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Tahina Princy Ranaivomanana

PhD Candidate

rtprincy
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http://rtprincy.github.io

Profile

Data scientist with a strong focus on machine learning (ML) and time-series data analysis. Specialised in applying advanced ML techniques to complex, multi-wavelength astrophysical datasets. Proficient in Python, with hands-on experience building and deploying ML models for tasks such as classification, anomaly detection, and synthetic image generation. Demonstrated ability to translate performance requirements into scalable computational software solutions. Published author in peer-reviewed journals and a key contributor to large-scale international collaborations, showcasing communication, teamwork, and cross-cultural project management skills. Now looking to leverage this unique blend of research, technical software and machine-learning expertise, requirements definition, and data-driven problem- solving in data-handling challenged in the industrial or scientific domain.

Experience

PhD project **10/2021 — 09/2025**
Radboud University — KU Leuven *The Netherlands - Belgium*

- Applied an unsupervised machine learning methodology (UMAP and t-SNE) to a catalogue of over 10,000 Gaia mission time-series datasets, enabling the accurate identification of data variability and the efficient removal of noise. This enhanced data integrity for further analysis.
- Designed and built efficient frequency analysis solutions specifically for identifying periodicity within complex, sparsely sampled, multi-colour, and heteroscedastic time-series datasets obtained from the MeerLICHT telescope.

MPhil project **2020 — 2021**
University of Manchester *United Kingdom*

- Engineered semi-supervised GAN models to synthesise and classify pulsar data, directly supporting and integrating with large-scale radio surveys (e.g., SKA).

Teaching Assistant
Radboud University

- Delivered tutorials for data analysis and astronomical instrumentation courses **2023 - 2024**
- Delivered tutorials for a Data Analysis course **2021**

KU Leuven

- Supervised 2 bachelor research projects (two students per project) **2022**

Education

PhD candidate, *Radboud University — KU Leuven* **10/2021 — 09/2025**
MPhil in Astronomy, *University of Manchester* **2020 — 2021**
M.Sc. in Astronomy, *University of Antananarivo* **2016 — 2017**
B.Sc. Honours in Astrophysics, *University of Antananarivo* **2015 — 2016**
B.Sc in Physics, *University of Antananarivo* **2012 — 2015**

Skills

- Programming
  Python: Conduct big data analysis with libraries such as Pandas, NumPy, SciPy, and Astropy
- SQL
  Perform SQL query to retrieve and manipulate large datasets, including those from astronomical databases
- Bash scripting
  Automate task execution, job scheduling, and data pipeline management on UNIX-based systems
- Machine learning libraries: Tensorflow, Keras, Pytorch
  Perform classification, prediction, and clustering related tasks on tabular, time-series, and image data
- Deep Learning
  Perform synthetic data/image generation tasks based on neural network models
- Data handling
  Experience with extracting and handling large heterogeneous data, including those from astronomical observations: BlackGEM, Gaia, TESS, ZTF

Relevant Peer-reviewed publication

[1] P. **Ranaivomanana**, M. Uzundag, C. Johnston, et al. "Variability in hot sub-luminous stars and binaries: Machine-learning analysis of Gaia DR3 multi-epoch photometry". In: 693, A268 (Jan. 2025), A268. DOI: 10.1051/0004-6361/202452429. arXiv: 2411.18609 [astro-ph.SR].

[2] P. **Ranaivomanana**, C. Johnston, P. J. Groot, et al. "Identifying and characterising the population of hot sub-luminous stars with multi-colour MeerLICHT data". In: 672, A69 (Apr. 2023), A69. DOI: 10.1051/0004-6361/202245560. arXiv: 2302.07266 [astro-ph.SR].

[3] P. **Ranaivomanana**, C. Johnston, G. Iorio, et al. "Unsupervised learning for variability detection with Gaia DR3 photometry. The main sequence–white dwarf valley". Submitted to Astronomy & Astrophysics (A&A) journal (June 2025).

Certification

Teaching training course: Offered by Radboud University (Online certificate)
Oxford machine learning school certificate (Online certificate)
Advanced Machine Learning and Signal Processing: Offered by IBM Skills Network (online certificate)
Data Analysis with Python: Offered by IBM Skills Network (online certificate)
Exploratory Data Analysis for Machine Learning: Offered by IBM Skills Network (online certificate)

Prizes and Grants

- Receipt of the Leids Kerkhoven-Bosscha Fonds (LKBF) travel grants for attending conferences 2023/2024
- Recipient of the UK's Newton Fund/DARA Big Data MPhil Bursary 2020
- Receipt of SKA/SARAO grant to attend the 2nd Big Data Africa School – South Africa 2018

Relevant international conferences Attended & Talk contributions

- BlackGEM meeting – Manchester, United Kingdom 2024

Talk title: Time series analysis using machine learning

- MW-Gaia WG2 conference – Sofia, Bulgaria 2023

Talk title: Classification of variable stars observed in multiple filters with MeerLICHT and BlackGEM