Grant Stevens

Machine Learning Researcher

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SUMMARY

I am currently an EPSRC Doctoral Prize Fellow at the University of Bristol. I specialise in machine learning techniques applied to astronomical data, with a focus on improving active learning performance and exploring the utility of weak supervision. My work has enabled me to be involved and consult in the morphology classification pipeline of the recently launched ESA telescope Euclid.

SKILLS

Research: Active Learning, Weak Supervision, Computer Vision, Interactive Software Development.

	Proficient:	**Experience with:**
Languages:	Python	C++, CUDA, BASH.
Technologies:	PyTorch, SKLearn.	PyBind, Tensorflow.

EDUCATION

EPSRC Doctoral Prize Fellow
School of Physics, University of Bristol — Jun 2024 – Jun 2026

- Diffusion Models
- Simulation-Based Inference
- Likelihood-Free Inference
- Digital Twins
- Simulation Parameter Estimation
- Simulation Calibration

Interactive Artificial Intelligence, PhD
School of Computer Science, University of Bristol — Sep 2019 – May 2024

- Active Learning
- Weak Supervision
- Computer Vision
- Interactive Software Development
- ML for Real World Data
- Multimodal Learning
- Human-in-the-Loop ML
- Crowdsourced Labels
- Galaxy Classification

Computer Science, MEng
School of Computer Science, University of Bristol — Sep 2015 – Jul 2019

- Programming & Algorithms
- Machine Learning
- Deep Learning
- Software Engineering
- Computer Architecture
- Systems Security
- Computer Graphics
- 3D Modelling & Animation
- Web Technologies

SELECTED PUBLICATIONS

[1] Grant Stevens et al. "AstronomicAL: an interactive dashboard for visualisation, integration and classification of data with Active Learning". In: *Journal of Open Source Software* 6.65 (Sept. 2021), p. 3635. DOI: 10.21105/joss.03635.

[2] Riku Green et al. *Time-Series Classification for Dynamic Strategies in Multi-Step Forecasting*. 2024. eprint: 2402.08373.

[3] Euclid Collaboration et al. *Euclid preparation. Measuring detailed galaxy morphologies for Euclid with Machine Learning*. 2024. eprint: 2402.10187.

EXPERIENCE

AI Research Engineer
Imagination Technologies — Jun 2022 – Dec 2022

During this 6-month internship, I worked on creating custom CUDA implementations for Deep Learning Inference on high sparsity data. My novel implementation of sparse convolutions can compete with SOTA latency on LiDAR classification networks. The code has been developed to be able to run on any general-purpose hardware. The project has since been submitted for five patents.

C++ CUDA Python | **PyTorch PyBind11**

PATENTS

[1] Grant Stevens et al. *Methods and systems for performing a sparse submanifold convolution using an nna*. **GB2623140** Pending. 2023.

[2] Grant Stevens et al. *Methods and systems for performing a sparse submanifold convolution on a gpu*. **GB2623141** Pending. 2023.

[3] Grant Stevens et al. *Methods and systems for performing a standard convolution on a gpu*. **GB2623142** Pending. 2023.

[4] Grant Stevens et al. *Methods and systems for performing a standard deconvolution on a gpu*. **GB2623143** Pending. 2023.

[5] Grant Stevens et al. *Methods and systems for performing a sparse submanifold deconvolution on a gpu*. **GB2623144** Pending. 2023.

PROJECTS

AstronomicAL: an interactive dashboard for visualisation, integration and classification of data with Active Learning

Developed as part of my PhD

AstronomicAL is a human-in-the-loop interactive labelling and training dashboard that allows users to create reliable datasets and robust classifiers using active learning. The system enables users to visualise and integrate data from different sources and deal with incorrect or missing labels and imbalanced class sizes by using active learning to help the user focus on correcting the labels of a few key examples. AstronomicAL enables researchers to take full advantage of the benefits of active learning: high accuracy models using just a fraction of the total data, without the requirement of being well versed in underlying libraries.

Python Javascript | **PyTorch SKLearn Holoviews Bokeh**

Passive Information Extraction System (P.I.E.S)

Interactive AI Group Project - Developed for L.V Insurance

Based on the requirements of L.V, our group developed a backend question-answering system which assists the service desk staff in extracting relevant information from customer phone calls. The Passive Information Extraction System (P.I.E.S) analyses a live transcript of the conversation to improve customer experience by allowing service desk operators to concentrate on the human interaction rather than data collection. The system processes all information from the conversation in real time and enters it on the system while the call operator concentrates on the customer's welfare. All information extracted can be verified by the call handler ensuring vital information is never missed or incorrectly identified. The system uses a BERT model trained on the Stanford Question Answering Dataset (SQuAD). One of the main advantages of the implemented system is the ability to produce more training data with every call the company handles. With thousands of calls per week, it is possible to generate a sufficiently large labelled dataset of transcripts specific to the company's requirements. This allows for routine updating of the Question and Answer model to ensure it is performing to a high standard.

Python | **PyTorch**

Multiplayer Rhythm-Based Dungeon Crawler

Games Project - Awarded Best 3rd Year Group Project

For a 3rd Year group project, we created a game called Rave Cave. It is a multiplayer rhythm-based dungeon crawler where large amounts of players rock out simultaneously in time to the music. Players must cooperate with their team to solve puzzles and complete complex button sequences - all in time to the beat of the music. We created our own game engine in C++ by integrating our custom code with external libraries.

C++ | **SFML Irrlicht GLM Anax**

TEACHING EXPERIENCE

Artificial Intelligence (COMS30014), Teaching Assistant 2021/2022
Introduction to Artificial Intelligence (EMATM0044), Teaching Assistant 2021/2022
Machine Learning (COMS30007), Teaching Assistant 2019/2020
Symbols, Patterns & Signals (COMS21202), Teaching Assistant 2018/2019

CONFERENCES

Simulation Based Inference for Galaxy Evolution 2024 | LOC Apr 2024
Bristol Interactive AI Symposium (BIAS) 23 | Planning Group and Organisation Committee Sep 2023