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 and Machine Learning Researcher, I have gained valuable knowledge from diverse fields such as Geospatial Remote Sensing, Neurotechnology, Physics, and Astrophysics. I have extensive experience in various areas, including computer vision, image analysis, registration, segmentation, time series analysis, working with large multi-terabyte datasets, Machine Learning (ML), Deep Learning (DL), and statistical data analysis.

I am passionate about exploring new 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.

Experience

Dec 2022 - present **Senior Machine Learning Scientist**
Agreena, London, UK (formerly Hummingbird Technologies, London, UK)

Encompassing data science, ML engineering and software engineering in the remote sensing and verification field, using satellite and drone imagery inputs. Remote detection of agricultural land (FracTAL ResUNet) and crops (Mask R-CNN), time series classification and prediction with custom or adapted architectures (1D CNN, LSTM, CatBoost, XGBoost, Transformers) and scene classification through transfer learning or custom architectures (2D CNN, MobileNet, EfficientNet). Scaling analysis pipelines from research and development stage, to deployment in production environments. Individually responsible for developing a Python wrapper software developer kit to standardise and improve efficiency in data management with STAC. Formulating unit, integration and end-to-end testing of production code-bases.

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, Apache MXNet, Scikit-learn, Scipy, Numpy, Pandas, OpenCV, Rasterio, Plotly, Pydantic, Pytest
Databases	STAC, MySQL, PostgreSQL
Software	Docker, Git, CircleCI, Poetry, GCP, Vertex AI, ImageJ/Fiji, Blender, Adobe Suite

Publications

2023 **Synchronous and asynchronous GABA release in the thalamus helps solve a fuzzy logic problem**

Stephen Brickley, Deyl Djama, Florian Zirpel, Zhiwen Ye, Gerald Moore, Charmaine Chue, Christopher Edge, Polona Jager, Alessio Delogu. Nature Neuroscience [submitted].

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 Alzheimers Research**

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

2017 **Tissue Clearing and 3D Imaging Course**

Learning tissue clearing techniques and light-sheet microscopy.

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.