Dr. Gerald Laura-Moore

Doctorate in Neurotechnology | Data Scientist | Machine Learning Scientist | Developer | Researcher

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Profile

As a highly analytical, computational, and motivated Data Scientist (DS) and Machine Learning (ML) Researcher, I have gained valuable knowledge from diverse fields such as Geospatial Remote Sensing, Neurotechnology, Physics, and Astrophysics. I have extensive experience in areas including computer vision, registration, segmentation, time-series analysis, working with large multi-terabyte datasets, statistical data analysis and pipeline-scaling from research to production environments.

I am passionate about exploring innovative ideas and expanding my knowledge in an environment that encourages learning and discovery. I strongly value the entire scope of Data Science, from exploratory data analysis and visualisation to experimentation and scaling pipelines. I am looking for an opportunity to apply my skills and knowledge to solve complex problems and contribute to the development of cutting-edge and impactful technologies.

Experience

Dec 2022 - present
Senior Machine Learning Scientist | ***Agreena, London, UK***

- Encompassing DS, ML engineering and software engineering using remote sensing for verification for a soil carbon program.
- Technical senior lead for numerous projects; remote detection of agricultural land (FracTAL ResUNet), remote detection and analysis of individual crops (Mask R-CNN), time-series agricultural event detection and prediction (1D CNN, LSTM, CatBoost, XGBoost, Transformers), satellite scene quality classification (2D CNN, MobileNet, EfficientNet), global scale agricultural event mapping (LSTM, Transformers), and image description reports (VLM).
- Spearheaded the development of innovative products, including image report generation in combination with YAML-formatted multi-task classification for field event verification from mobile imagery (fine-tuning PaliGemma and LLaVA VLMs) and creating a targeted ground truth data collection approach to enhance internal model performance using a multi-task classifier for Google Street View imagery.
- Scaled research-to-production pipelines using tools like Ray (including distributed training and inference), FastAPI, AnyScale, VertexAI, Airflow and Kubernetes, whilst managing KPIs for accuracy, throughput, resource management and stake-holder satisfaction.
- Earned recognition from senior leadership, including the CEO, for consistently driving value and showcasing pivotal results, earning myself praise from leadership that I had significant contribution to the company and its direction.
- Responsible for project and team planning to hit KPI deliverables for internal and external stakeholders whilst also pushing state-of-the-art scientific research and new tooling adoption within the team.
- Sole initiative to drive standardisation for ML based projects through cookie-cutter, Kedro, and HuggingFace frameworks.
- Formulation of unit, integration and end-to-end testing frameworks across code-bases.
- Sole responsiblity for developing a Python SDK and a data ingestion service, driving significant efficiency and standardisation across the DS and Engineering teams for accessing STAC catalogues and ingesting data through APIs.
- Utilising PCA and manifold-learning techniques to detect and monitor data drift and implementing K-fold cross-validation training to optimise train/val/test dataset splits.
- Addressing severe dataset size limitations through ensemble learning, auxiliary task learning and transfer learning from primary to secondary tasks.
- Writing research publications, presenting at conferences, presenting technical topics to external stakeholders and client prospects.
- Responsible for hiring, and known within the team as the go-to trustee for addressing complex technical challenges and providing unique solutions and insights.

Jan 2021 - Dec 2022
Data Scientist | ***Hummingbird Technologies, London, UK***

- Nurturing key client partnerships by researching and developing new customer driven solutions, such as an instance segmentation approach for high resolution object detection in agricultural fields, and an attention based semantic segmentation model for delineating agricultural parcels at large scale.
- Conducting grant funded research and creating comprehensive documentation for research award programs and conference presentations.
- Technical interviewing for new candidates.

Oct 2016 - Jan 2021
Ph.D Neurotechnology | ***Imperial College London, London, UK***

- Sole ownership of developing an end-to-end analysis pipeline of multi-terabyte image data, including CNN classification through custom or adapted architectures (VGG Net, Google Inception), semantic segmentation (UNet, UNet++), image registration (Elastix, aMAP, ANTs) and dashboard visualisations (Ploty, Dash, Heroki).
- Applied the pipeline to investigate neuronal connectivity in the visual thalamic and pre-frontal cortex pathways, as well as studying structural changes under Alzheimer's and Huntington's pathology.
- Presenting research through publications, conferences, and workshops.

Projects

BinOcular

- Self driven development of a Python package that clusters camera photographs based on feature similarity and temporal thresholding.
- Uses a pre-trained EfficientNet model to compress imagery into a latent feature space, and subsequently uses a cosine-similarity metric and temporal thresholding to group images into *similar* clusters based on shared features within images.

Education

2015 - 2016 MRes Neurotechnology | Imperial College London, UK

2011 - 2015 MPhys in Physics and Astrophysics | University of Sussex, UK

2009 - 2011 A-levels including Mathematics, Physics and Computing | Furze Platt Sixth Form College, UK

2007 - 2009 Thirteen GCSEs including Mathematics, Physics and Biology | Furze Platt Senior School, UK

Technical Skills

Languages Python, C++, JAVA, MATLAB, Rust

Libraries Tensorflow, Keras, PyTorch, Ray, Scikit-learn, Scipy, OpenCV, Pydantic, Pytest, Kedro

Databases STAC, MySQL, PostgreSQL

Software AnyScale, Docker, Git, CircleCI, Poetry, GCP, Vertex AI, ImageJ/Fiji, Blender, Adobe Suite

Publications

2024 **Hierarchical Bayesian modeling of multi-region brain cell count data**

Sydney Dimmock, Benjamin MS Exley, Gerald Moore, Lucy Menage, Alessio Delogu, Simon R Schultz, E Clea Warburton, Conor Houghton, Cian O'Donnell. eLife Neuroscience. 10.7554/eLife.102391.1.

2024 **Detecting cover crop activity at scale using fusion of multiple satellite sources**

Gerald Moore, Edward Dowling, Gabor Szakacs, Daniel Szponar. Remote Sensing [to be submitted].

2024 **Tracking tillage practices across Europe using multi-source Earth observations & machine learning**

Nicholas Synes, Aoife Whelan, Edward Dowling, Francois Lemarchand, Khushboo Jain, Ben Smith, Gerald Moore, Peter Kongstad, Blayne Lees, Vincent Cornwell, Nathan Torbick. IEEE IGARSS.

2024 **The type of inhibition provided by thalamic interneurons alters the input selectivity of thalamocortical neurons**

Stephen Brickley, Deyl Djama, Florian Zirpel, Zhiwen Ye, Gerald Moore, Charmaine Chue, Christopher Edge, Polona Jager, Alessio Delogu. bioRxiv. 10.1016/j.crneur.2024.100130

2021 **Dual midbrain and forebrain origins of thalamic inhibitory interneurons**

Polona Jager, Gerald Moore, Padraic Calpin, Xhuljana Durmishi, Yoshiaki Kita, Irene Salgarella, Yan Wang, Simon R. Schultz, Stephen Brickley, Tomomi Shimogori, Alessio Delogu. Elife. 10.7554/eLife.59272.

2020 **Cell counting in targeted nuclei of whole brain two-photon image data**

Gerald Moore, Polona Jager, Alessio Delogu, Simon Schultz, Stephen Brickley. Biophotonics Congress: Biomedical Optics Congress 2018 (Microscopy/Translational/Brain/OTS), OSA Technical Digest (Optical Society of America, 2018). 10.1364/TRANSLATIONAL.2018.JTu3A.48.

Conferences & Workshops

2022 **Living Planet Symposium**

Exhibited a FracTAL ResUNet model for agricultural field boundary detection, and presented a solution for counting and sizing crop in drone imagery using a Mask R-CNN architecture.

2019 **British Neuroscience Association**

Presented an automated U-Net based cell distribution analysis method for cell counting across whole mouse brain microscopy data, in addition to research on a longitudinal study of cognitive decline in female mice and its association with healthy brain ageing.

2019 **London Neurotechnology Network Imaging Workshop**

Demonstrated research on high-resolution imaging technologies for mapping small-scale objects of interest across large tissue volumes, and the challenges of big data analytics.

2018 **The Optical Society Annual Meeting**

Deep learning approach for cell counting in targeted nuclei of whole brain two-photon microscopy data.

2018 **Dementia Symposium ICL Alzheimer's Research**

Showcased a study on brain pathology in response to Alzheimer's and Huntington's disease.

2017 **British Neuroscience Association**

Macroscopic imaging of neuronal connectivity related to health and disease, as well as meso- and micro-scale changes in synaptic connectivity with age.