Editorial overview: Special issue on Bayesian nonparametrics

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Guest editor of the special issue on Bayesian nonparametrics

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Bayesian nonparametrics started its journey over fifty years ago when Freedman showed that the behavior of the posterior distribution in infinite dimensional models may be rather peculiar. Soon after came the celebrated paper by Schwartz on posterior consistency which is still very relevant today. Indeed a rich theory of posterior concentration developed in the last fifteen–twenty years is deeply indebted to her theorem. Within ten years the nascent subject got a tremendous boost when Ferguson introduced the Dirichlet process. The journey continued with the introduction of new tools for prior constructions through Dirichlet process mixtures, Gaussian processes and independent increment processes. However, Bayesian nonparametric methods became truly integrated in a statistician's toolbox only after the astonishing development of Markov chain Monte Carlo methods in the early nineties, assisted by ever increasing computing power, made virtually any Bayesian nonparametric methods computable. On the theoretical side results on posterior consistency, concentration rates, adaptation, Bernstein-von Mises theorem and coverage of credible sets developed to an unbelievable extent in the recent years, and these results continue to pour in every day, maturing the subject. At the same time discrete random objects such as partitions and clusters have led to the development of Bayesian machine learning and its integration with Bayesian nonparametrics.

To fulfill the growing need of a conference solely dedicated to Bayesian nonparametrics, the first meeting of the kind was held in Reeding, U.K., 1997. Since then the conference is being organized roughly every other year. It grew in participation and influence, and distinguished itself as a major conference in the Bayesian circle. The 10th conference on Bayesian Nonparametrics was held in North Carolina State University Campus, Raleigh, during the period June 22–26, 2015, under the banner of the International Society for Bayesian Analysis. The conferences consisted of 3 plenary lectures, 24 invited talks, about 50 contributed talks and 40 poster presentations covering all aspects of modern day Bayesian nonparametrics. Federal grants from the National Science Foundation, Army Research Office and the Office of Naval Research made it possible to support over seventy participants. Generous private donations from SAS Inc. and

Google helped cover a significant portion of the expenses allowing the organizers to reduce or waive the registration fee. The conference was also co-sponsored by the Institute of Mathematical Statistics.

As the organizer of the conference, we felt that a special issue of a major statistics journal dedicated to Bayesian nonparametrics would be instrumental for publishing many exciting ideas presented in the conference. This was inspired by the successful publication of a handbook on Bayesian nonparametrics by the Cambridge University Press following the Bayesian nonparametric meeting in Cambridge, UK, 2007, and a special issue of the Journal of Statistical Planning and Inference with contributions from participants of the 9th conference on Bayesian nonparametrics in Amsterdam, The Netherlands, 2013. The Electronic Journal of Statistics serves as a natural venue for the special issue because of its broad coverage, high quality and reputation for timely publication.

The present special issue tried to touch various corners of current research interests in Bayesian nonparametrics. Frequentist asymptotic properties of Bayesian nonparametric methods are studied in the papers by De Blasi and Walker on conditional density estimation, and by Shen, Ning and Yuan on independent component analysis. Bayesian methodology and applications are developed in the papers by Canale and Ruggiero on forecasting of monotone functional time series with application to modeling price of natural gas; Barcella, De Iorio, Baio and Malone-Lee on modeling the number of white blood cells; Marcon, Padoan and Antoniano-Villalobos on multivariate extremal dependence with application to exchange rate modeling; Filippi, Holmes and Nieto-Barajas on scalable methods for testing pairwise dependence; Bean, Xu and MacEachern on Bayesian density estimation through transformations, and Guha and Baladandayuthapani on high dimensional regression based on clustering predictors in groups. Bayesian models of complex processes and machine learning are addressed in the papers by Elliott and Teh on hidden Markov models for genetic imputation; Papaspiliopoulos, Ruggiero and Spanò on time evolving random measures, and Cai, Ackerman and Freer on priors on exchangeable directed graphs. Computational techniques are developed in the papers by Argianto, Bianchini and Guglielmi on ϵ-approximations for normalized random measures and Raykov, Boukouvalas and Little on approximate maximum a posteriori inference for Dirichlet process mixture models.

We are indebted to a number of people. George Michailidis enthusiastically approved the proposal for a special issue, gave many valuable suggestions and spent a lot of his precious time working as the editor in chief. The editorial staff, especially Geri and Ina, set up a very efficient system for paper submission and review for the special issue and helped in tons of other ways. The associate editors for the special issue, Francois Caron, Ismaël Castillo, Li Ma, Peter Orbanz, Igor Prünster, Surya Tokdar and Harry van Zanten along with anonymous referees worked tirelessly on multiple rounds of vigorous reviews within a limited period of time which made it possible to publish the special issue on schedule. Finally the contributors of papers for the special issue are to be congratulated and thanked for their contributions.