Chris Bamford

Email: chrisbam4d@gmail.com - **Mobile:** +44-7853-262-719 **Twitter:** @Bam4d **Github:** Bam4d

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Education

- **PhD - Artificial Intelligence in Gaming, Queen Mary University (Expected August 2022)**
- **First Class Hons MEng in Applied Cybernetics, University of Reading.**
- 3 A-levels (3 A), Dr Challoner's Grammar School, United Kingdom.
- 12 GCSEs (6 A*, 4 A), Dr Challoner's Grammar School, United Kingdom.

Recent Publications

2021 Griddly - A platform for AI research in games

Software Impacts 8, 100066 + AAAI Workshop on reinforcement Learning

URL: https://arxiv.org/abs/2011.06363

2021 Generalising Discrete Action Spaces with Conditional Action Trees

2021 IEEE Conference on Games (CoG), 1-8

URL: https://arxiv.org/abs/2104.07294

2021 Gym uRTS - Toward Affordable Full Game Real-time Strategy Games Research with Deep Reinforcement Learning

2021 IEEE Conference on Games (CoG), 1-8

URL: https://arxiv.org/abs/2105.13807

2020 Neural Game Engine: Accurate learning of generalizable forward models from pixels.

2020 IEEE Conference on Games (CoG), 81-88

URL: https://arxiv.org/abs/2003.10520

Professional Experience

2022 March-Present Internship (continuation) MetaAI London

During my internship at MetaAI I made a POC of a level building and editing tool for the MiniHack learning environment. I was invited back as a contractor to continue this work.

2021 June-September Internship MetaAI London

For my internship with MetaAI, I worked on algorithms to improve training in IMPALA algorithm under data augmentation. I identified several problematic theoretical implications that negatively affect training and provided and evaluated methods to mitigate these effects. These methods centered around consistency regularization and geometric deep learning.

2018 Q4-present PhD - Artificial Intelligence in Gaming, Queen Mary University

My research interests are primarily in Deep Reinforcement leaning particularly using model-based planning as a method of improving sample efficiency and model accuracy. Model-based methods are a particuarly interesting area of research as they allow artificial agents to use tools which have psychological parallels such as imagination, curiosity and empowerment. I believe that these tools are a step towards general artificial intelligence.

2018 Q3 Founder - embod.ai

embod.ai is a start-up where researchers, students and hobbiests can build and observe AI agents in Massively Multiplayer Online environments. The goal of embod.ai is to make AI based gaming and competitions a mainstream e-sport. Beta release: https://medium.com/@chris.bamford/embod-ai-come-join-the-beta-efcdbc85f524

2018 Q2 EF10LDN Cohort Member - Entrepreneur First

Entrepreneur First is the UK's most successful startup accellerator programme. Entrepreneur First gathers up to 100 highly talented individuals in two cohorts a year and helps them to build globally important companies.

2015-2017 Lead Research and Development engineer at import.io

import.io specializes in making it easy for non-technical users to gather and structure data from the web. I have worked at import.io since it was founded in 2012. I have worked mainly on designing and creating innovative technologies to generate a leading edge over any competitors. I have worked mainly in Java when building infrastructure and backend projects, and Python when doing Machine Learning.

Some of the projects of which I have had significant input and I have enjoyed working on:

- **Bees** - import.io's highly distributed and scalable querying and messaging platform. Bees handles many challenges that are faced when building a distributed web extraction system, such as variable and unknown network latency, asynchronous IO across multiple servers and thousands of endpoints, pipelining and sorting of sparse data sets and collation of data from multiple sources.
- **Label Suggestion** - A statistical model that would return the "most likely next label" that a user would chose for a data column given the previous data columns the user had inputted. Label suggestion used some highly optimized BLAS libraries to quickly infer probabilities over a large data set of manually labelled training data.
- **Deep Learning** - Research projects with deep learning and web data extraction. For example I worked on several page classification approaches using Recurrent Neural networks and Recursive Neural networks. Additionally I worked on data point recognition where i worked to develop algorithms that would classify where there were datapoints in a webpage and then classify what label those data points should be given. The research was performed using a few different deep learning libraries; deeplearning4j, neon, keras (experimenting with tensorflow and theano).

2012-2015 Software Engineer at import.io

Before the machine learning and algorithm team was created at import.io, We were a small team of 3-5 engineers. At this time I mainly worked on the main Java codebase.

Notable Projects

Griddly Griddly is an open-source project aimed to be a all-encompassing platform for grid-world based research. Griddly provides a highly optimized game state and rendering engine with a flexible high-level interface for configuring environments. Not only does Griddly offer simple interfaces for single, multi-player and RTS games, but also multiple methods of rendering, configurable partial observability and interfaces for procedural content generation.

Open Source Contributions

Entity Neural Networks This is an ongoing project to provide implemenations and baselines for transformer models in reinforcement learning environments. More specifically the Griddly project natively provides interfaces for these types of models.

Commits: https://github.com/entity-neural-network/incubator/commits?author=Bam4d

RLLib Have made several contributions to RLLib, specifically around threading and memory usage in their implementation of the distributed IMPALA algorithm.

Commits: https://github.com/ray-project/ray/commits?author=bam4d

Key Skills

C/C++ The majority of Griddly is written in C/C++ with bindings to Python, Julia and Javascript.

Python I have worked with python in many different types of projects, from research with deep learning libraries such as pytorch and tensorflow, pytorch; To building REST API services using libraries such as Flask when productionizing machine learning models.

Java The majority of my work at import.io was using Java. I have used Spring, SpringBoot, Hazelcast, Jedis, Jackson, Lettuce, Jetty 8/9, mockito, cucumber, gherkin and Google libraries such as Guava, Lombok and Futures.

Javascript/Typescript I have mande several demos and smaller projects using React, such as simple level designers for Griddly and MiniHack learning environments.

Amazon AWS I have used a large number of features of amazon aws while at import.io, embod.ai and in some personal projects. I am comfortable with using Lambda, CloudFormation, ECR, ECS, ElasticBeanstalk, Route53, S3, EC2, Redshift, AuroraDB and ElastiCache