MD IQBAL HOSSAIN

Ph.D. Candidate in Statistics | Statistical Researcher | Educator

Norfolk, VA 23508 | (989) 317-7578 | mhoss005@odu.edu | github.com/iqbal1012 | iqbal1012.github.io

RESEARCH INTERESTS

Copula-based multivariate statistical modeling | Time series and count data analysis | Structural change-point detection | Bayesian inference and MCMC methods | Machine learning for health and social science applications | Causal inference and directed acyclic graphs | Computational statistics

EDUCATION

Ph.D., Computational and Applied Mathematics (Statistics)

Old Dominion University, Norfolk, VA | Expected: Summer 2026

Dissertation: Change Points Detection, Copula-Based Dependencies, and Directional Dependency Analysis using DAG for Count Time Series Data (e.g., Modeling of Tropical Cyclone Counts with Structural Dependency).

Advisor: Dr. Norou Diawara, Department of Mathematics and Statistics

M.S., Computational and Applied Mathematics (Statistics)

Old Dominion University, Norfolk, VA | 2020 – 2023

Project: Finding the Best Method to Predict Diabetes Status Using ML and Bayesian Models

Advisor: Dr. N. Rao Chaganty

M.S., Applied Statistics and Analytics

Central Michigan University, Mt. Pleasant, MI | 2018 – 2020

B.Sc., Statistics

University of Dhaka, Dhaka, Bangladesh | 2013 – 2017

RESEARCH EXPERIENCE

Ph.D. Dissertation Research *Old Dominion University | Norfolk, VA | 2020 – Present*

- Developing a copula-based multi-series statistical model for count time series (e.g., tropical cyclone (hurricane) counts, capturing cross-basin dependence structures across 6 major ocean basins (North Atlantic, Eastern & Western North Pacific, North Indian, South Indian, South Pacific)).
- Applying structural change-point analysis to 40+ years of IBTrACS global tropical cyclone data to identify climate-driven regime shifts.
- Incorporating Directed Acyclic Graphs (DAGs) within the copula framework to model causal interdependence between series-level activity and dependency (e.g., basin-level storm activity and environmental covariates).
- Employing Conway-Maxwell-Poisson (COM-Poisson) and related dispersion models to handle over- and under-dispersed count data (e.g., tropical cyclone frequency time series).
- Implementing models in R using packages: copula, VineCopula, changepoint, bnlearn, and custom-written R code for computational efficiency.

Graduate Research Assistant: Electoral Behavior Studies *School of Public Service, Old Dominion University | Norfolk, VA | 2021 – 2023*

- Analyzed the American National Election Studies (ANES) 2020 and Harvard Cooperative Election Study (CES) 2020 datasets to model voter turnout probability and voter suppression drivers.

- Applied logistic regression, random forest, and LASSO-regularized models; results contributed to 2 peer-reviewed publications.
- Presented interdisciplinary findings to political science and statistics audiences; work accepted at the Midwest Political Science Association 2024.

Master's Research Project *Old Dominion University | 2022 | Supervisor: Dr. N. Rao Chaganty*

- Conducted a large-scale comparative study benchmarking ML and Bayesian classifiers for early-stage diabetes risk prediction using a Diabetes dataset.
- Methods included: Logistic Regression, SVM, Decision Trees, Random Forest, XGBoost, Naive Bayes, LDA, Bayesian Networks; evaluated using 10-fold cross-validation, ROC/AUC, sensitivity/specificity.
- Findings extended into a journal publication.

Statistical Consulting Intern *Statistical Consulting Center, Central Michigan University | Summer 2019*

- Analyzed clinical data comparing carotid imaging modalities (Doppler Ultrasound, CTA, ICA) for surgical decision support; applied kappa statistics and ROC analysis.
- Investigated flu vaccine uptake stratified by ZIP code and clinic type using ANOVA and logistic regression.

TEACHING EXPERIENCE

Graduate Teaching Assistant *Old Dominion University | Norfolk, VA | 2021 – Present*

Spring 2026: STAT-604 Statistical Tools for Data Science and Analytics (TA)
Spring 2025: STAT-603 Probability Models for Data Science and Analytics (TA)
Spring 2025: STAT-604 Statistical Tools for Data Science and Analytics (TA)
Fall 2025: STAT-603 Probability Models for Data Science and Analytics (TA)
Spring 2024: STAT-603 Probability Models for Data Science and Analytics (TA)
Spring 2024: STAT-604 Statistical Tools for Data Science and Analytics (TA)
Fall 2024: STAT-130M Elementary Statistics (Instructor of Record)
Spring 2023: STAT-130M Elementary Statistics (Instructor of Record)
Fall 2022: STAT-130M Elementary Statistics (Instructor of Record)
Fall 2021: STAT-130M Elementary Statistics (Instructor of Record)

Instructor | Graduate Teaching Assistant *Central Michigan University | Mt. Pleasant, MI | 2018 – 2020*

Spring 2020: STA-282QR Introduction to Statistics (Instructor of Record, Section 22357380)
Fall 2019: STA-282QR Introduction to Statistics (Instructor of Record, Section 22373787)
Spring 2019: MTH-105 Intermediate Algebra (Instructor of Record, Section 22363650)
Fall 2018: MTH-105 Intermediate Algebra (Instructor of Record, 2 Sections)

Teaching Philosophy: I design my courses around applied problem-solving, connecting theoretical foundations to real datasets. I emphasize statistical thinking, reproducible analysis (R/SAS), and communicating uncertainty clearly, which helps students carry into research and industry.

PUBLICATIONS

- Md Iqbal Hossain, and Norou Diawara. "Applying Changepoint-Copula Modeling to Count Time Series Analysis: an Example of Tropical Cyclones" Stats (Under Review: **April 2026**).
- Diawara, Norou, Tiffany Henley, Samuel L. Brown, and Md Iqbal Hossain. "In search of the rational voter in the 2020 presidential election: Understanding the impact of voter costs and benefits on

turnout." In Understanding Voter Behavior With Predictive Modeling, pp. 35-60. IGI Global Scientific Publishing, **2026**.

- Hossain, Md Iqbal, and Najila Alam Porno. "Comprehensive Benchmarking of Several Machine Learning and Bayesian Models for Early-Stage Diabetes Risk Prediction: A Large-Scale Comparative Study." International Journal of Computer Applications 187, no. 57 (**2025**).
- Henley, Tiffany, Samuel Brown, Norou Diawara, Md Iqbal Hossain, and Gregory Rivera. "Contemporary voter suppression: Impact on the 2020 general election." Ralph Bunche Journal of Public Affairs 7, no. 1 (**2024**): 4.

CONFERENCE PRESENTATIONS

- Hossain, M.I. (2026). Changepoint-Copula Modeling to Count Time Series Analysis: an Example of Tropical Cyclones. ODU Mathematics Awareness Conference 2026, ODU, **Norfolk, VA**.
- Hossain, M.I. (2025). Copula-Based Multi-Basin Tropical Cyclone Modeling. VA-ASA Chapter Annual Meeting, Virginia Tech, **Blacksburg, VA**.
- Hossain, M.I. (2024). Voter Suppression and Turnout in the 2020 U.S. Election. Midwest Political Science Association Annual Conference, **Chicago, IL**.
- Hossain, M.I. (2023). A Flexible Zero-truncated Model for Dispersed Count Data. VA-ASA Chapter Annual Meeting, University of Virginia, **Charlottesville, VA**.
- Hossain, M.I. (2022). Best Method to Predict the Status of Diabetes by Comparing Logistic Regression, Support Vector Machine, and Decision Tree. VA-ASA Chapter Annual Meeting, VCU, **Richmond, VA**. [**Awarded 2nd Place, Poster Presentation**]

COMPUTATIONAL & TECHNICAL SKILLS

Statistical Software: R, SAS, Python, SPSS, Minitab, Stata

Programming: R, Python, SQL/MySQL, Fortran, SAS Macro Language

ML & Modeling: caret, bnlearn, copula, VineCopula, changepoint, Stan (Bayesian)

Visualization: Tableau, ggplot2, Matplotlib, SAS Enterprise Miner

Other Tools: Antigravity, Git/GitHub, Jupyter Notebook, RMarkdown, LaTeX, VS Code

AWARDS, CERTIFICATIONS & SERVICE

- **2nd** Place Winner on Poster Presentation, **VA-ASA** Chapter Annual Meeting, 2023
- **SAS** Certified Base Programmer for SAS 9
- Graduate Teaching Assistant Development Program Certificate, Old Dominion University
- Member: American Statistical Association (**ASA**)
- Member: Royal Statistical Society (**RSS**)
- Member: American Mathematical Society (**AMS**)
- Member: Society for Industrial and Applied Mathematics (**SIAM**)
- Member: Institute of Mathematical Statistics (**IMS**)