. Ghosal (2003). Adaptive Bayesian inference on the mean of an infinite-dimensional normal distribution, *The Annals of Statistics*, 31, 536 – 559.

13. McCulloch, R. and P. Rossi (1994), An exact likelihood analysis of the multinomial probit model. *Journal of Econometrics*, Vol. 64, pp. 207-240.

Moment Conditions:

14. Scennach, S. (2005). Bayesian Exponentially Tilted Empirical Likelihood, *Biometrika*, 92, 31 – 46.

15. Liu, Z., Forbes, C. and Anderson, H.M. (2017). A Robust Bayesian Exponentially Tilted Empirical Likelihood Method, Arxiv working paper. *https://arxiv.org/abs/1801.00243*

16. Chib, S., Shin, M. and Simoni, A. (2018). Bayesian Estimation and Comparison of Moment Condition Models, *Journal of the American Statistical Association*, 113, 1656 – 1668.

17. Chernozhukov, V. and H.Hong (2003). An MCMC approach to classical estimation, *Journal of Econometrics*, 115, 293 – 346.