Curriculum Vitae
Mark A. Griffiths

Contact Information

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Professional Summary

Theoretical Neuroscientist and Machine Learning Researcher with expertise in causal inference, Bayesian methods, and neural networks. Extensive experience in developing scalable machine learning models, applying advanced computational techniques to complex datasets, and conducting impactful research in neuroscience.

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Education

King's College London (KCL)
Master of Science in Neuroscience, Distinction
2017–2018

- Achieved distinction with a final mark of 74.
- Awarded the **Henry Ilwain Poster Prize** for the best academic poster.
- Published research on *structural and functional MRI* and *fMRS glutamate responses* in schizophrenia and bipolar disorder.

University College London (UCL)
Bachelor of Science in Psychology, 2:1 (Overall Mark: 67)
2008–2014

- Conducted a BSc thesis focusing on the analysis of structural MRI data using FreeSurfer for cortical surface reconstruction and SPM VBM (Voxel-Based Morphometry) for assessing gray matter volume differences in a study of healthy participants.

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Key Skills

- **Programming Languages & Tools:** Python (Scikit-learn, Tensorflow/Keras, PyTorch), Unix Shell, C/C++, MATLAB, R
- **Algorithms & Techniques:** Kalman Filters, Hidden Markov Models, Variational Autoencoders, Taylor Series, Synthetic Gradients, Inferential Learning
- **Research Areas:** Active Inference, Amortized Inference, Causal Inference, Bayesian Model Reduction

- **Machine Learning Specializations:** Autoencoders, RNNs, Model Parameter Tuning, Synthetic Gradients, Compact Neural Networks

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Certifications

TensorFlow: Advanced Techniques Specialization
Coursera (Completed: March 2024)

- Successfully completed four courses:
    - Custom Models, Layers, and Loss Functions with TensorFlow
    - Custom and Distributed Training with TensorFlow
    - Advanced Computer Vision with TensorFlow
    - Generative Deep Learning with TensorFlow
- Gained expertise in building complex, non-sequential models using the Functional API, optimizing training environments with multiple processors, and applying advanced computer vision techniques such as object detection and image segmentation.
- Explored generative deep learning methods including Style Transfer, Autoencoders, Variational Autoencoders (VAEs), and Generative Adversarial Networks (GANs).
- Certificate Verification Link

Generative Adversarial Networks (GANs) Specialization
Coursera, DeepLearning.AI (Completed: March 2024)

- Successfully completed three courses:
    - Build Basic Generative Adversarial Networks (GANs)
    - Build Better Generative Adversarial Networks (GANs)
    - Apply Generative Adversarial Networks (GANs)
- Acquired skills in designing and implementing GAN models for tasks such as image generation and image-to-image translation.
- Developed expertise in applying classical machine learning and state-of-the-art deep learning techniques for generative modeling.
- Certificate Verification Link

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Professional Experience

Research Assistant (King's College London)
2018–2020

- Conducted structural and functional MRI research using FreeSurfer and SPM.
- Analyzed functional connectivity covariance using the McLaren gPPI toolbox in MATLAB for a study on Dissociative Identity Disorder (currently in press).
- Generated findings on fMRI and glutamate responses by applying directed ROI analysis and R-based statistical techniques.

Machine Learning Researcher (University College London)
Project with Professor Peter Howell
2019–2021

- Developed a machine learning pipeline for stutter categorization based on auditory data, leveraging *Kalman filters* and *Taylor series transformations*.

- Used a concrete autoencoder for dimensionality reduction, optimizing auditory feature sets for classification tasks.

- Validated preprocessing pipelines and feature selection using TensorFlow-based compact neural networks.

Graduate Teaching Assistant (King's College London)
2021

- Delivered online tutorials for Modules A1 and A2 of the MSc Neuroscience course, supporting students in understanding course material.

- Provided guidance and feedback on course assessments, including the lab book, thesis, and exams.

- Facilitated small group discussions to enhance critical thinking and subject mastery.

- Supported students' academic development through personalized assistance and practice exercises.

Independent Research on Neuro-Computational Models
2021–Present

- Explored causal modeling and synthetic gradients in neuroimaging using Bayesian algorithms, including Kalman Filters and Variational Autoencoders.

- Developed scalable and efficient training techniques incorporating Bayesian model reduction and TD(λ)-blending methods.

- Investigated active inference frameworks using amortized inference schemes to enable asynchronous updates and minimize parameter interference.

- Presented ideas to Karl Friston's methods group on three occasions.

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Selected Publications

- **Identity-state-dependent emotion regulation networks in Dissociative Identity Disorder**
  In Press — Role: Functional connectivity analysis using gPPI toolbox and MATLAB/SPM.

- **Variants in the Zinc Transporter-3 Encoding Gene (SLC30A3) in Schizophrenia and Bipolar Disorder**
  Frontiers in Psychiatry
  Role: Structural MRI analysis, FreeSurfer workflows, and R-based data interpretation.

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Research Interests

- **Neuro-Computational Modeling:** Investigating active inference and generative model architectures for adaptive systems.

- **Causal Inference in Machine Learning:** Applying Bayesian algorithms and Kalman Filters to uncover causal pathways in complex systems.

- **Deep Learning in Neuroscience:** Applying machine learning models for neuroimaging and time-series data.