Nisansala Wickramasinghe

Postdoctoral Research Associate
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Professional Summary

Doctoral candidate in statistics with firsthand skills in applying statistical and machine learning methods to clinical and experimental data. Bringing over a decade of proficiency in R and four years of mastery in Python. Demonstrated ability to tailor existing algorithms to meet specific data requirements and innovate new methodologies when necessary.

Education

Doctor of Philosophy in Statistics | *GPA: 3.926* *Aug 2019 – Jul 2024*
The University of Texas at Dallas, Richardson, TX

Master of Science in Statistics Specialization in Data Science | *GPA: 3.973* *Aug 2019 – Aug 2023*
The University of Texas at Dallas, Richardson, TX

Master of Science in Mathematics | *GPA: 4.000* *Jan 2017 – Dec 2018*
Western Illinois University, Macomb, IL

Bachelor of Science in Statistics | *GPA: 3.820* *Jul 2011 – Nov 2015*
University of Peradeniya, Sri Lanka

Certifications

Graduate Certificate in Data Science | *The University of Texas at Dallas* *Expected May 2024*

Technical Skills

Research & Courses: : Clinical research, experimental design, data mining, data visualization, exploratory data analysis, Bayesian methods, machine learning, analysis of categorical data, big data analysis, microbiome and compositional data analysis, medical image analysis, computational biology, database management
Technical tools : R, Python, SAS, AWS, SQL, Keras, TensorFlow, Scikit-learn, Spark, LaTeX, MS Office
Other : Critical thinking, complex problem solving, technical writing, collaboration, simplifying complex concepts for non-expert audiences, teamwork

Experience

Doctoral Researcher | *The University of Texas at Dallas* *Aug 2021 – Present*
- Developed an innovative statistical methodology to construct a reference region for compositional data under classical and Bayesian frameworks by capturing complex patterns inherent in such data
- Designed the Bayesian MCMC algorithm to estimate the model parameters, including Gibbs sampler, Metropolis-Hastings algorithm, and variational inference
- Introduced advanced visualization techniques and validated the model using simulations
- Implemented methodologies in R and applied them to construct a reference region for healthy gut microbiome data, providing clinicians with a valuable tool to detect deviations from normal

Graduate Teaching Assistant | *The University of Texas at Dallas* *Aug 2019 – Present*
- Mentored graduate and undergraduate students in machine learning courses for 3+ years, assisting in R and Python programming
- Implemented predictive models on clinical and other datasets, utilizing machine learning techniques such as regression, classification, clustering, decision trees, neural networks, and anomaly detection
- Collaborated with faculty and students across disciplines to address complex, data-intensive challenges
- Led weekly discussion classes on Linear algebra, Calculus, and Integral Calculus for 200+ students

Graduate Researcher | *Western Illinois University* *Jan 2017 – Dec 2018*
- Developed a cutting-edge binary classifier for imbalanced data to minimize the risk of biased predictions toward the majority class that outperformed standard logistic classifiers by reducing error rates by 50%
- Introduced a novel feature selection algorithm that was effective even without class labels, surpassing the efficacy of lasso regularization and other feature selection methods
- Implemented methodologies in R and MATLAB to predict habitat selection for avian species using spatial scale variables when data was limited to sites where the species is known to be present

Temporary Lecturer | *University of Peradeniya* *Jan 2016 – Nov 2016*

- Led instructional sessions in R, SAS, C++, and Minitab for over 100 undergraduates
- Conducted discussion classes on Multivariate Methods, Non-parametric & Categorical Data Analysis and Structured Oriented Programming and Non-parametric Data Analysis

Undergrduate Researcher | *University of Peradeniya* *Jan 2014 – Nov 2015*

- Analyzed the spatial structure of different tree species in Sinharaja forest, Sri Lanka, using two spatial point processes: homogeneous Poisson process and homogeneous Thomas cluster process.
- Analyzed intraspecific and interspecific patterns among life stages through univariate and bivariate pair correlation functions.

Projects

Prediction Model to Calculate Prostate-Specific Antigen (PSA) Level | *Python, R* *Spring 2023*

- Developed models for early cancer detection, predicting PSA levels in prostate cancer data using linear regression, ridge regression, lasso regression, KNN regression, decision trees, and neural networks.
- Conducted feature engineering, parameter tuning, and cross-validation to build a robust model

Deep Neural Network from Scratch | *Python* *Fall 2022*

- Designed and developed a deep neural network from scratch without relying on mainstream libraries
- Demonstrated a deep understanding of neural network architecture and programming skills in Python
- Assessed the model using a classification dataset and conducted parameter tuning, resulting in 87% accuracy

Bayesian Modeling of Spatial Transcriptomics Data via Hidden Potts Model | *R, C++* *Fall 2021*

- Developed a method to detect genes whose expression levels display spatial patterns (SE genes) with respect to the sample locations utilizing the hidden Potts model and MCMC algorithm to make inferences
- Evaluated the model with a real-world dataset, identifying 5714 SE genes, a significant sevenfold increment compared to the current SPARK method, which only detects 772 SE genes

Publication

– **Wickramasinghe, N.**, Choudhary, P. Statistical methods for a reference region for compositional data with application to microbiome data (working paper)

– Ekanayake, D., WasalaMudiyanselage, I., and **Wickramasinghe, N.** (2023). Expectation of occupancy for habitat quality research for threatened and endangered avian and bat species. Letters in Biomathematics 10(1), 117-132

– **Wickramasinghe, N.** (2018). Variable selection and modeling expectation of success (Order No. 13421717). Available from Dissertations & Theses @ Western Illinois University; ProQuest Dissertations & Theses Global

Fellowship and Awards

Graduate Studies Scholarship | *The University of Texas at Dallas* *Aug 2019 – Present*
Mei Lein Fellowship | *The University of Texas at Dallas* Jul 2023
ABGOD Conference Travel Award | *The University of Texas at Dallas* March 2023
Women in Science Research Scholarship | *Western Illinois University* May 2018
University Award for Academic Excellence | *University of Peradeniya* Nov 2015

Conferences and Presentations

Advances in Statistical Methods for Analysis of Biomedical, Genetic, and Omics Data *Mar 2023*

- Statistical methods for reference region for compositional data with application to microbiome data

iPURSE 2016, the Annual International Research Sessions, University of Peradeniya *Nov 2016*

- Potential impact of weather patterns on dengue disease and vector densities

Postgraduate Institute of Science Research Congress *Oct 2016*

- Spatial distribution and intraspecific associations of tree species at different life stages in a Sinharaja rain forest, Sri Lanka