Shariq Mohammed

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PRESENT POSITION

Assistant Professor *August 2021+*
Department of Biostatistics
Boston University (BU), Boston, MA

Hariri Junior Faculty Fellow *August 2022+*
Rafik B. Hariri Institute for Computing and Computational Science & Engineering
Boston University (BU), Boston, MA

EDUCATION & TRAINING

University of Michigan (U-M), Ann Arbor, MI

Precision Health Scholar *2019-2021*

Postdoctoral Research Fellow *2018-2021*
Mentors: Dr. *Veerabhadran Baladandayuthapani* & Dr. *Arvind Rao*

University of Connecticut (UConn), Storrs, CT

Ph.D. in Statistics *August 2018*
Dissertation: Bayesian variable selection with applications to neuroimaging data
Advisors: Dr. *Dipak Dey* & Dr. *Yuping Zhang*

M.S. in Statistics *September 2017*

Chennai Mathematical Institute (CMI), Chennai, India

M.Sc. Applications of Mathematics *May 2014*

Indian Statistical Institute (ISI), Bangalore, India

B.Math.(Hons.) *June 2012*

RESEARCH INTERESTS

Methodology:
Bayesian modeling, variable selection, geometric/functional data analysis and spatial statistics

Applications:
biomedical imaging analysis, neuro- and cancer-imaging, imaging-genomics, digital data, Alzheimer's disease and precision health

RESEARCH POSITIONS

Research Assistant, *The Travelers Companies*, Hartford, Connecticut *2016 - 2018*

Graduate/Research Assistant, *UConn* *2016 - 2017*

Summer Student Worker, *Pfizer Inc.*, Boston, Massachusetts *Summer 2016*

Research Intern, *Tata Consultancy Services Innovation Labs*, Hyderabad, India *Summer 2013*

GRANTS

- Developing novel digital neuropsychological test-based markers to quantify heterogeneity in participants' performance: *Framingham Heart Study Brain Aging Program* pilot *2022 - 2023*
- Statistical modeling for topographic analysis of spatially resolved transcriptomics data: *BU SPH Early Career Catalyst Award* *2022 - 2023*
- Integrative decision models combining radiological-imaging and genotypic data in gliomas: *Precision Health Scholars Award* by Precision Health at U-M *2019 - 2021*

PUBLICATIONS

† equal contribution; * co-corresponding

17. Panigrahi, S., **Mohammed, S.**, Rao, A. and Baladandayuthapani, V.: Integrative Bayesian models using post-selective inference: A case study in radiogenomics. To appear in *Biometrics*. arXiv:2004.12012

16. Turk, S., Wang, N.C., Kitis, O., **Mohammed, S.** et al. (2022). Comparative study of radiologists vs machine learning in differentiating biopsy-proven pseudoprogression and true progression in diffuse gliomas. *Neuroscience Informatics*, 2(3), p.100088. 10.1016/j.neuri.2022.100088

15. Qin, A., Lima, F., Bell, S., ..., **Mohammed, S.** et al. (2022). Cellular engagement and interaction in the tumor microenvironment predict non-response to PD-1/PD-L1 inhibitors in metastatic non-small cell lung cancer. *Scientific Reports*, 12(1), pp.1–13. 10.1038/s41598-022-13236-8

14. Bhattachayya, R., Banerjee, S., **Mohammed, S.** and Baladandayuthapani, V. (2022): Spatial network-based modeling of COVID-19 dynamics: Early pandemic spread in India. To appear in *Journal of the Indian Statistical Association*. medRxiv

13. Krishnan, S.N.†, **Mohammed, S.**†, Frankel, T.L. and Rao, A. (2022): GaWRDenMap: A quantitative framework to study the local variation in cell-cell interactions in pancreatic disease subtypes. *Scientific Reports*, 12(1), pp.1–11.

12. **Mohammed, S.**, Ravikumar, V., Warner, E., Patel, S.H. et al. (2021): Quantifying T2-FLAIR mismatch using geographically weighted regression and predicting molecular status in lower-grade gliomas. *American Journal of Neuroradiology*, 43(1), pp.33–39. 10.3174/ajnr.A7341 (Nominated for 2021 Lucien Levy Best Research Article; AJNR blog announcement.)

11. Halder, A., **Mohammed, S.**, Chen, K. and Dey D.K. (2021): Spatial Tweedie exponential dispersion models: An application to insurance rate-making. *Scandinavian Actuarial Journal*, 10, pp.1017–1036. 10.1080/03461238.2021.1921017

10. **Mohammed, S.**, Bharath, K., Kurtek, S., Rao, A. and Baladandayuthapani, V. (2021): RA-

DIOHEAD: Radiogenomic analysis incorporating tumor heterogeneity in imaging through densities. *Annals of Applied Statistics*, 15(4), pp.1808–1830. 10.1214/21-AOAS1458

9. **Mohammed, S.** and Dey D.K. (2021): Scalable spatio-temporal Bayesian analysis of high-dimensional electroencephalography data. *Canadian Journal of Statistics*, 49, pp.107–128. 10.1002/cjs.11592

8. Lee, J., Wang, N., Turk, S., **Mohammed, S.** et al., (2020): Discriminating pseudoprogression and true progression in diffuse infiltrating glioma using multi-parametric MRI data through deep learning. *Scientific Reports*, 10, 2033. 10.1038/s41598-020-77389-0

7. **Mohammed, S.**, Li, T., Chen, X.D., Warner, E. et al., (2020). Density-based classification in diabetic retinopathy through thickness of retinal layers from optical coherence tomography. *Scientific Reports*, 10(1), pp.1–13. 10.1038/s41598-020-72813-x

6. Chekouo, T.*, **Mohammed, S*** and Rao, A*. (2020): A Bayesian 2D functional linear model for gray-level co-occurrence matrices in texture analysis of lower grade gliomas. *NeuroImage: Clinical*, 28, p.102437. 10.1016/j.nicl.2020.102437

5. **Mohammed, S.**, Dey D.K. and Zhang, Y. (2020): Classification of high-dimensional electroencephalography data with location selection using structured spike-and-slab prior. *Statistical Analysis and Data Mining: The ASA Data Science Journal*, 13(5), pp.465–481. 10.1002/sam.11477 (Invited for SADM Best Paper Session at JSM 2022; JSM 2022 Program.)

4. Ray, D., Salvatore, M., Bhattacharyya, R., Wang, L., Du, J., **Mohammed, S.** et al., (2020). Predictions, role of interventions and effects of a historic national lockdown in India's response to the COVID-19 pandemic: Data science call to arms. *Harvard Data Science Review*(Suppl 1). 10.1162/99608f92.60e08ed5

3. **Mohammed, S.**, Dey D.K. and Zhang, Y. (2019): Bayesian variable selection using spike-and-slab priors with application to high dimensional electroencephalography data by local modelling. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, 68(5), pp.1305–1326. 10.1111/rssc.12369

2. **Mohammed, S.** and Dey D.K. (2019): Assessing malaria using neutral-zone classifiers with mixture discriminant analysis on 2D images of red blood cells. *Journal of Biostatistics and Epidemiology*, 5(1), pp.1–11. 10.18502/jbe.v5i1.1901

1. Bhat, S.P., Murali, U.K. and **Mohammed, S.** (2016): A dynamical systems approach to systemic risk in a financial network. In *2016 Indian Control Conference (ICC)*, pp.377–384. IEEE. 10.1109/INDIANCC.2016.7441162

Book Chapter:

1. Matuk, J., **Mohammed, S.**, Kurtek, S. and Bharath, K. (2020): Biomedical applications of geometric functional data analysis. In *Handbook of Variational Methods for Nonlinear Geometric Data*, pp.675–701. Springer, Cham. 10.1007/978-3-030-31351-7_24

Preprints:

3. **Mohammed, S.**, Kurtek, S., Bharath, K., Rao, A., Baladandayuthapani, V.: Tumor radiogenomics with Bayesian layered variable selection. *Submitted*. arXiv:2106.10941

2. Chekouo, T., Stingo, F.C., **Mohammed, S**, Rao, A., Baladandayuthapani, V.: A Bayesian group selection with compositional responses for analysis of radiologic tumor proportions and their

genomic determinants *Submitted*.

1. Halder, A., **Mohammed, S.**, Chen, K. and Dey D.K.: Spatial risk estimation in Tweedie compound Poisson double generalized linear models. *Submitted*. arXiv:1912.12356

SOFTWARE

R Packages (on GitHub)

- marbles - https://github.com/shariq-mohammed/marbles
- RADIOHEAD - github.com/shariq-mohammed/RADIOHEAD
- ScalableBayesEEG - github.com/shariq-mohammed/ScalableBayesEEG
- stSpikeSlabEEG - github.com/shariq-mohammed/stSpikeSlabEEG
- SpikeSlabEEG - github.com/shariq-mohammed/SpikeSlabEEG

AWARDS

- *Doctoral Dissertation Fellowship* awarded by Graduate School at UConn *Spring 2018*
- *Doctoral Student Travel Award* awarded by Graduate School at UConn *2017*
- Multiple conference travel grants from Department of Statistics at UConn *2017*
- *Pre-doctoral Dissertation Fellowship* *Summer 2016*
- *Matthew M. Goldstein Graduate Fellowship* *Summer 2015*
- *CMI Medal of Excellence* for outstanding performance in National Graduate Program in Applications of Mathematics *2014*
- *Post-graduate Fellowship* awarded by CMI *2012 - 2014*
- *INSPIRE Scholarship for Higher Education* awarded by Ministry of Science & Technology, Government of India *2009 - 2014*
- *Undergraduate Fellowship* awarded by ISI *2009 - 2012*

TEACHING

Instructor

- Introduction to R: Software for Statistical Computing - BU *Spring 2022*
- Computational Biostatistics and Survival Analysis - a workshop at *Tata Memorial Center*, Navi Mumbai, India (taught jointly with Dr. *Bhramar Mukherjee*) *December 2019*
  - ⋆ shariq-mohammed.github.io/teaching/cbsa2019/
- Statistical Methods (Calculus level I) - UConn *Summer & Fall 2017*

Teaching Assistant

- Introduction to Statistics I & II, and Introduction to Mathematical Statistics I & II - Department of Statistics, UConn *Fall 2014 - Spring 2016*
- Numerical Linear Algebra and Probability Theory - CMI *Spring & Fall 2013*

TALKS

Invited

- IISA Annual Conference, Bengaluru, India (*Upcoming*)
- International Conference on Statistical Distributions and Applications, Huntington, West Virginia (*Upcoming*)
- Royal Statistical Society International Conference 2022, Aberdeen, Scotland (*Upcoming*)
- Joint Statistical Meetings, Washington, DC - *Talk and Poster* *August 2022*
- 22nd Meeting of New Researchers in Statistics and Probability, George Mason University, Fairfax, Virginia *August 2022*
- 35th New England Statistics Symposium, UConn *May 2022*
- BU Department of Epidemiology Seminar, BU *March 2022*
- Tech Talks 1.0 by Student's Association of Artificial Intelligence and Data Science, G H Raisoni College of Engineering and Management, Pune, India - Virtual *February 2022*
- The Fifth Eastern Asia Chapter–The International Society for Bayesian Analysis Conference: A Satellite Meeting of the 2020 ISBA World Meeting to Celebrate James O Berger's 70th Birthday - Virtual *November 2021*
- BU Biostatistics Student Association Seminar, BU - Virtual *November 2021*
- Biostatistics Career Development panel on 'Academic Career Path', BU *October 2021*
- Joint Statistical Meetings - Virtual *August 2021*
- Center for Computational Mathematics Seminar, Flatiron Institute, Simons Foundation, New York - Virtual *June 2021*
- Statistical Methods in Imaging Conference - Virtual *May 2021*
- ENAR Spring Meeting - Virtual *March 2021*
- Precision Health Seminar (Pharmacy 217) - Virtual, U-M *February 2021*
- 2020 U-M Precision Health Symposium - Virtual (*Poster*) *September 2020*
- StatChat 2020 - Panel discussions at NMIMS Sunandan Divatia School of Science, Mumbai, India - Virtual *August & September 2020*
- Joint Statistical Meetings - Virtual (*Topic-contributed*) *August 2020*
- MIDAS COVID-19 Special Seminar Series, U-M (*Group presentation*) *June 2020*
- ENAR Spring Meeting, Nashville, Tennessee *March 2020*
- Precision Health Seminar (Pharmacy 217), U-M *March 2020*
- Tools and Technology Seminar, U-M *March 2020*
- IISA Annual Conference, Mumbai, India *December 2019*

Contributed

- BU Department of Biostatistics Research Blitz, BU *March 2022*
- ENAR Spring Meeting, Philadelphia, Pennsylvania *March 2019*
- Joint Statistical Meetings, Vancouver, Canada *July 2018*

- Symposium on Data Science and Statistics, Reston, Virginia *May 2018*
- BayesComp 2018. Barcelona, Spain (*Poster*) *March 2018*
- IISA Annual Conference, Hyderabad, India *December 2017*
- 34th Quality and Productivity Research Conference, UConn (*Poster*) *June 2017*
- 31st New England Statistics Symposium, UConn *April 2017*

STUDENTS

- John Billings Cannon (joint with Yorghos Tripodis), PhD Biostatistics *Summer 2022+*
- Abhi Jain (joint with Mike LaValley and Kimberly Dukes), PhD Biostatistics *Summer 2022+*
- Tianxiang Sheng, MS Applied Biostatistics *Spring 2022*
- Kim-Judy You, MS Applied Biostatistics *Spring 2022*

SERVICE & LEADERSHIP

Academic

- *Reviewer*: Annals of Applied Statistics, Biometrics, Biostatistics, Clinical Cancer Informatics, Harvard Data Science Review, Journal of the American Medical Informatics Association, Spatial Statistics, STAT *2019+*
- *Member*: Membership & Outreach Committee, IISA; Student Research Awards Committee, NESS 2022 *2020+*
- *Founding Co-Organizer*: IISA Statistics and Data Science Innovations Webinar Series *2022+*
- *Co-Chair, Organizing Committee*: 36th New England Statistics Symposium 2023 hosted by Boston University *2022-2023*
- *Organizer (Invited Sessions)*: JSM 2020, ENAR Spring Meeting 2021, JSM 2021, NESS 2022, JSM 2022 *2020+*

Departmental

- *Co-Organizer*, Biostatistics Department Seminar, BU *2021+*
- *Vice-President*, Statistics Graduate Student Committee, UConn *2016 - 2017*
- *Vice-Chair* of Student Committee, 31st New England Statistics Symposium *April 2017*
- *Co-President*, Statistics Graduate Student Committee, UConn *2015 - 2016*
- *Senator*, UConn Graduate Student Senate *2015 - 2016*

External

- *Advisor, President, Treasurer*, Tarang (South Asian cultural organisation), UConn *2015-18*
- *Student Representative*, Senate Faculty Standards Committee, UConn *2015 - 2016*