Samuel Overington

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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 on theoretical and mathematical modules, and my final dissertation subject is on exploring new and novel methods of calculating scattering amplitudes. I am currently applying for a Masters Course (MSc Artificial Intelligence / MSc Machine Learning) to commence in September 2020, as this is the area in which I would like to specialise for 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, over the past two summer breaks of my physics undergrad, I have been selected for two internships: one in software development for a fin-tech startup, and the other, as part of the SEPNet programme, in machine learning and artificial intelligence at a space engineering company.

2019 SEPNet Internship: Machine Learning and Computer Vision.

I took part in the South-Eastern Physics Network (SEPNet) internship programme, joining the Earth Observation team at Deimos Space UK. I lead an investigative project to produce NN object detection models that could differentiate between various types of vegetation and biodiversity; hi-lighting regions of high detection density of a particular biodiversity class within an image. The model would be used in a project for their farming industry partners with the aim to reduce chemical usage extracting optimal areas to target the resources. On completion of the project, I produced a report and research poster and presented my findings and results at the SEPNet presentation day.

I used python and libraries Keras, TensorFlow, PIL, pandas, and numpy to batch process the labelled images, and then trained the model on them using a dedicated high power GPU server. The trained model could then be used to classify a stream of images on the fly, or be saved for later use further down in the partner pipeline.

I research and implemented the process of transfer learning in neural networks as within the project remit, it was specified that there would be a limited availability of labelled source imagery. This increased the feature extraction accuracy and decreased the training time (when comparing to the same dataset without using 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 fin-tech 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.

Freelance web development experience.

Before commencing my Bsc 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. One such project, which began as full time in 2016, and have continued occasionally helping out with when I commenced my studies; I was lead web developer for *Stillnessinyoga*, a dutch yoga and meditation studio. I built a web platform for their digital learning space and online membership.

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 particular 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. Utilising the public data-set from the LIGO interferometers, which measure stellar mass black-hole mergers, and python, numpy and scipy, in a Jupyter notebook I analysed the data and I used discrete Fourier transforms to clean the signals, as well as 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.

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.