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So Cool

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I am a graduating physics student in my third and final year at Queen Mary University of London. My major focus has been in theoretical and mathematical modules, and my final dissertation subject has been exploring new and novel methods of calculating scattering amplitudes. I am currently pursuing a masters course (Msc Artificial Intelligence / Msc Machine Learning) to commence in September 2020, as this is the area in which I am pursuing in my career.

I have a diverse history of experience with a background in art where I have been part of many creative collaborations, exhibitions and projects. I have been a freelance web developer; leading creative front-end and graphic design projects. Most recently, during the past two summer breaks of my physics undergrad, I have undertaken two internships; one for a fin-tech startup, and the other as part of the South Eastern Physics Network internship program in a space engineering company.

2019 Internship: Machine Learning and Computer Vision.

In the 2019 Summer break, I joined the Earth Observation team at Deimos Space UK, a satellite and space engineering company in Harwell, Oxfordshire.

The team use machine learning to create object detection models from satellite imagery, which are pipelined to produce rich information for industry partners.

I lead an investigative project using python, TensorFlow and Keras, to produce an object detection model differentiating between various types of vegetation, creating a heat-map like image, which could be used to (**give back farmers useful information**)

I used python to automate and batch process labelled images, creating a pipeline to train the model on a given set of images; which would be used by the industry partner to upload the images, and

with the aim that it would feed this information back into the application pipeline to serve back to industry partner, who would use and learning about the UK space industry, and how machine learning and computer vision is being used to produce useful information from satellite imagery.

I took part in several projects:

- Built object detection model for earth observation data, to detect and differentiate between biodiversity types (Python, TensorFlow and Keras).
- Researched methods of transfer learning in neural networks, and implemented one in a project constrained by a limited labelled dataset; improving training time.
- Created internal reference documentation for CVAT (Computer Vision Annotation Tool).
- Collaborated on a poster researching computer vision methods using machine learning, neural networks and transfer learning.

2018 Internship: Fin-tech, and Software engineering.

During the 2018 summer break, I undertook a Python software engineering internship with Yobota; a mid-sized fintech startup in London, who have created a lean cloud based banking platform. I was delegated to the API / integrations team and given the exploratory project of creating an internal client for payment initiations using the UK's new banking initiative the OpenBanking API. The client that I wrote had to conform to banking industry standards, and employed technologies such as OAuth bearer tokens, a REST API for internal platform use, test driven development life cycle, continuous integration using Jenkins and written using Python / Django / DRF, with testing suite pytest.

As part of team building, I delivered a company presentation on my research into OpenBanking. And for project planning, I took part in a daily morning standup, and weekly sprint planning meetings, where I set my own goals, and recounted updates on the progress of my integration.

Research projects and education.

Throughout my degree, I have been learning techniques in mathematics, programming, and physical laws to interrogate, model and analyse data from physical systems.

During the module *Introduction to Scientific Computing*, we used Python and Jupyter Notebooks to model mathematical functions and analyse datasets; extracting relevant physical information from them. Of note, we learned about linear regression algorithms and curve fitting and image manipulation and cleaning using discrete Fourier transform; which drew upon my mathematical knowledge of linear algebra, and calculus.

As my final project for scientific computing, I researched and wrote a scientific report analysing gravitational waves and black hole mergers, which included an analysis of the first confirmed merger. I used the public data-set from the LIGO interferometers, which measure stellar mass black-hole mergers, and I used python, numpy and scipy, in a Jupyter notebook to analyse the data. I used discrete Fourier transforms to clean the signals, and a linear regression to fit Einsteinian prediction about the merger, for example: the mass of each of the two black holes, and producing a 'chirp mass' graph for that particular event.

In first year, I took part in a collaborative group project using Python and MatPlotLib to investigate financial data sourced from the World Bank, collating multiple years of financial information about specific and grouped countries, then analysing and normalising for inflation the results to plot using MatPlotLib's PyPlot, the movement of variables throughout a set time period in specific and grouped countries.

Freelance web development experience.

Before commencing my Msci at Queen Mary, I worked as a freelance web developer, where I used my creative background to design and build custom website themes and plugins, gaining experience in PHP, JavaScript, HTML, CSS.

From 2016, I worked as lead web developer for *Stillnessinyoga*, a dutch yoga and meditation studio. I built a web platform for their digital product, which has become an industry leading, online learning space that accompanies their teacher trainings. The site included a content restricted membership area, with e-commerce checkout, and a media streaming platform to present secure video content hosted in a private Amazon S3 buckets.

Along with designing the interactive digital teacher training manuals. I worked along side head teachers to design and put together three teacher training manuals (Level 1, 2, Advanced 2) - in iBook format - an interactive e-publishing book format.

Interests

I have begun using machine learning techniques in personal projects. One currently that I am working on uses scikit-learn to predict housing prices based on location, and other relavent data-points.

I am also interested in game engines as a framework for pushing machine learning, deep neural networks and AI - for example DeepMind's AlphaGo, and more recent AlphaStar. I think that deep learning engines will revolutionise how we process todays data-heavy research.

To sum up, I believe that my software engineering, freelance, and training in art and science has given me a unique edge in analysing and solving problems needed to work in machine learning and AI. I believe that I would bring out-of-the-box insights, making me an ideal candidate for a team undertaking such research.