Buddhika Jayawardana

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SUMMARY

Passionate researcher with interests in applied mathematics and data science. Extensive knowledge of machine learning and AI applications. Proven ability to create innovative solutions, analyze complex data, and collaborate effectively with interdisciplinary teams. Eager to leverage my expertise for scientific advancement.

SKILLS (*with Artificial Intelligence experience)

Area of Expertise	Machine Learning*, Neural Networks*, Image Analysis*, Statistical Analysis, Numerical Analysis, Optimization, Dynamical Systems, Causal Inference
Software/Programming	Python*, R*, MATLAB*, SQL, Mathematica, Processing (Java), HTML
Database Management	BigQuery, Postgre SQL
Cloud platforms	Google*, AWS*, Azure

PROFESSIONAL WORK EXPERIENCE

Post-Doctoral Research Fellow Oct 2022 – present
Division of Biostatistics and Bioinformatics, FDA National Center for Toxicological Research, Jefferson, AR, US

- Collaborated with Division members on machine learning and artificial neural network-related projects.
- Presented research findings at division seminars and conferences.
- Prepared research papers for publication in peer-reviewed journals.

Graduate Teaching / Research Assistant Aug 2017 – Aug 2022
University of Texas at Dallas, Richardson, Texas, US

- Engaged in independent research under the guidance of faculty advisors.
- Conducted discussion sessions in Linear Algebra, Calculus I, and Integral Calculus for undergraduate students.
- Assisted instructors with administering tests, and preparing and evaluating assignments.

Teaching Instructor Jan 2016 – Jul 2017
University of Peradeniya, Sri Lanka

- Conducted tutorial classes in Linear Algebra, Vector Analysis, and Fluid Dynamics.
- Prepared and graded assignments, exams, and projects, ensuring fairness and consistency in assessment.
- Offered mentorship to undergraduate students in their research studies.

RESEARCH PROJECT EXPERIENCE

Post-Doctoral Research Fellow, Food and Drug Administration Oct 2022 – Present

1. *Investigating the performance of machine learning algorithms on covariate shift domains*
   - Employed Google BigQuery to access data in MIMIC ICU patient databases for the analysis.
   - Trained ML algorithms with MIMIC-III data and calibrated with a portion of MIMIC-IV ICU records.
   - Evaluated them on MIMIC-IV to compare the performance of predicting ICU mortality.

2. *Examining ethnic and racial disparities in critical care delivery to heart failure patients using artificial intelligence (AI) and real-world data (RWD)*
   - Created low-dimensional patient representations using an auto-encoder neural network to analyze race/ethnic differences in heart failure care and health outcomes using MIMIC data.
   - Identified important data elements and applied causal inference approaches to quantify racial disparities in providing specialized service to patients with heart failure and ascertain the impact on health outcomes.

Doctor of Philosophy, University of Texas at Dallas Aug 2017 – Aug 2022

1. *Measuring the true treatment effect of a drug with a two-step Bayesian approach*
   - Analyzed the effect of a drug treatment employing a two-step Bayesian technique.
   - Collected Cardiovascular Health data from ClinicalTrials.gov, from both treatment and control groups.
   - Calculated the propensity scores to assess the likelihood of treatment assignment.
   - Employed stratification and matching to assess blood-thinning drug effect on cardiovascular patients.
2. *Temperature forecasting in Texas cities*
   - Conducted temperature forecasting research in Texas cities.
   - Utilized GRNN (Generalized Regression Neural Network) to predict temperatures for 20 Texas cities.
   - Achieved 93.94% forecasting accuracy.
3. *Cell nuclei segmentation*, Supervisor: Prof. Yan Cao
   - Applied a Gaussian filter to pathology images of lung cancer patients to achieve image smoothing.
   - Validated and fine-tuned K-means algorithm to segment cell nuclei based on intensity and spatial features.
   - Quantified the segmentation accuracy using ROC-AUC, Accuracy, precision, recall, and F1 score.

Bachelor of Science, University of Peradeniya Jul 2011 - Nov 2015

1. *Early childhood dental caries in Sri Lanka*, Supervisor: Dr. Sachith P. Abeysundara
   - Conducted in-depth statistical analysis on early childhood dental caries in Sri Lanka.
   - Explored a comprehensive range of factors, both direct and indirect, influencing early childhood caries, aiming to establish connections and identify causative elements.

EDUCATION

PhD in Mathematics	University of Texas at Dallas, Richardson, Texas, Jul 2022 Dissertation title: Geometric Integrators for Non-separable Hamiltonian Systems
Post Graduate Program in Cloud Computing	University of Texas at Austin – McCombs School of Business, Nov 2022 (portfolio)
MS in Mathematics	University of Texas at Dallas, Richardson, Texas, May 2020 (degree certificate)
BS in Mathematics	University of Peradeniya, Sri Lanka, Nov 2015 Thesis title: A Numerical Study on Fourier Continuation

LIST OF PUBLICATIONS AND PRESENTATIONS - Google Scholar

Publications

1. Buddhika Jayawardana, and Tomoki Ohsawa. Semiexplicit symplectic integrators for non-separable Hamiltonian systems. *Mathematics of Computation* 92, no. 339 (2023): 251-281.
2. Buddhika Jayawardana, Philip J. Morrison, Tomoki Ohsawa. Clebsch canonization of Lie–Poisson systems. *Journal of Geometric Mechanics*, 2022, 14(4): 635-658.
3. Subas Acharya, Robert Atmur, Buddhika Jayawardana, Peter Kramer, Richard Moore, Vrushaly Shinglot, Rui Xiang, and Yimin Zhong. Actuating platform systems. *Mathematics in Industry Reports*, 2022.

Professional Presentations

1. Buddhika Jayawardana, Dong Wang, Paul Rogers. Enhancing ICU Mortality Prediction through Autoencoder-Based Dimensionality Reduction. *NCTR/UAMS Systems Pharmacology and Toxicology (SPaT) Workshop* June 2024 NCTR, Jefferson, Arkansas.
2. Buddhika Jayawardana, Dong Wang, Paul Rogers, Zhiyuan Lu, Hyeonju Kim. Resilience in Covariate Shift: Evaluating the Impact of Model Complexity on Mortality Prediction with MIMIC Data, *Arkansas Biostatistics Consortium (AR-BIC)* February 2024 Little Rock, Arkansas.
3. Buddhika Jayawardana, Philip J. Morrison, Tomoki Ohsawa. Geometric Integrators for Lie-Poisson Hamiltonian Systems.*DFW Area 2021 Virtual Poster Competition in Mathematics.*
4. Buddhika Jayawardana, Jinendrika Weliwita.A Numerical Study on Fourier Continuation. *International Conference on Computational Modeling & Simulation (ICCMS-2017)* May 2017 Colombo, Sri Lanka