Daniel Galea

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Profile

Highly motivated and results-driven researcher interested in the predictability of the weather system, with multiple years of experience in applying deep learning techniques to solve problems in the weather and climate domain. Skilled in data analysis using Python, programming, high-performance computing, working with and processing large datasets from climate models and problem-solving.

Skills

- Data Science
- Deep Learning
- Python
- Linux/Unix
- Software Development
- C
- C++
- FORTRAN
- JAVA
- MySQL
- MongoDB
- Git / Version Control
- High-Performance Computing
- Amazon Web Services (AWS)
- Google Cloud Platform (GCP)
- CMIP 5/6
- E3SM Climate Model
- UK Met Office Unified Model
- Meteorological Data Analysis
- Problem Solving
- Physical Modelling
- System Understanding
- Systematic Thinking
- Communication
- Adaptability
- Presentation Skills
- Collaboration
- Teamwork
- Flexibility
- Time-management
- Machine Learning Algorithms
- Explainable AI
- PyTorch
- Tensorflow
- Project Planning and Scheduling
- Data-based Decision Making
- Self-motivated
- Accountability
- Unconventional thinking
- Attention to detail
- Technical Writing
- Technical Presentations
- Results-driven
- Quick learner

Work Experience

Machine Learning Scientist
MetDesk Ltd, Jul 2024 - Present

- Improved execution speed of in house model by 76%, resulting in the quickest model to market in the sector and attracting multiple new clients due to this speed up
- Developed a deep-learning based algorithm for wind energy forecasting
- Developed plan and leading project for an improved solar and cloud forecasting method using live satellite data
- Pitched and now leading a project that would allow the company to expand to a worldwide client base without the need for any new hires
- Interacted with company leaders to help in the planning of new offerings in the upcoming years, as well as developing methods to improve efficiency of current company practices
- Helped improve understanding and usage of company hardware, leading to more efficient processes, including version control and a clean codebase
- Helping mentor and set reasonable targets for new intern

Postdoctoral Researcher
Lawrence Livermore National Laboratory, Oct 2022 - Jun 2024

- Developed deep learning model to detect atmospheric rivers with world-leading performance
- Contributed to creating a model to perform bias correction for rainfall for in-house climate model
- Developed a system to employ deep learning to discover new physics to improve rainfall modelling via a new parametrisation for deep convection

- Helped out various colleagues to optimise their computational workflows, thus being able to produce results much quicker
- Organised various events for networking of postdocs across different sections

Computational Scientist
National Centre for Atmospheric Science, Reading, UK, Feb 2022 - Sept 2022

- Carried out data analysis to inform on the implementation of a new data storage method when using the UK Met Office climate model
- Started work to use physically-informed neural networks to be used for emulation of certain processes in a climate model, to improve the computational cost of the climate model, while making it quicker to execute

JAVA Software Engineer
LOQUS Business Intelligence, Pieta, Malta, Jun 2016 - Sept 2017

- Improved existing algorithms to produce more efficient solutions via genetic algorithms
- Carried data analysis on existing algorithms to identify any inefficiencies
- Helped transition the company from a local MySQL database to a cloud-based MongoDB database
- Presented team results to company executives and clients

Education

PhD in Computer Science
University of Reading, UK, Sept 2018 - Sept 2022

- Developed deep learning model to detect the presence of tropical cyclones in meteorological data
- Formulated and executed a method to use this model for a data reduction method, which was implemented in the UK Met Office's climate model
- Performed data analysis to computationally optimize the data reduction method
- Developed skills in deep learning, working with large datasets, HPC, Linux, version control
- Presented findings at an international conference
- Participated in the Young Entrepreneur Scheme where various skills, including working to a deadline and working with a team, were developed

MSc in Atmosphere, Ocean and Climate
University of Reading, UK, Sept 2017 - Sept 2018

- Developed understanding of major physical processes controlling meteorological activity across the globe
- Developed physical modelling skills, e.g. using the finite difference method for modelling gas dispersion
- Developed skills in presenting complex data and ideas to a non-expert audience, as well as writing weekly progress reports

BSc in Computational Physics
University of Malta, Malta, Sept 2014 - Sept 2017

- Developed various skills in computational modelling using a variety of programming languages
- Learnt various computer science fundamentals including Linux, HPC and object-oriented programming
- Experienced and developed skills in implementing machine learning techniques, e.g. genetic algorithms
- Developed skills in mathematical understanding of differential equations and other constructs

Publications

- Shuang, Y., I. Chakraborty, G. J. Anderson, D. D. Lucas, Y. Lops, **D. Galea**, 2024: UXNet: Joint U-Net and Fully Connected Neural Network to Bias Correct Precipitation Predictions from Climate Models. Artif. Intell. Earth Syst.
- Wu, W. Y., H. Y. Ma, D. C. Lafferty, Z. Feng, P. Ullrich, Q. Tang, J.-C. Golaz, **D. Galea**, H.-H. Lee 2024: Assessment of Storm-Associated Precipitation and its Extremes using Observations and Short-term Climate Model Hindcasts. Journal of Geophysical Research.
- **Galea, D.**, K. Hodges and B. N. Lawrence, 2024: Investigating Differences between Tropical Cyclone Detection Systems. Artif. Intell. Earth Syst.
- **Galea, D.**, H. Ma, W. Wu, and D. Kobayashi, 2023: Deep Learning Image Segmentation for Atmospheric Rivers. Artif. Intell. Earth Syst., https://doi.org/10.1175/AIES-D-23-0048.1.
- **Galea, D.**, J. Kunkel, and B. N. Lawrence, 2023: TCDetect: A New Method of Detecting the Presence of Tropical Cyclones Using Deep Learning. Artif. Intell. Earth Syst., 2, e220045, https://doi.org/10.1175/AIES-D-22-0045.1.
- **Galea, D.** 2022: Meteorological data reduction for tropical cyclones using deep learning techniques. PhD Thesis, University of Reading, doi: 10.48683/1926.00108656