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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, over the past two summer breaks of my physics undergrad, I have undertaken two internships; one in software development for a fin-tech startup, and the other as part of the South Eastern Physics Network internship program in machine learning and artificial intelligence at a space engineering company.

2019 SEPNet Internship: Machine Learning and Computer Vision.

In the 2019 Summer break, I took part in the South-Eastern Physics Network (SEPNet) internship programme, joining the Earth Observation team at Deimos Space UK; a satellite and space engineering company in the science campus in Harwell, Oxfordshire. There, the team use high resolution satellite imagery and machine learning object detection models to extract resources and information pipelined to products and industry partners.

I lead an investigative project using Python, TensorFlow and Keras to produce object detection models differentiating various types of vegetation and biodiversity and creating a heat-map like output image which could be used to for their farming industry partners. I created a pipeline to train a deep neural network that would be fed from the industry partners labelled inputs, and would return the trained model for use later on in the application. I created the pipeline using python, and libraries Keras, TensorFlow, PIL, pandas, and numpy to batch process the labelled inputs, and then trained the model on them using a dedicated high power GPU server.

Within the project remit, it was specified that there would be a limited availability of labelled source imagery; so I researched and implemented methods of transfer learning; increasing the feature extraction accuracy

and and decreased training time (when comparing to the same dataset without using transfer learning).

At the end project I produced a report and research poster, presenting my findings and results at the SEPNet presentation day, along with my collaborator.

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.

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. Including projects like from 2016, I worked as lead web developer for *Stillnessinyoga*, a dutch yoga and meditation studio. I built a web platform for their digital learning space and online membership.

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 relevant data-points.

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.