MOHAMMAD SAMSUL ALAM

PhD Biostatistician — Longitudinal Data · Multi-Omics Integration · Medical Imaging · Joint Modeling

Postdoctoral Associate
Biostatistics & Bioinformatics
Duke University
Durham, NC 27705

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SUMMARY

- PhD-trained biostatistician with expertise in high-dimensional longitudinal modeling, statistical learning, and biomedical data analysis.
- Develops statistical methods to analyze high-dimensional biomedical data (e.g., microbiome, imaging, EHR) in support of translational research and precision medicine.
- Proficient in applying modern statistical methods including Bayesian modeling, functional data analysis, and tensor decomposition for real-world biomedical problems.
- Committed to developing reproducible and interpretable statistical methods that advance biomedical science and data-driven decision making.

TECHNICAL SKILLS

- **Programming:** R, Python, SAS, MATLAB, STATA, SPSS
- **Statistical Methods:** Longitudinal data analysis, survival analysis, multivariate analysis, supervised tensor decomposition, joint modeling, functional data analysis, spatial statistics, machine learning
- **Domain Areas:** Multi-omics integration, medical imaging, neurodegenerative diseases (Alzheimer's, Parkinson's), item response theory (IRT), HIV, cancer, spatial epidemiology

EDUCATION

- **PhD in Statistics** , Department of Statistics, North Carolina State University, Spring, 2024.

  Dissertation Title: Modern Methods for the Next Generation of Functional Data.
- **MS in Applied Statistics**, ISRT, University of Dhaka, CGPA-3.93 (Out of 4.00), 2012

  Thesis Title: Design Sensitivity of Bootstrap Methods in Variance Estimation.
- **BS in Applied Statistics**, ISRT, University of Dhaka, CGPA-3.87 (Out of 4.00), 2011

RESEARCH INTERESTS

- Functional Data Analysis, Longitudinal Data Analysis, High-dimensional Data Analysis, Medical Image Analysis, Classification and Clustering, Spatial statistics, Spatio-temporal statistics, Machine Learning, Mathematical Statistics, Multivariate Data Analysis.

MANUSCRIPT (IN PROGRESS))

- **Alam, M.S.**, and Luo, S. (2025+). Dynamic Prediction of Dementia Risk in Alzheimer's Disease Integrating Longitudinal High-dimensional Multi-omics Data. (*under preparation*)
- **Alam, M.S.**, Choi, D., and Luo, S. (2025+). Generalized Multivariate Functional Mixed Model for Joint Modeling of Item Response and Time to Event Data: A Dynamic Prediction Framework (*under preparation*)
- **Alam, M.S.**, and Luo, S. (2025+). Joint modeling of high-dimensional longitudinal and time-to-event data using supervised low-rank tensor decomposition. (*under review at Biostatistics*)
- **Alam, M.S.**, Choi, D., Koner, S., and Luo, S. (2025+). Dynamic prediction using functional latent trait joint models for multivariate longitudinal outcomes: An application to Parkinson's disease. (*accepted in Statistics in Medicine*)
- **Alam, M. S.** and Staicu, A. M. Classification using repeated and spatially indexed multivariate functional data: an application to prostate cancer identification on H & E stained histopathology image. (*under preparation for Journal of Royal Statistical Society Series C*)

- **Alam, M. S.**, Staicu, A. M., and Pixu, S. Supervised low-rank approximation of high-dimensional multivariate functional data via tensor decomposition. (*under review in Annals of Applied Statistics.*) https://arxiv.org/pdf/2409.13819

PUBLICATIONS

- Guo, Y., Zou, H., **Alam, M.S.**, and Luo, S. (2025). Integrative Multi-Omics and Multivariate Longitudinal Data Analysis for Dynamic Risk Estimation in Alzheimer's Disease. *Statistics in Medicine.* (https://doi.org/10.1002/sim.70105).

- **Alam, M. S.**, and Staicu, A. M. (2024). Modeling longitudinal skewed functional data. *Biometrics*, 80(4).

- Lipi N., **Alam, M. S.**, and Hossain, S. S. (2020). A Generalized Estimating Equations Approach for Modeling Spatially Clustered Data. *Austrian Journal of Statistics*, $50(4), 36 - 52$.

- **Alam, M. S.**, and Paul S. (2020). A Comparative Analysis of Clustering Algorithms to Identify the Homogeneous Rainfall Gauge Stations of Bangladesh. *Journal of Applied Statistics*, $47(8), 1460 - 1481$.

- **Alam, M. S.**, Hossain, S. S., and Sheela, F. F. (2019). Spatial Smoothing of Low Birth Weight Rate in Bangladesh using Bayesian Hierarchical Model. *Journal of Applied Statistics*, $46(10), 18870 - 1885$.

- Hossain S. S., and **Alam, M. S.**, (2017). MISSPECIFICATION EFFECT IN BOOTSTRAP VARIANCE ESTIMATION FOR ESTIMATORS OF THE POPULATION MEAN, *Far East Journal of Theoretical Statistics*, $53(1), 1 - 14$.

- Ahmed M.K., **Alam, M. S.**, Yousuf, A. H. M., and Islam, M. M. (2016). A long-term trend in precipitation of different spatial regions of Bangladesh and its teleconnections with El Niño/Southern Oscillation and Indian Ocean Dipole. *Theoretical and Applied Climatology*, $129(1 - 2), 473 - 486$.

- **Alam, M. S.**, and Hossain, S. S. (2016). A Geostatistical Approach to Predict the Average Annual Rainfall of Bangladesh. *Journal of Data Science*, $14(1), 149 - 165$.

R PACKAGES

- **sLFDA**: https://github.com/msalam14/sLFDA
- **supFTSVD**: https://github.com/msalam14/supFTSVD
- **supFTSVDJM**: https://github.com/msalam14/supFTSVDJM

CONFERENCE

- 2025 Symposium on Data Science and Statistics, April 29 - May 02, Salt Lake City, Utah, USA.
- Duke Industry Statistics Symposium, April 9-11, 2025. Durham, NC, USA.
- 32nd International Biometric Conference (IBC), December $8 - 13, 2024$, Atlanta, Georgia, USA.
- The 19th Annual CFAR Fall Scientific Retreat, Duke Center for AIDS Research, September 14, 2023, Durham, USA.
- Joint statistical meeting (JSM), August $6 - 11$, 2022, Washington, D.C., USA.
- The 18th Annual CFAR Fall Scientific Retreat, Duke Center for AIDS Research, September 22, 2022, Durham, USA.
- The 36th annual conference of the International Society for Clinical Biostatistics (ISCB 2015), $23 - 27$ August, 2015, Utrecht, The Netherlands.
- International Conference on Applied Statistics (ICAS), 2014, $27 - 29$ December, 2014, Dhaka, Bangladesh.

PROFESSIONAL EXPERIENCE	**Postdoctoral Associate**	June 01, 2024 − **Present**

Postdoctoral Associate June 01, 2024 − **Present**
Department of Biostatistics & Bioinformatics, Duke University

Statistics Data Science Consultant August 16, 2023 − **May, 2024**
Data & Visualization Services, North Carolina State University Libraries

Quantitative Summer Intern May, 2023 − **July , 2023**
Duke Center for AIDS Research, Duke University School of Medicine

Graduate Teaching Assistant August 2022 − **May, 2023**
Department of Statistics, North Carolina State University

Quantitative Summer Intern May, 2022 − **August , 2022**
Duke Center for AIDS Research, Duke University School of Medicine

Graduate Student Mentor May, 2022 − **August , 2022**
Directed Research for Undergraduates Students in Math and Statistics (DRUMS), North Carolina State University

Graduate Teaching Assistant August, 2021 − **May, 2022**
Department of Statistics, North Carolina State University

Graduate Research Assistant July, 2020 − **August, 2021**
Department of Statistics, North Carolina State University

Graduate Teaching Assistant August, 2019 − **June, 2020**
Department of Statistics, North Carolina State University

Assistant Professor (on leave) May, 2017 − **Present**
Institute of Statistical Research and Training (ISRT), University of Dhaka

Lecturer February, 2014 − **May, 2017**
Institute of Statistical Research and Training (ISRT), University of Dhaka

Lecturer October, 2013 − **February, 2014**
Department of Statistics, Jagannath University

AWARDS

- **GSA Travel Assistance Award**, Spring (2023), North Carolina State University.
- **Conference Award for the Developing Countries**, 36th Annual Conference (2016), International Society for Clinical Biostatistics (ISCB).
- **Dean's Award** for the excellent result in B.S. (Honors) examination-2011 in Applied Statistics, Faculty of Science, University of Dhaka.

REVIEWER

- Biometrics
- Stat
- Biostatistics
- Journal of Computational and Graphical Statistics
- Journal of Applied Statistics
- Theoretical and Applied Climatology

MEMBERSHIPS	• American Statistical Association (ASA), Eastern North American Region (ENAR).
COURSE PROJECTS	• Bivariate penalized smoothing for irregularly sampled data. • Spatial smoothing on irregular graphs. • Classifiers for determining biodegradability of chemical using QSAR approach. • Estimation for Logistic Regression under Model Misspecification.
CONSULTING EXPERIENCES	• Elderly Population in Bangladesh: Current Features and Future Perspectives, Population Monograph of Bangladesh, Bangladesh Bureau of Statistics, 2015. • Knowledge, Attitude and Practice regarding ICT by the Rural Women of Bangladesh, Tottho Apa: Empowering Women through ICT Towards Digital Bangladesh, Jatiyo Mohila Sangstha, 145 New Baily Road, Dhaka, 2016.
PROFESSIONAL DEVELOPMENT	• Induction Workshop, Center of Excellence in Teaching & Learning, University of Dhaka, May $6-7$, 2017.
PROGRAMMING LANGUAGES	• R, Python, SAS, SPSS, STATA, and MATLAB.
PHD COURSES	• Statistical Methods I, Computation for Statistical Research, Advanced Statistical Inference, Linear Models and Variance Components, Advanced Computing, Statistical Methods II, Dynamic Treatment Regime, Statistical Consulting
COURSES TAUGHT	• Environmental and Spatial Statistics, Statistical Inference-I, Statistical Inference-II, Multivariate Analysis-I, Advanced Sampling Techniques, Data Analysis Using S Language and MATLAB, Population Studies, Experimental Design Using R, Basic and Linear Algebra, Structural Equation Modeling, Time Series Analysis.