Dennies Bor

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Professional Summary

Data science & machine learning practitioner with strengths in time-series modeling, signal processing, and applied ML for scientific and infrastructure systems. Experienced in building reproducible pipelines, benchmarking models against classical baselines, and communicating results via dashboards and open-source code.

Technical Skills

- **Machine Learning:** Deep learning (CNN/GRU/LSTM, attention), physics-informed learning, object detection (YOLO), feature engineering, model benchmarking.
- **Statistics & Uncertainty:** Probabilistic simulation (Monte Carlo), hypothesis testing, sensitivity analysis, error analysis and validation workflows.
- **Time Series & Signal Processing:** Frequency-domain analysis, matched filtering concepts, coherence estimation, Welch PSD, spectral features.
- **Scientific Programming:** Python (NumPy, SciPy, Pandas, Matplotlib), PyTorch/TensorFlow (project-dependent), reproducible notebooks and scripts.
- **Data & Tooling:** Git, Linux, Docker, GitHub Actions; experiment organization, logging, and result tracking.

Education

- **George Mason University** — Fairfax, VA, USA
  PhD in Earth Systems and Geoinformation Sciences (Advisor: Dr. Edward Oughton) — *Sep 2023 – Present*

  Selected Coursework: Quantitative Methods; Earth Sci Data / Advanced Data Analysis; Digital Signal Processing; Computational Physics II; Remote Sensing.

  GPA: 3.85

- **Technical University of Kenya** — Nairobi, Kenya
  BEng in Aeronautical Engineering (First Class Honors) — *Sep 2013 – May 2019*

Research Experience

- **Graduate Research Assistant** — George Mason University, VA, USA
  ML-Enabled Risk Modeling, Time Series, Spatial Data Products — *May 2022 – Present*
  - Built reproducible research pipelines integrating observational data, predictive modeling, and validation for infrastructure and space-environment risk studies.
  - Developed benchmarking workflows comparing classical models (e.g., transfer functions / physics baselines) against ML approaches on real event datasets.

- **Engineering Intern** — Broglio Space Center, Malindi, Kenya
  Satellite Operations, RF Systems — *Aug 2018 – Nov 2018*
  - Supported satellite tracking, telemetry processing, and RF communication system operations for Earth observation missions.

Selected Projects

- **tfpy**: GIC Prediction Model Benchmarking — tfpy
  - Comparative evaluation of traditional transfer-function methods versus neural network approaches for geomagnetically induced current prediction.
  - Implemented deep learning variants (CNN/GRU/LSTM with attention) and physics-informed modeling components; organized reproducible runs for analysis.
- **substation-assets-identification**: Substation Asset Identification (YOLO) — substation-assets-identification
  - Object detection workflow for identifying substation assets (e.g., transformers) in overhead imagery using YOLO.
  - Curated project structure for training/inference and repeatable experimentation.
- **twitter_political_polarization**: Polarization via Sentiment Analysis — twitter_political_polarization

- Large-scale sentiment analysis of political discourse across policy topics; statistical comparison across groups.
- Results dashboard: twitter_political_polarization.

- **C-SWIM**: Coupled Space Weather Impact Model — C-SWIM
  - End-to-end pipeline coupling space-weather hazard scenarios, power-grid response modeling, and socio-economic impact estimation.
  - Dashboard: space-weather-grid.

Selected Publications & Preprints

- **Quantifying Political Polarization on Key Policy Issues Using Sentiment Analysis (Primary Author):** arXiv:2302.07775 — Results: twitter_political_polarization — Code: twitter_political_polarization
- **Socio-economic impact of electricity grid infrastructure failure due to severe space weather events (Primary Author):** arXiv:2412.18032 — Code: C-SWIM — Dashboard: space-weather-grid
- **A Reproducible Method for Mapping Electricity Transmission Infrastructure for Space Weather Risk Assessment (Co-Author):** arXiv:2412.17685
- **GIC-Related Observations During the May 2024 Geomagnetic Storm in the United States (Co-Author):** arXiv:2507.07009

Professional Development

- **National Center for Atmospheric Research** — Boulder, CO, USA
  Early Career Faculty Innovators Program — *2023 – 2025*
- **African Institute of Mathematical Sciences** — Cape Town, South Africa
  Africa Data Science Intensive Program — *2022*

References

Available upon request.