Dr. Gerald 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, pipeline-scaling, and statistical data analysis.

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 from research to production. 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 as part of 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), and global scale agricultural event mapping (LSTM, Transformers). Scaling entire pipelines from research to production environments with VertexAI, Airflow and Kubernetes, as well as formulation of unit, integration and end-to-end testing across all code-bases. Individually responsible for developing a Python SDK to improve data workflows with STAC catalogues, driving efficiency for the DS team. Utilising dimensionality reduction through PCA and manifold-learning techniques, and detecting/monitoring data drift. 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 a primary to secondary task. Writing research publications, presenting at conferences. Facilitating communication between DS and internal stakeholders to effectively manage project requirements and expectations. Responsible for hiring. 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 DL 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. Technical interviewing for new candidates, conducting grant funded research and creating comprehensive documentation for research award programs and conference presentations.

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. Research was presented through publications, conferences, and workshops.

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
Libraries	Tensorflow, Keras, PyTorch, Scikit-learn, Scipy, OpenCV, Pydantic, Pytest
Databases	STAC, MySQL, PostgreSQL
Software	Docker, Git, CircleCI, Poetry, GCP, Vertex AI, ImageJ/Fiji, Blender, Adobe Suite

Publications

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   **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].

2023   **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. 10.1101/2024.01.17.576001

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.

Teaching & Events

2016 - 2021   **Postgraduate and Undergraduate Supervisor**

Supervised more than 20 students ranging from Bioengineering, Biophysics, Engineering and Medicine disciplines. Refined teaching, communication and supervisory skill-sets.

2015 - 2021   **Graduate Teaching Assistant and Tutoring**

Taught undergraduate and postgraduate students on topics including Statistics and Data Analysis, Mathematical Methods for Bioengineers and Biophysics of Nerve Cells and Networks.

2015 - 2021   **Events organiser and speaker**

Research engagement and outreach events, including public panel discussions on nootropics and brain enhancement, a microscopy symposium, and a science festival.