Zawar Qureshi

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Information engineering graduate specialised in optimisation, control, computer vision and machine learning. Hands on experience with vehicle hardware and software development. Undertaken various projects over the years ranging from particle modelling at CERN to Convolutional Neural Networks deployed on an android phone. Published and presented a paper discussing a GPU based ML algorithm (ADMM) for resource allocation problems at the ACC19.

Education

2014-2018   **University of Oxford, M.Eng. Engineering Science (~3.7/4.0 GPA)**

2012-2014   **Karachi Grammar School (Glaize Brook prize)**

A Levels:Economics(A*) Mathematics(A*) Further Mathematics(A) Chemistry(A*) Physics(A*)

2002-2012   **The City School (TCS distinction award)**

O Levels: 8 at A*, 1 at A, including Additional Mathematics (A*) and Physics (A*)

Experience

Sept 2018 -   **Machine Learning Engineer - Jaguar Land Rover, Autonomous Driving Pre-Dev Team**

- Perception engineer tackling problems ranging from deep monocular depth estimation to object recognition (Cameras & LIDAR), deployable on real time hardware (such as Nvidia drive platform)

- Researching multitask autoencoders to tackle problems such as semantic segmentation and depth estimation with interest in sequential data and estimation uncertainties

- Developed a pipeline for NN hyper-parameter optimisation using bayesian optimisation methods allowing for automated tuning, saving weeks of engineering time for every NN algorithm that is being developed. looking at adding NN pruning into the pipeline using the ADMM algorithm which allows orders of magnitude of reduction in NN parameters

- Productionised an object detection algorithm actively being researched using docker and flask to allow engineers within the company to study algorithm performance in a scenario of their choosing by simply typing a URL in their browser to open a GUI/visualization

- Leading a team of 4-5 engineers in R&D of the algorithms following SCRUM framework

- Actively support exchanges between suppliers/startups to share knowledge and explore potential for collaboration. Supported talks between suppliers such as DELL EMC and Nvidia for devising JLR's scale-able infrastructure (worth over £500,000 in the initial phase) for inference/training ML algorithms.

July - Sept 2018   **Research intern - Oxford University Visual Geometry Group (VGG)**

- Worked under Prof. Andrea Vidaldi on the challenging problem of estimating depth using a single camera with deep convolutional neural networks (supervised/unsupervised structure from motion (SFM) using deep encoder-decoder architectures)

- Replicated state of the art results produced by VGG on Tensorflow and developed the model in Pytorch. Investigated possible novel improvements to the state of the art

Jun - Sept 2017   **Software Engineer - Jaguar Land Rover, Autonomous Driving Pre-Development Team**

- Devised a software platform for use throughout JLR (from design to functional safety) to aid in deciding the required sensor set and safety critical positioning of sensors on different vehicles. Program widely used by engineers and management in decision making.

- Briefly worked for a startup funded by JLR InMotion to investigate routing algorithms

Projects (https://github.com/qureshizawar)

2017-2018	**Parallel ADMM for robust quadratic optimal resource allocation problems**

- Developed a novel robust GPU based optimal resource allocation algorithm using highly parallelisable machine learning techniques (ADMM). The algorithm was developed for NVIDIA GPUs (CUDA C/C++) to optimise energy usage in HEVs by learning from past data (traffic etc.) to handle large uncertainties in the energy demand. Results showed speed up of over 20X using GPUs vs CPUs, making an impractical scenario-based approach implementable. Presented an academic paper discussing algorithm and results at the American Control Conference 2019 (**https://arxiv.org/abs/1903.10041**)

2017   **Recognising vehicles using Convolutional Neural Networks on an android phone**

- Utilised Google's MobileNet to create an image classifier for Nexar challenge which was trained using images (NEXET dataset) of different types of vehicles (cars, buses, etc.). The model was deployed on an android phone using Tensorflow

2016-2017   **Unidentified Falling Objects (UFOs) in the Large Hadron Collider at CERN**

- Worked with a team of engineers from Oxford and CERN to find a solution for high power beam losses due to interactions with unknown particles inside the LHC at CERN. The interactions have caused significant loss of money/research time

- Relying on large amounts of data from previous experiments, developed and modelled a solution which was then presented at CERN to a panel of scientists and engineers. Recommendations considered for further development work

2016   **Digital camera calibration for computer vision**

- Built and optimised a real-world model of a camera for use in computer vision. Built considering a pin hole camera design and a noisy grid of points as a calibration object

2015   **Line follower robot**

- Programmed a 4 wheeled robot (from data sheets to C code) to follow a route outlined by a black taped line using a monochrome camera; set the university-wide fastest time to complete the test route

Skills

Programming Languages: C, C++, CUDA (including Thurst, CUBLAS), Python (including OpenCV, Tensorflow, Pytorch), MATLAB(including Simulink, computer vision toolbox), Basic Javascript
Operating systems: MS Windows, Linux, Mac OS
Tools/applications: Docker, Kubernetes, MS Visual Studio, Eclipse, Vector CANalyzer, SolidWorks
Version control: Git, SVN
Languages: Urdu, good written and spoken