Vinayak A.P. Rao

Current information

Assistant Professor, Purdue University
Dept. of Statistics (2014-present),
Dept. of Computer Science (by courtesy, 2018-present),

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Academic background

Postdoctoral research associate, Duke University
Dept. of Statistical Science (November 2012-July 2014)

PhD in Machine Learning, University College London
Gatsby Computational Neuroscience Unit (June 2012)

Research interests

Bayesian nonparametrics, machine learning, Markov chain Monte Carlo methods, continuous-time stochastic models, point processes, mixture modeling, Bayesian computation, decision theory, network analysis

Awards

- Statistics Outstanding Assistant Professor Teaching Award, 2018
- Regina and Norman F. Carroll (Col. USAF) Research Award, 2017
- Savage Award 2015 (Theory and Methods), International Society for Bayesian Analysis
- Bogue research fellowship, 2010

External Grants

1. Probabilistic models of repulsion and reinforcement
   NSF/CISE/RI, Primary Investigator
   $234,004 (100% of total), 2018-2021
2. Decision theoretic Bayesian computation
   NSF/DMS, Primary Investigator
   $150,000 (50% of total), 2018-2021

Internal Grants

1. PRF International Travel Grant, 2018, $1,400
2. PRF Research Grant, 2017-18, $29,526
3. PRF Summer Faculty Grant, 2017, $8,000

Submitted Journal Publications ($^+$: Grad student)

1. Zhang, B.$^+$and **Rao**, **V.A.** (2018) Efficient parameter sampling for Markov jump processes (revision submitted).
2. Sudyanti, P.$^+$and **Rao**, **V.A.** (2018) Mixture modeling on constrained spaces.
3. Jaiswal, P.$^+$, **Rao**, **V.A.** and Honnappa, H. (2018) Asymptotic consistency of α-Rényi-approximate posteriors.
4. Wang, Q.$^+$, **Rao**, **V.A.** and Teh, Y.W. (2019) An exact auxiliary variable Gibbs sampler for a class of diffusions.

Journal Publications

5. Tang, B.$^+$, Iyer, A.$^+$, **Rao**, **V.A.** and Kong, N. (2019) Group-representative functional network estimation from multi-subject fMRI data via MRF-based image segmentation. *Computer Methods and Programs in Biomedicine* (accepted).
6. Lin, L., **Rao**, **V.A.**, and Dunson, D. B. (2017). Bayesian inference on the Stiefel manifold. *Statistica Sinica*.
7. **Rao**, **V.A.**, Adams, R.P. and Dunson, D.B. (2016). Bayesian inference for Matérn repulsive processes. *Journal of the Royal Statistical Society, Series B*.

8. **Rao**, **V.A.**, Lin, L., and Dunson, D. B. (2016) Data-augmentation for models based on rejection sampling. *Biometrika*.
9. Yuan, X., **Rao**, **V.A.**, Han, S., and Carin, L. (2014). Multiscale shrinkage with Lévy processes. *IEEE Transactions in Signal Processing*.
10. **Rao**,**V.A.** and Teh, Y.W. (2013). MCMC inference for Markov jump processes and extensions. *Journal of Machine Learning Research 14*.
11. Howard, M.W., Jing, B, **Rao**, **V.A.**, Provyn, J.P. and Datey, A.V. (2008). Bridging the gap: Transitive associations between items presented in similar temporal contexts. *Journal of Experimental Psychology: Learning, Memory, and Cognition, Vol 35(2)*.

Refereed Conference Publications

12. Murphy, R.$^+$, Srinivasan, B.$^+$, **Rao**, **V.A.** and Ribeiro, B. (2019) Relational pooling for graph representations. *International Conference on Machine Learning* (Acceptance rate: 22%)
13. Yang, J.$^+$, **Rao**, **V.A.** and Neville, J. (2019) A Stein–Papangelou Goodness-of-Fit Test for Point Processes *Artificial Intelligence and Statistics* (Oral) (Oral acceptance rate: 2.5%)
14. Murphy, R.$^+$, Srinivasan, B.$^+$, **Rao**, **V.A.** and Ribeiro, B. (2019) Janossy pooling: learning deep permutation-invariant functions for variable-size inputs. *International Conference on Learning Representations* (Acceptance rate: 31%)
15. Gomes, G.M.$^+$, **Rao**, **V.A.** and Neville, J. (2018) Multi-level hypothesis testing for populations of heterogeneous networks. *International Conference on Data Mining* (Acceptance rate: 11%)
16. Tan, X.$^+$, **Rao**, **V.A.** and Neville, J. (2018) The Indian Buffet Hawkes process to model evolving latent influences. *Uncertainty in Artificial Intelligence*. (Acceptance rate: 31%)
17. Yang, J.$^+$, Liu, Q., **Rao**, **V.A.**, and Neville, J. (2018) Goodness-of-fit testing for discrete distributions via Stein discrepancy. *International Conference on Machine Learning*. (Acceptance rate: 25%)
18. Tan, X.$^+$, **Rao**, **V.A.** and Neville, J. (2018) Nested CRP with Hawkes-Gaussian processes. *Artificial Intelligence and Statistics*. (Acceptance rate: 33%)
19. Pan, J.$^+$, Zhang, B.$^+$and **Rao**, **V.A.** (2017) Collapsed variational inference for Markov jump processes. *Neural Information Processing Systems*. (Acceptance rate: 20%)
20. Yang, J.$^+$, **Rao**, **V.A.** and Neville, J. (2017) Decoupling homophily and reciprocity with latent space network models. *Uncertainty in Artificial Intelligence*. (Acceptance rate: 31%)
21. Tan, X.$^+$, Naqvi, S.$^+$, **Rao**, **V.A.**, Heller, K., and Qi, Y. (2016) Content-based Modeling of Reciprocal Relationships using Hawkes and Gaussian Processes *Uncertainty in Artificial Intelligence*. (Acceptance rate: 31%)
22. Pan, J.$^+$, **Rao**, **V.A.**, Agarwal, P., and Gelfand, A. (2016) Markov-modulated marked Poisson processes for check-in data. *International Conference on Machine Learning*. (Acceptance rate: 24%)
23. Lian, W.$^+$, Henao, R., **Rao**, **V.A.**, Lucas, J., and Carin, L. (2015). A multitask point process predictive model. *Int. Conf. on Machine Learning*. (Acceptance rate: 26%)
24. Lian, W.$^+$, **Rao**, **V.A.**, Eriksson, B., and Carin, L. (2014). Modeling correlated arrival events with latent semi-Markov processes. *Int. Conf. on Machine Learning*. (Acceptance rate: 22%)
25. Carlson, D.$^+$, **Rao**, **V.A.**, Vogelstein, J., and Carin, L. (2013). Real-time inference for a Gamma process model of neural spiking. *Adv. in Neural Information Proc. Sys. 26* . (Acceptance rate: 25%)

26. Chen, C.$^+$, **Rao,V.A.**, Buntine,W. and Teh, Y.W. (2013). Dependent normalized random measures. *Int. Conf. on Machine Learning*. **(Oral presentation)**. (Acceptance rate: 12%)
27. **Rao,V.A.** and Teh, Y.W. (2012). MCMC for continuous-time discrete-state systems. *Adv. in Neural Information Proc. Sys. 25*. (Acceptance rate: 25%)
28. Petralia, F.$^+$, **Rao,V.A.** and Dunson, D. (2012). Repulsive mixtures. *Adv. in Neural Information Proc. Sys. 25*. (Acceptance rate: 25%)
29. **Rao,V.A.** and Teh, Y.W. (2011). Gaussian process modulated renewal processes. *Adv. in Neural Information Proc. Sys. 24*. (Acceptance rate: 22%)
30. **Rao,V.A.** and Teh, Y.W. (2011). Fast MCMC inference for Markov jump processes and continuous time Bayesian networks. *The 27th Conf. on Uncertainty in AI* (Acceptance rate: 34%)
31. **Rao,V.A.** and Teh,Y.W. (2009). Spatial normalized Gamma processes. *Adv. in Neural Information Proc. Sys. 22*. (Acceptance rate: 24%)
32. **Rao**, **V.A.** and Howard, M.W. (2007). Retrieved context and the discovery of semantic structure. *Adv. in Neural Information Proc. Sys. 20*. **(Spotlight presentation)**.

Book Chapters

33. **Rao**, **V.A.** (2015). Dirichlet Process mixtures and nonparametric Bayesian approaches to clustering. *The Handbook of Cluster Analysis*, *editors Roberto Rocci*, *Fionn Murtagh*, *Marina Meila*, *Christian Hennig*. Chapman & Hall/CRC.

Workshop proceedings

34. **Rao**, **V.A.**, Sudderth, E., and Teh, Y. W. (2014). Expectation propagation for Dirichlet process mixture models. *Advances in Variational Inference*, *NIPS 2014*.

Professional Activities

Senior program committee for NeurIPS 2019
Senior program committee for ICML 2017, 2018 and 2019
Senior program committee for AISTATS 2016, 2017, 2018 and 2019
Publications chair in AISTATS 2015 organizing committee
Panel and ad hoc grant reviewer for the National Science Foundation
Grant reviewer for the National Science Center, Poland
Grant reviewer for the European Research Council
Organized and chaired sessions on Machine Learning, and Nonparametric Bayes for the 9th International Purdue Symposium on Statistics

Reviewing

Journal of Machine Learning Research, Journal of the Royal Statistical Society-B, Journal of the American Statistical Association, Annals of Statistics, Bayesian Analysis, IEEE Trans. on Pattern Analysis and Machine Intelligence, Operations Research, Machine Learning Journal, Statistics and Computing, Journal of Artificial Intelligence Research, Statistics and Probability Letters, Methodology and Computing in Applied Probability, Journal of Computational and Graphical Statistics, International Conference on Learning Representations (2018), Neural Information Processing Systems (2010, 2011, 2013, 2014, 2016, 2017), International Conference on Machine Learning (2010, 2013, 2014), Artificial Intelligence and Statistics (2011), Uncertainty in Artificial Intelligence (2012, 2013), International Joint Conferences on Artificial Intelligence (2011), Association for Advancement of Artificial Intelligence (2012)

Teaching

Spring 2015-2019 Purdue	Stat598Z:	Intro. to Computing for Statistics
Fall 2014-2018, Purdue	Stat545:	Intro. to Computational Statistics
Fall 2016-2018, Purdue	Stat695:	Bayesian Data Analysis

Talks

December 2019	2019 Conf. of the IISA, Mumbai, India	Invited Talk
November 2019	Duke University, Statistics	Colloquium
July 2019	University College London, UK	Invited talk
July 2019	University of Oxford, UK, Statistics	Colloquium
June 2019	12th conf. on Bayesian nonparametrics, Oxford, UK	Invited talk
February 2019	Indiana University-Purdue University, Indianapolis, Biostatistics	Colloquium
February 2018	University of Notre Dame, Appl. and Comp. Math and Stat	Colloquium
December 2017	2017 Conf. of the IISA, Hyderabad, India	Invited
September 2017	University of Louisville, Biostatistics	Colloquium
April 2017	University of Iowa, Statistics	Colloquium
December 2016	University of Turin, Statistics	Colloquium
December 2016	CMStatistics conference, Seville	Invited
September 2016	Simon Fraser University, Statistics	Colloquium
August 2016	Joint Statistical Meetings, Chicago	Contributed
May 2016	University of Missouri (St. Louis), Math/CS	Colloquium
December 2015	CMStatistics conference, London	Invited
October 2015	The Pennsylvania State University, Statistics	Colloquium
August 2015	Joint Statistical Meetings, Seattle	Invited
July 2015	Purdue University, ISIM workshop	Invited
April 2015	Univ. of Texas (Austin), Statistics	Colloquium
February 2014	University College London, Gatsby Unit	Colloquium
February 2014	Virginia Tech, Statistics	Colloquium
February 2014	Purdue University, Statistics	Colloquium
January 2014	Univ. of Chicago, Booth School of Business	Colloquium
January 2014	University of Michigan (Ann Arbor), Statistics	Colloquium
January 2014	University of Chicago, Statistics	Colloquium
January 2014	The Ohio State University, Statistics	Colloquium
September 2013	Duke University, iiD	Colloquium
June 2013	9th conference on Bayesian nonparametrics, Amsterdam, Netherlands	Invited talk
February 2013	NCSU, Statistics	Colloquium
November 2012	Duke University, Statistics	Colloquium
June 2012	University College London, CSML	Colloquium
October 2011	Brown University, CS	Colloquium
November 2011	Univ. of Cambridge, Machine Learning Group	Colloquium
June 2011	8th workshop on Bayesian nonparametrics, Veracruz, Mexico	Contrib talk
November 2010	Univ. of Cambridge, Machine Learning Group	Colloquium
May 2007	Soc. for Math. Psychology, 40th Meeting	Contrib talk
2007-2012	University College London, Gatsby Unit	Many talks

Other experience

Machine Learning Summer School, (University of Cambridge, UK, August 2009)
Research Assistant, Syracuse University, NY, (August 2005 - May 2007)
Design Engineer, Paxonet Comm. Inc., India (now Conexant Systems)
(August 2003 - July 2005)