

Applied Bayesian Nonparametric Mixture Modeling

Presenters: Athanasios Kottas and Abel Rodriguez
Department of Applied Mathematics and Statistics
University of California, Santa Cruz
(thanos@ams.ucsc.edu, abel@ams.ucsc.edu)

2014 ISBA World Meeting
Cancún, Mexico
Sunday July 13, 2014

REFERENCES

- Antoniak, C.E. (1974), "Mixtures of Dirichlet Processes With Applications to Bayesian Nonparametric Problems," *The Annals of Statistics*, 2, 1152-1174.
- Argiento, R., Guglielmi, A., and Pievatolo, A. (2009), "A comparison of nonparametric priors in hierarchical mixture modelling for AFT regression," *Journal of Statistical Planning and Inference*, 139, 3989-4005.
- Bagshaw, S., and Ghali, W. (2004), "Acetylcysteine for prevention of contrast-induced nephropathy after intravascular angiography: a systematic review and meta-analysis," *BMC medicine*, 2, 38.
- Basu, S., and Mukhopadhyay, S. (2000), "Bayesian analysis of binary regression using symmetric and asymmetric links," *Sankhya, Series B, Indian Journal of Statistics*, 62, 372-387.
- Berry, D.A., and Christensen, R. (1979), "Empirical Bayes Estimation of a Binomial Parameter via Mixtures of a Dirichlet Process," *The Annals of Statistics*, 7, 558-568.
- Bhattacharya, P.K. (1981), "Posterior Distribution of a Dirichlet Process from Quantal Response Data," *The Annals of Statistics*, 9, 803-811.
- Blackwell, D., and MacQueen, J.B. (1973), "Ferguson Distributions via Pólya Urn Schemes," *The Annals of Statistics*, 1, 353-355.
- Blei, D.M., and Jordan, M.I. (2006), "Variational inference for Dirichlet process mixtures," *Bayesian Analysis*, 1, 121-144.
- Brunner, L.J. (1992), "Bayesian Nonparametric Methods for Data from a Unimodal Density," *Statistics and Probability Letters*, 14, 195-199.
- Brunner, L.J. (1995), "Bayesian Linear Regression With Error Terms That Have Symmetric Unimodal Densities," *Journal of Nonparametric Statistics*, 4, 335-348.
- Brunner, L.J., and Lo, A.Y. (1989), "Bayes Methods for a Symmetric Unimodal Density and its Mode," *The Annals of Statistics*, 17, 1550-1566.
- Burr, D., Doss, H., Cooke, G.E., Goldschmidt-Clermont, P.J. (2003), "A meta-analysis of studies on the association of the platelet PIA polymorphism of glycoprotein IIIa and risk of coronary heart disease," *Statistics in Medicine*, 22, 1741-1760.
- Bush, C.A., and MacEachern, S.N. (1996), "A Semiparametric Bayesian Model for Randomised Block Designs," *Biometrika*, 83, 275-285.

- Cao, G., and West, M. (1996), "Practical Bayesian inference using mixtures of mixtures," *Biometrics*, 52, 1334-1341.
- Carota, C., and Parmigiani, G. (2002), "Semiparametric regression for count data," *Biometrika*, 89, 265-281.
- Chib, S., and Hamilton, B.H. (2002), "Semiparametric Bayes analysis of longitudinal data treatment models," *Journal of Econometrics*, 110, 67-89.
- Cifarelli, D.M., and Regazzini, E. (1978), "Nonparametric statistical problems under partial exchangeability. The use of associative means," (in Italian), *Annali dell' Istituto di Matematica Finanziaria dell'Universita di Torino, Serie III*, 12, 1-36.
- Connor, R.J., and Mosimann, J.E. (1969), "Concepts of independence for proportions with a generalization of the Dirichlet distribution," *Journal of the American Statistical Association*, 64, 194-206.
- Dahl, D.B. (2005), "Sequentially-Allocated Merge-Split Sampler for Conjugate and Nonconjugate Dirichlet Process Mixture Models," Technical Report.
- Damian, D., Sampson, P.D., and Guttorp, P. (2001), "Bayesian Estimation of Semi-parametric Non-stationary Spatial Covariance Structures," *Environmetrics*, 12, 161-178.
- Das, K., and Chattopadhyay, A.K. (2004), "An analysis of clustered categorical data – application in dental health," *Statistics in Medicine*, 23, 2895-2910.
- De Iorio, M., Müller, P., Rosner, G.L., and MacEachern, S.N. (2004), "An ANOVA Model for Dependent Random Measures," *Journal of the American Statistical Association*, 99, 205-215.
- De Iorio, M., Johnson, W.O., Müller, P., and Rosner, G.L. (2009), "Bayesian Nonparametric Nonproportional Hazards Survival Modeling," *Biometrics*, 65, 762-771.
- DerSimonian R. and Laird N. (1986), "Meta-analysis in clinical trials," *Control Clin Trials*, 7, 177-188.
- Dey, D., Mueller, P., and Sinha, D. (Editors) (1998). *Practical Nonparametric and Semiparametric Bayesian Statistics*. New York: Springer.
- DeYoreo, M., and Kottas, A. (2014), "A fully nonparametric modeling approach to binary regression," Technical Report, Department of Applied Mathematics and Statistics, University of California, Santa Cruz. Manuscript available at <http://arxiv.org/abs/1404.5097>
- Diaconis, P., and Ylvisaker, D. (1985), "Quantifying prior opinion," in: J.M. Bernardo, M.H. DeGroot, D.V. Lindley and A.F.M. Smith, eds. *Bayesian statistics 2* (North-Holland, Amsterdam).
- Disch, D. (1981), "Bayesian Nonparametric Inference for Effective Doses in a Quantal-Response Experiment," *Biometrics*, 37, 713-722.
- Do, K.-A., Müller, P., and Tang, F. (2005), "A Bayesian mixture model for differential gene expression," *Applied Statistics (Journal of the Royal Statistical Society, Series C)*, 54, 627-644.
- Dominici, F., and Parmigiani, G. (2001), "Bayesian Semiparametric Analysis of Developmental Toxicology Data," *Biometrics*, 57, 150-157.
- Duan, J.A., Guindani, M., and Gelfand, A.E. (2007), "Generalized Spatial Dirichlet Process Models," *Biometrika*, 94, 809-825.
- Dunson, D.B. (2005), "Bayesian semiparametric isotonic regression for count data," *Journal of the American Statistical Association*, 100, 618-627.
- Dunson, D.B. and Park, J.-H. (2008), "Kernel stick-breaking processes," *Biometrika*, 95, 307-323.

- Erkanli, A., Sung, M., Costello, E.J., and Angold, A. (2006), "Bayesian semi-parametric ROC analysis," *Statistics in Medicine*, 25, 3905-3928.
- Escobar, M.D. (1988), "Estimating the Means of Several Normal Populations by Nonparametric Estimation of the Distribution of the Means," Ph.D. dissertation, Yale University.
- Escobar, M.D. (1994), "Estimating Normal Means With a Dirichlet Process Prior," *Journal of the American Statistical Association*, 89, 268-277.
- Escobar, M.D., and West, M. (1995), "Bayesian Density Estimation and Inference Using Mixtures," *Journal of the American Statistical Association*, 90, 577-588.
- Etzioni, R., Pepe, M., Longton, G., Hu, C., Goodman, G. (1999), "Incorporating the time dimension in receiver operating characteristic curves: A case study of prostate cancer," *Medical Decision Making*, 19, 242-251.
- Fabius, J. (1964), "Asymptotic Behavior of Bayes' Estimates," *The Annals of Mathematical Statistics*, 35, 846-856.
- Ferguson, T.S. (1973), "A Bayesian Analysis of Some Nonparametric Problems," *The Annals of Statistics*, 1, 209-230.
- Ferguson, T.S. (1974), "Prior Distributions on Spaces of Probability Measures," *The Annals of Statistics*, 2, 615-629.
- Ferguson, T.S. (1983), "Bayesian Density Estimation by Mixtures of Normal Distributions," in *Recent Advances in Statistics*, eds. M.H. Rizvi, J.S. Rustagi and D. Siegmund, New York: Academic Press, pp. 287-302.
- Freedman, D.A. (1963), "On the Asymptotic Behavior of Bayes' Estimates in the Discrete Case," *The Annals of Mathematical Statistics*, 34, 1386-1403.
- Fronczyk, K., and Kottas, A. (2014a), "A Bayesian nonparametric modeling framework for developmental toxicity studies," To appear with discussion in the *Journal of the American Statistical Association*.
- Fronczyk, K., and Kottas, A. (2014b), "A Bayesian approach to the analysis of quantal bioassay studies using nonparametric mixture models," *Biometrics*, 70, 95-102.
- Gasparini, M. (1996), "Bayesian density estimation via Dirichlet density processes," *Journal of Nonparametric Statistics*, 6, 355-366.
- Gelfand, A.E. (1999), "Approaches for Semiparametric Bayesian Regression," in *Asymptotics, Nonparametrics and Time Series*, ed. S. Ghosh, New York: Marcel Dekker, pp. 615-638.
- Gelfand, A.E., and Kuo, L. (1991), "Nonparametric Bayesian Bioassay Including Ordered Polytomous Response," *Biometrika*, 78, 657-666.
- Gelfand, A.E., and Mukhopadhyay, S. (1995), "On Nonparametric Bayesian Inference for the Distribution of a Random Sample," *The Canadian Journal of Statistics*, 23, 411-420.
- Gelfand, A.E., and Kottas, A. (2002), "A Computational Approach for Full Nonparametric Bayesian Inference under Dirichlet Process Mixture Models," *Journal of Computational and Graphical Statistics*, 11, 289-305.
- Gelfand, A.E., and Kottas, A. (2003), "Bayesian Semiparametric Regression for Median Residual Life," *Scandinavian Journal of Statistics*, 30, 651-665.
- Gelfand, A.E., Kottas, A., and MacEachern, S.N. (2005), "Bayesian Nonparametric Spatial Modeling With Dirichlet Process Mixing," *Journal of the American Statistical Association*, 100, 1021-1035.

- Ghosh, J.K., and Ramamoorthi, R.V. (2003), *Bayesian Nonparametrics*, New York: Springer.
- Goldstein, H. (1979), *The Design and Analysis of Longitudinal Studies*, London: Academic Press.
- Gopalan, R., and Berry, D.A. (1998), "Bayesian Multiple Comparisons Using Dirichlet Process Priors," *Journal of the American Statistical Association*, 93, 1130-1139.
- Griffin, J.E., and Steel, M.F.J. (2004), "Semiparametric Bayesian inference for stochastic frontier models," *Journal of Econometrics*, 123, 121-152.
- Griffin, J.E., and Steel, M.F.J. (2006), "Order-based dependent Dirichlet processes," *Journal of the American Statistical Association*, 101, 179-194.
- Giudici, P., Mezzetti, M., and Muliere, P. (2003), "Mixtures of products of Dirichlet processes for variable selection in survival analysis," *Journal of Statistical Planning and Inference*, 111, 101-115.
- Griffin, J.E., and Steel, M.F.J. (2006), "Order-based dependent Dirichlet processes," *Journal of the American Statistical Association*, 101, 179-194.
- Gutiérrez-Peña, E., and Nieto-Barajas, L.E. (2003), "Bayesian nonparametric inference for mixed Poisson processes," in: J.M. Bernardo, M.J. Bayarri, J.O. Berger, A.P. Dawid, D. Heckerman, A.F.M. Smith and M. West, eds. *Bayesian Statistics 7* (University Press, Oxford), pp. 163-179.
- Guttorp, P. (1995), *Stochastic Modelling of Scientific Data*, Chapman & Hall, Boca Raton.
- Hannah, L.A., Blei, D.M., and Powell, W.B. (2011), "Dirichlet process mixtures of generalized linear models," *Journal of Machine Learning Research*, 12, 1923-1953.
- Hanson, T.E. (2006), "Modeling censored lifetime data using a mixture of gammas baseline," *Bayesian Analysis*, 1, 575-594.
- Hanson, T., Branscum, A., and Johnson, W. (2005), "Bayesian Nonparametric Modeling and Data Analysis: An Introduction," in *Bayesian Thinking: Modeling and Computation (Handbook of Statistics, volume 25)*, eds. D.K. Dey and C.R. Rao, Amsterdam: Elsevier, pp. 245-278.
- Hanson, T.E., Kottas, A., and Branscum, A.J. (2008), "Modeling stochastic order in the analysis of receiver operating characteristic data: Bayesian non-parametric approaches," *Journal of the Royal Statistical Society, Series C*, 57, 207-225.
- Hasegawa, H., and Kozumi, H. (2003), "Estimation of Lorenz curves: a Bayesian nonparametric approach," *Journal of Econometrics*, 115, 277-291.
- Hirano, K. (2002), "Semiparametric Bayesian inference in autoregressive panel data models," *Econometrica*, 70, 781-799.
- Hjort, N.L. (1996), "Bayesian Approaches to Non- and Semiparametric Density Estimation," in *Bayesian Statistics 5, Proceedings of the Fifth Valencia International Meeting*, eds. J.M. Bernardo, J.O. Berger, A.P. Dawid and A.F.M. Smith, Oxford: Oxford Clarendon Press, pp. 223-253.
- Hjort, N.L. (2000), "Bayesian Analysis for a Generalised Dirichlet Process Prior," Statistical Research Report, Department of Mathematics, University of Oslo.
- Hjort, N.L., Holmes, C., Müller, P., and Walker, S.G. (Editors) (2010). *Bayesian Nonparametrics*. Cambridge University Press.
- Hoff, P. (2005), "Subset clustering of binary sequences, with an application to genomic abnormality data," *Biometrics*, 61, 1027-1036.
- Ibrahim, J.G., Chen, M-H., and Sinha, D. (2001), *Bayesian survival analysis*, New York: Springer.

- Ishwaran, H., and James, L.F. (2001), "Gibbs Sampling Methods for Stick-Breaking Priors," *Journal of the American Statistical Association*, 96, 161-173.
- Ishwaran, H., and James, L.F. (2002), "Approximate Dirichlet process computing in finite normal mixtures: smoothing and prior information," *Journal of Computational and Graphical Statistics*, 11, 1-26.
- Ishwaran, H., and James, L.F. (2004), "Computational methods for multiplicative intensity models using weighted gamma processes: Proportional hazards, marked point processes, and panel count data," *Journal of the American Statistical Association*, 99, 175-190.
- Ishwaran, H., and Zarepour, M. (2000), "Markov Chain Monte Carlo in Approximate Dirichlet and Beta Two-parameter Process Hierarchical Models," *Biometrika*, 87, 371-390.
- Jain, S., and Neal, R. M. (2004), "A Split-Merge Markov Chain Monte Carlo Procedure for the Dirichlet Process Mixture Model," *Journal of Computational and Graphical Statistics*, 13, 158-182.
- Jain, S., and Neal, R. M. (2007), "Splitting and Merging Components of a Nonconjugate Dirichlet Process Mixture Model," (with discussion), *Bayesian Analysis*, 2, 445-500.
- Jasra, A., Holmes, C.C., and Stephens, D.A. (2005), "Markov chain Monte Carlo methods and the label switching problem in Bayesian mixture modeling," *Statistical Science*, 20, 50-67.
- Johnson, V.E., and Albert, J.H. (1999), *Ordinal Data Modeling*, New York: Springer.
- Kalli, M., Griffin, J. E., and Walker, S. G. (2011). "Slice sampling mixture models", *Statistics and computing*, 21, 93-105.
- Kingman, J.F.C. (1993), *Poisson Processes*, Clarendon Press, Oxford.
- Kleinman, K.P., and Ibrahim, J.G. (1998), "A semi-parametric Bayesian approach to generalized linear mixed models," *Statistics in Medicine*, 17, 2579-2596.
- Kottas, A. (2006), "Nonparametric Bayesian Survival Analysis using Mixtures of Weibull Distributions," *Journal of Statistical Planning and Inference*, 136, 578-596.
- Kottas, A., and Behseta, S. (2010), "Bayesian nonparametric modeling for comparison of single-neuron firing intensities," *Biometrics*, 66, 277-286.
- Kottas, A., and Gelfand, A.E. (2001), "Bayesian Semiparametric Median Regression Modeling," *Journal of the American Statistical Association*, 96, 1458-1468.
- Kottas, A., and Krnjajić, M. (2009), "Bayesian Semiparametric Modeling in Quantile Regression," *Scandinavian Journal of Statistics*, 36, 297-319.
- Kottas, A., and Sansó, B. (2007), "Bayesian mixture modeling for spatial Poisson process intensities, with applications to extreme value analysis," *Journal of Statistical Planning and Inference*, 137, 3151-3163.
- Kottas, A., Branco, M.D., and Gelfand, A.E. (2002), "A Nonparametric Bayesian Modeling Approach for Cytogenetic Dosimetry," *Biometrics*, 58, 593-600.
- Kottas, A., Duan, J.A., and Gelfand, A.E. (2008), "Modeling Disease Incidence Data with Spatial and Spatio-temporal Dirichlet Process Mixtures," *Biometrical Journal*, 50, 29-42.
- Kottas, A., Müller, P., and Quintana, F. (2005), "Nonparametric Bayesian Modeling for Multivariate Ordinal Data," *Journal of Computational and Graphical Statistics*, 14, 610-625.
- Kottas, A., Wang, Z., and Rodriguez, A. (2012), "Spatial modeling for risk assessment of extreme values from environmental time series: a Bayesian nonparametric approach," *Environmetrics*, 23, 649-662.

- Kottas, A., Behseta, S., Moorman, D.E., Poynor, V., and Olson, C. (2012), "Bayesian nonparametric analysis of neuronal intensity rates," *Journal of Neuroscience Methods*, 203, 241-253.
- Krnjajić, M., Kottas, A., and Draper, D. (2008), "Parametric and Nonparametric Bayesian Model Specification: A Case Study Involving Models for Count Data," *Computational Statistics & Data Analysis*, 52, 2110-2128.
- Kuo, L. (1983), "Bayesian Bioassay Design," *The Annals of Statistics*, 11, 886-895.
- Kuo, L. (1986a), "A Note on Bayes Empirical Bayes Estimation by Means of Dirichlet Processes," *Statistics and Probability Letters*, 4, 145-150.
- Kuo, L. (1986b), "Computations of Mixtures of Dirichlet Processes," *SIAM Journal on Scientific and Statistical Computing*, 7, 60-71.
- Kuo, L., and Ghosh, S.K. (1997). Bayesian nonparametric inference for nonhomogeneous Poisson processes. Technical Report, Department of Statistics, University of Connecticut.
- Kuo, L., and Mallick, B. (1997), "Bayesian Semiparametric Inference for the Accelerated Failure-Time Model," *The Canadian Journal of Statistics*, 25, 457-472.
- Kuo, L., and Smith, A.F.M. (1992), "Bayesian Computations in Survival Models via the Gibbs Sampler," in *Survival Analysis: State of the Art*, eds. J.P. Klein and P.K. Goel, Dodrecht: Kluwer Academic Publishers, pp. 11-24.
- Kyung, M., Gill, J. and Casella, G. (2010), "Estimation in Dirichlet random effects models," *Annals of Statistics*, 38, 979-1009.
- Laird, N. M., and Ware, J. H. (1982), "Random-Effects Models for Longitudinal Data," *Biometrics*, 38, 963-974.
- Lavine, M., and Mockus, A. (1995), "A Nonparametric Bayes Method for Isotonic Regression," *Journal of Statistical Planning and Inference*, 46, 235-248.
- Lau, J.W., and Green, P.J. (2007), "Bayesian Model-Based Clustering Procedures," *Journal of Computational and Graphical Statistics*, 16, 526-558.
- Lee, J., and Berger, J.O. (1999), "Semiparametric Bayesian Analysis of Selection Models," *Journal of the American Statistical Association*, 96, 1397-1409.
- Leslie, D.S., Kohn, R., and Nott, D.J. (2007), "A general approach to heteroscedastic linear regression," *Statistics and Computing*, 17, 131-146.
- Lijoi, A., Mena, R.H., and Prünster, I. (2007), "Controlling the reinforcement in Bayesian non-parametric hierarchical models," *Journal of the Royal Statistical Society, Series B*, 69, 715-740.
- Liu, J.S. (1996), "Nonparametric Hierarchical Bayes via Sequential Imputations," *The Annals of Statistics*, 24, 911-930.
- Lo, A.Y. (1984), "On a Class of Bayesian Nonparametric Estimates: I. Density Estimates," *The Annals of Statistics*, 12, 351-357.
- Lo, A.Y., and Weng, C.-S. (1989), "On a class of Bayesian nonparametric estimates: II. Hazard rate estimates," *Annals of the Institute of Statistical Mathematics*, 41, 227-245.
- MacEachern, S.N. (1999), "Dependent Nonparametric Processes," in *ASA Proceedings of the Section on Bayesian Statistical Science*, Alexandria, VA: American Statistical Association, pp. 50-55.

- MacEachern, S.N. (2000), "Dependent Dirichlet Processes," Technical Report, Department of Statistics, The Ohio State University.
- MacEachern, S.N., and Müller, P. (1998), "Estimating Mixture of Dirichlet Process Models," *Journal of Computational and Graphical Statistics*, 7, 223-238.
- MacEachern, S.N., Clyde, M., and Liu, J.S. (1999), "Sequential Importance Sampling for Nonparametric Bayes Models: The Next Generation," *The Canadian Journal of Statistics*, 27, 251-267.
- Mallick, B.K., and Walker, S.G. (1997), "Combining Information from Several Experiments With Nonparametric Priors," *Biometrika*, 84, 697-706.
- Merrick, J.R.W., Soyer, R., and Mazzuchi, T.A. (2003), "A Bayesian semiparametric analysis of the reliability and maintenance of machine tools," *Technometrics*, 45, 58-69.
- Mira, A., and Petrone, S. (1996), "Bayesian Hierarchical Nonparametric Inference for Change-Point Problems," in *Bayesian Statistics 5, Proceedings of the Fifth Valencia International Meeting*, eds. J.M. Bernardo, J.O. Berger, A.P. Dawid and A.F.M. Smith, Oxford: Oxford Clarendon Press, pp. 693-703.
- Møller, J., and Waagepetersen, R.P. (2004), *Statistical Inference and Simulation for Spatial Point Processes*, Chapman & Hall, Boca Raton.
- Mukhopadhyay, S. (2000), "Bayesian Nonparametric Inference on the Dose Level With Specified Response Rate," *Biometrics*, 56, 220-226.
- Mukhopadhyay, S., and Gelfand, A.E. (1997), "Dirichlet Process Mixed Generalized Linear Models," *Journal of the American Statistical Association*, 92, 633-639.
- Muliere, P., and Tardella, L. (1998), "Approximating Distributions of Random Functionals of Ferguson-Dirichlet Priors," *The Canadian Journal of Statistics*, 26, 283-297.
- Müller, P., and Quintana, F.A. (2004), "Nonparametric Bayesian Data Analysis," *Statistical Science*, 19, 95-110.
- Müller, P., and Rodriguez, A. (2013), *Nonparametric Bayesian Inference*, NSF-CBMS Regional Conference Series in Probability and Statistics, Volume 9.
- Müller, P., and Roeder, K. (1997), "A Bayesian Semiparametric Model for Case-control Studies With Errors in Variables," *Biometrika*, 84, 523-537.
- Müller, P., and Rosner, G.L. (1997), "A Bayesian Population Model With Hierarchical Mixture Priors Applied to Blood Count Data," *Journal of the American Statistical Association*, 92, 1279-1292.
- Müller, P., Erkanli, A., and West, M. (1996), "Bayesian Curve Fitting Using Multivariate Normal Mixtures," *Biometrika*, 83, 67-79.
- Müller, P., Quintana, F.A., and Rosner, G. (2004), "A method for combining inference across related nonparametric Bayesian models," *Journal of the Royal Statistical Society, Ser. B*, 66, 735-749.
- Müller, P., West, M., and MacEachern, S. (1997), "Bayesian Models for Non-linear Autoregressions," *Journal of Time Series Analysis*, 18, 593-614.
- Müller, P., Rosner, G.L., De Iorio, M., and MacEachern, S. (2005), "A nonparametric Bayesian model for inference in related longitudinal studies," *Applied Statistics (Journal of the Royal Statistical Society, Series C)*, 54, 611-626.
- Neal, R.M. (2000), "Markov Chain Sampling Methods for Dirichlet Process Mixture Models," *Journal of Computational and Graphical Statistics*, 9, 249-265.

- Newton, M.A., and Zhang, Y. (1999), "A Recursive Algorithm for Nonparametric Analysis With Missing Data," *Biometrika*, 86, 15-26.
- Ostle, B. (1963). *Statistics in Research: Basic Concepts and Techniques for Research*. Ames: Iowa State University Press.
- Papaspiliopoulos, O., and Roberts, G.O. (2008), "Retrospective Markov chain Monte Carlo methods for Dirichlet process hierarchical models," *Biometrika*, 95, 169-186.
- Pitman, J., and Yor, M. (1997), "The Two-Parameter Poisson-Dirichlet Distribution Derived from a Stable Subordinator," *The Annals of Probability*, 25, 855-900.
- Quintana, F.A. (1998), "Nonparametric Bayesian Analysis for Assessing Homogeneity in $k \times l$ Contingency Tables With Fixed Right Margin Totals," *Journal of the American Statistical Association*, 93, 1140-1149.
- Richardson, S., and Green, P.J. (1997), "On Bayesian Analysis of Mixtures With an Unknown Number of Components" (with discussion), *Journal of the Royal Statistical Society, Ser. B*, 59, 731-792.
- Rodriguez, A., and Dunson, D.B. (2011), "Nonparametric Bayesian models through probit stick-breaking processes," *Bayesian Analysis*, 6, 145-178.
- Rodriguez, A., and ter Horst, E. (2008), "Bayesian dynamic density estimation," *Bayesian Analysis*, 3, 339-366.
- Rodriguez, A., Dunson, D.B., and Gelfand, A.E. (2008), "The nested Dirichlet process," (with discussion), *Journal of the American Statistical Association*, 103, 1131-1154.
- Rodriguez, A., Dunson, D.B., and Gelfand, A.E. (2009), "Bayesian nonparametric functional data analysis through density estimation," *Biometrika*, 96, 149-162.
- Rodriguez, A., Wang, Z., and Kottas, A. (2014), "Assessing systematic risk in the S&P500 index between 2000 and 2011: A Bayesian nonparametric approach," Technical Report, Department of Applied Mathematics and Statistics, University of California, Santa Cruz.
- Sethuraman, J., and Tiwari, R.C. (1982), "Convergence of Dirichlet Measures and the Interpretation of their Parameter," in *Statistical Decision Theory and Related Topics III*, eds. S. Gupta and J.O. Berger, New York: Springer-Verlag, 2, pp. 305-315.
- Sethuraman, J. (1994), "A Constructive Definition of Dirichlet Priors," *Statistica Sinica*, 4, 639-650.
- Shahbaba, B., and Neal, R. (2009), "Nonlinear models using Dirichlet process mixtures," *Journal of Machine Learning Research*, 10, 1829-1850.
- Sinha, D., and Dey, D.K. (1997), "Semiparametric Bayesian Analysis of Survival Data," *Journal of the American Statistical Association*, 92, 1195-1212.
- Stephens, M. (2000), "Bayesian Analysis of Mixture Models With an Unknown Number of Components - An Alternative to Reversible Jump Methods," *The Annals of Statistics*, 28, 40-74.
- Taddy, M. (2010), "An auto-regressive mixture model for dynamic spatial Poisson processes: Application to tracking the intensity of violent crime," *Journal of the American Statistical Association*, 105, 1403-1417.
- Taddy, M., and Kottas, A. (2009), "Markov switching Dirichlet process mixture regression," *Bayesian Analysis*, 4, 793-816.
- Taddy, M., and Kottas, A. (2010), "A Bayesian Nonparametric Approach to Inference for Quantile Regression," *Journal of Business and Economic Statistics*, 28, 357-369.

- Taddy, M., and Kottas, A. (2012), "Mixture modeling for marked Poisson processes," *Bayesian Analysis*, 7, 335-362.
- Teh, Y.W., Jordan, M.I., Beal, M.J., and Blei, D.M. (2006), "Hierarchical Dirichlet processes," *Journal of the American Statistical Association*, 101, 1566-1581.
- Tomlinson, G., and Escobar, M. (1999), "Analysis of Densities," Research Report, Department of Public Health Sciences, University of Toronto.
- Walker, S.G. (2007), "Sampling the Dirichlet Mixture Model with Slices," *Communications in Statistics – Simulation and Computation*, 36, 45-54.
- Walker, S.G., Damien, P., Laud, P.W., and Smith, A.F.M. (1999), "Bayesian Nonparametric Inference for Random Distributions and Related Functions" (with discussion), *Journal of the Royal Statistical Society, Ser. B*, 61, 485-527.
- West, M., Müller, P., and Escobar, M.D. (1994), "Hierarchical Priors and Mixture Models, With Application in Regression and Density Estimation," in *Aspects of Uncertainty: A Tribute to D.V. Lindley*, eds. A.F.M. Smith and P. Freeman, New York: Wiley, pp. 363-386.
- Wolpert, R.L., and Ickstadt, K. (1998), "Poisson/Gamma random field models for spatial statistics," *Biometrika*, 85, 251-267.
- Xiao, S., Kottas, A., and Sanso, B. (2014), "Modeling for seasonal marked point processes: An analysis of evolving hurricane occurrences," Technical Report, Department of Applied Mathematics and Statistics, University of California, Santa Cruz.