Collins Maripane

Data Scientist — Astrophysics Researcher

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Profile

An aspiring Data scientist, Astrophysicist, and creative innovator driven by curiosity, powered by machine learning.Whether predicting the universe's seeing conditions, emulating cosmic structures with AI, or solving theoretical puzzles, I push boundaries with ambition and precision. A hard-working team player who thrives in collaboration, I don't just process data, I shape it into groundbreaking insights. Always reaching for the next frontier, one algorithm at a time.

Technical Skills

Programming
Python, R, SQL

HTML, CSS, JavaScript

Tensorflow and Pytorch

Machine Learning
Score-based Diffusion Models

Generative Adversarial Networks

Predictive and classification

Latex, Linux, Window

Data Processing
NumPy, Pandas Tableau

Visualization
Power BI, Matplotlib

Cloud
Google Cloud Platform

AWS

Education

Master of Science in Mathematics, University of Cape Town (UCT) **2024 – Present**.
Title: Emulating Large Scale HI Maps using Score-based Diffusion Models

Bachelor Honors in Astrophysics, University of Cape Town (UCT) **2023- complete**.

Project: Machine Learning Techniques to Predict the Seeing Condition on the South African Large Telescope (SALT).

Work Experience

Department of Physics Tutor, University of Cape Town 2023 – Present

- Tutoring science students and demonstrating physics labs.
- Providing supervision on computation and report writing.

NITheCS Intern, National Institute for Theoretical and Computational Sciences Dec 2023 – Jan 2024

- Worked on theoretical data computation and problem-solving.
- Conducted research on theoretical computation methodologies.

Projects

Emulating Large Scale HI Maps with Diffusion Models
Model: Score-based Diffusion Models

- I developed and trained diffusion models to generate high-fidelity HI maps for astrophysical research.
- This successfully emulated large-scale HI maps with improved accuracy compared to previous approaches.
- Contributed to more efficient simulations in astrophysics, aiding large-scale structure studies.

Predicting Seeing Conditions for Observatories
Model: Predictive Modeling

- I developed a machine learning model during my honors research to predict atmospheric seeing conditions.
- I successfully created a robust model that forecasts seeing conditions with high accuracy based on meteorological data.
- This work helped improve scheduling and efficiency for astronomical observations by optimizing telescope usage.

References

- References are available upon request