Tabish Ali Rather

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Education

Bachelor of Science in Applied Mathematics and Data Science — CGPA: 3.696/4
Swinburne University of Technology, Melbourne, Australia — Completed Dec 2024

Erasmus Mundus Joint Master Degree Applied Mathematics — CGPA 3.75/4
Specilization: Stochastics for biological and artificial neural networks — Expected Sept 2027
University of L'Aquila, AQ, Italy — Sesmeter 1
Technical University of Hamburg, HH, Germany — Semester 2
University of Hamburg, HH, Germany — Semester 2

Work Experience

AI/ML Engineer, Suncorp Australia — Apr 2025 - Aug 2025

- Problem Overview: Led the end-to-end development of a automated LLM-prompt optimisation framework, ensuring consistency and minimal LLM-drift across time and model upgrades. Also collaborated with the Data Science team to design LLM-based solutions for claims processing in motor vehicle accidents, with a focus on contributory negligence.
- Approach: Implemented an iterative optimisation loop using LLM as a judge to provide actionable feedback on initial responses. Based on these insights, prompts were subjected to directional updates to reduce deficiencies, with the process repeated until convergence on an acceptable baseline score or a fixed number of epochs.
- Outcomes: Delivered a scalable framework for LLM prompt optimisation that reduces drift and maintains reliability across model versions with at least 20% increase in accuracy across projects. The framework has been implemented across all LLM-powered projects within the company.

Applied ML researcher, Swinburne University — Dec 2024 – April 2025

Project Title: On Forecasting, Deep Learning, and Kolmogorov-Arnold Networks (KANs)

- Research Overview: Extended final-year thesis on stochastic data modelling with KANs, building upon earlier comparisons of ARIMA, LSTM, and KANs. Explored integrating autoencoders for dimensionality reduction, and developing KAN based models for non-euclidean data.
- Approach: Developed varying statistical models, LSTMs and KANs using DataBricks for collaborative development and model evaluation at scale. Designed AI pipelines for prototyping models and validating against MSE and RMSE metrics. Initiated exploratory work on modelling temporal data, such as stock prices, alongside textual data (e.g. financial news sentiment) using fine-tuned Mistral models via Hugging Face.
- Outcomes: Developed a case study to establish a baseline for stochastic data modelling with KANs, providing a clear motivation to develop specialised KAN-based models for accurate and interpretable forecasting. Project link

Statistical Modelling Researcher, Swinburne University — Dec 2023 – Feb 2024

Project Title: Investigating Alternative Selection Criteria for ARIMA Models

- Research Overview: Investigated alternative selection criteria for ARIMA models, comparing the Hyndman-Khandakar algorithm with a new approach using Shapiro-Wilk, Ljung-Box, and t-tests for optimised simplicity and accuracy.
- Approach: Used custom R scripts to generate diverse time-series datasets, applied systematic parameter refitting to minimise overfitting, and bench marked models using rolling window cross-validation. Utilised Posit Workbench for collaborative statistical analysis and leveraged high-performance cloud computing to scale ARIMA model evaluation and parameter tuning across extensive datasets

- Outcomes: Achieved a 15% reduction in RMSE compared to traditional methods and eliminated 40% insignificant parameters. Project link

Scientific Computing Research Assistant,Swinburne University Dec 2022 – Feb 2023

Project Title: On Efficient Calculation of Virial Coefficients

- Research Overview: Developed an algorithm for computing virial coefficients in hard particle systems, optimising computational efficiency by identifying and calculating only unique integrals among possible permutations.
- Approach: Utilised advanced graph theory and adjacency matrices to define integration limits based on particle interactions, enhancing the precision of molecular behaviour modelling and achieving significant reductions in redundant computations. Implemented distributed computations on DataBricks to streamline large-scale integral evaluations and utilised high-performance cloud computing to prototype and validate the algorithm efficiently.
- Outcomes: Successfully reduced computation time by 81% by identifying unique permutations among over 5000 integrals. Project link

Conferences and Seminars

- **Speaker at the 12th Australasian Council of Undergraduate Research, Sydney:** Presented research project titled *On Forecasting, Deep Learning, and Kolmogorov-Arnold Networks (KANs)* and received a competitive travel grant. Link to Conference
- **Speaker at the 11th Australasian Council of Undergraduate Research, Melbourne**: Presented research project titled *On Efficient Calculation of Virial Coefficients*. Link to conference

Awards & Scholarships

- Top 3 in Swinburne Integration Bee 2022 and 2023
- Swinburne Research Scholarship, 2022, 2023 and 2024
- Vice Chancellor's Excellence Scholarship, Swinburne University 2021-2024
- Erasmus Mundus Joint Master Degree Scholarship 2025-2027

Skills

- **Programming Languages:** R, Python, MATLAB, SQL, C#, C++
- **Libraries/Frameworks:** pandas, Matplotlib, NumPy, SciPy, seaborn, TensorFlow, Py-torch, OpenMP
- **Tools/Databases:** Git, SPSS, KNIME, DataBricks, MySQL, DynamoDB, NoSQL-DB, MongoDB

Leadership

Swinburne Mathematics Society

- Vice-President (Jan 2024 - Dec 2024) and Treasurer (Jan 2023 - Dec 2023)

Swinburne Islamic Society

- President (Jan 2024 - Dec 2024) and Prayer Room Manager (June 2022 - Dec 2023)

Swinburne Representative Council

- Undergraduate Representative (Jan 2024 - Dec 2024)

Languages

English(C2), Kashmiri(Native), Urdu(Native), Arabic(A2), Italian(A1), German(A1)