

Matthew Lyon

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My research focuses on super-resolution in medical imaging data, and incorporating geometric priors into deep learning models. I am available to work from July 2024 upon PhD completion.

EDUCATION

10/2020–07/2024	Doctor of Philosophy · COMPUTER SCIENCE · University of Manchester <ul style="list-style-type: none">· Developed methods for super-resolution within medical imaging data.· Published work and presented findings within top research conferences including NeurIPS '23.· Built, trained, and tested an extensive range of ML models such as CNNs, Transformers, GANs, RNNs, NeRF models, and diffusion models.· Trained models using distributed paradigms such as DDP and model parallelism. Designed data pipelines for both parallel and distributed training.· Released and maintained several open-source deep learning projects in Pytorch and TensorFlow.· Developed models for several tasks including segmentation, classification, reinforcement learning, and data synthesis.
02/2015–08/2016	Masters · MEDICAL PHYSICS · University of Sydney
10/2011–07/2014	Bachelors (Honours) · PHYSICS · University of Warwick

PROFESSIONAL EXPERIENCE

06/2022–Present	Research Assistant · UNIVERSITY OF MANCHESTER · Manchester, UK <ul style="list-style-type: none">· Designed and implemented data cleaning and preprocessing pipelines.· Performed exploratory analysis on large time-series datasets.· Lead tutorials on several machine learning courses.· Graded assignments and exams for several machine learning courses. <i>Python, PyTorch, pandas, NumPy, SQL</i>
08/2019–08/2020	Research Software Engineer · SAVE SIGHT INSTITUTE · Sydney, Australia <ul style="list-style-type: none">· Developed, tested, and documented neuroimaging processing pipelines.· Lead algorithm design and optimisation workflows.· Consulted on neuroimaging analysis techniques and signal processing. <i>Python, TensorFlow, Keras, NumPy, Bash, git, GitHub, MRtrix3, ANTs</i>
08/2019–01/2020	Neuroimaging Analyst · SYDNEY NEUROIMAGING RESEARCH CENTRE · Sydney, Australia <ul style="list-style-type: none">· Developed, implemented, and led QC on neuroimaging analysis pipelines.· Conducted exploratory data analyses on neuroimaging data. <i>Python, Docker, FreeSurfer, git, GitHub, Bash</i>
07/2017–07/2019	Research Software Engineer · HEART RESEARCH INSTITUTE · Sydney, Australia <ul style="list-style-type: none">· Built and managed a distributed computing cluster.· Developed, tested, and documented neuroimaging processing pipelines.· Oversaw data ingestion and QC/QA, created dashboard visualisations.· Conducted clinical research using MRI data. <i>Python, Matlab, OpenCV, pandas, NumPy, git, GitHub, PyQt5, MRtrix3</i>

TECHNOLOGIES

Python · TensorFlow · Keras · PyTorch · PyTorch Lightning · OpenCV · NumPy · pandas · Matlab · TypeScript · React · Express · GraphQL · SQL · MongoDB · C++ · Docker · git · GitHub · Slurm · PyQt5

MODELS

Neural Networks (NNs) · Convolutional Neural Networks (CNNs) · Recurrent Neural Networks (RNNs) · Gaussian Processes (GPs) · Transformers · Generative Adversarial Networks (GANs) · Autoencoders (AEs) · Variational Autoencoders (VAEs) · Diffusion models · ResNets

PUBLICATIONS

- 2023** **Spatio-Angular Convolutions for Super-resolution in Diffusion MRI**, *NeurIPS '23*
Matthew Lyon, Paul Armitage, Mauricio A Álvarez
- 2022** **Angular Super-Resolution in Diffusion MRI with a 3D Recurrent Convolutional Autoencoder**, *MIDL '22*
Matthew Lyon, Paul Armitage, Mauricio Álvarez
- 2019** **Gender-specific structural abnormalities in major depressive disorder revealed by fixel-based analysis**, *NeuroImage: Clinical*
Matthew Lyon, Thomas Welton, Adrina Varda, Jerome J. Maller, Kathryn Broadhouse, Mayuresh S. Korgaonkar, Stephen H. Koslow, Leanne M. Williams, Evian Gordon, A. John Rush, Stuart M. Grieve
- 2019** **Is occipital bending a structural biomarker of risk for depression and sensitivity to treatment?**, *Journal of Clinical Neuroscience*
Karen Fullard, Jerome J. Maller, Thomas Welton, Matthew Lyon, Evian Gordon, Stephen H. Koslow, Stuart M. Grieve
- 2019** **Profound and reproducible patterns of reduced regional gray matter characterize major depressive disorder**, *Translational Psychiatry*
Sarah C. Hellewell, Thomas Welton, Jerome J. Maller, Matthew Lyon, Mayuresh S. Korgaonkar, Stephen H. Koslow, Leanne M. Williams, John A. Rush, Evian Gordon, Stuart M. Grieve
- 2019** **Structural core of the executive control network: A high angular resolution diffusion MRI study**, *Human Brain Mapping*
Kai-kai Shen, Thomas Welton, Matthew Lyon, Andrew N. McCorkindale, Greg T. Sutherland, Samantha Burnham, Jurgen Fripp, Ralph Martins, Stuart M. Grieve

TALKS

- 2023** Spatio-Angular Convolutions for Super-resolution in Diffusion MRI · *NeurIPS '23*
- 2022** Angular Super-Resolution in Diffusion MRI with a 3D Recurrent Convolutional Autoencoder · *MIDL '22*
- 2022** Angular Super-Resolution in Diffusion MRI with a 3D Recurrent Convolutional Autoencoder · *ASDAI '22*

INVITED REVIEWER

- 2024** International Conference on Machine Learning
ICML '24
- 2023** International Conference on Machine Learning
ICML '23
- 2022** International Conference on Artificial Intelligence and Statistics · *AISTATS '22*
- 2022** Conference on Neural Information Processing Systems · *NeurIPS '22*