

Zawar Qureshi

Machine Learning Engineer

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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

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

Karachi Grammar School (Glaize Brook prize) 2012-2014

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

The City School (TCS distinction award) 2002-2012

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

Experience

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

- Perception engineer tackling problems ranging from deep monocular depth estimation to object recognition (Cameras & LIDAR), deployable for tooling and real time hardware
- Developing multitask auto-encoders to tackle problems such as semantic segmentation and depth estimation with interest in sequential data and estimation uncertainties. Actively read and evaluate state-of-the-art research papers to propose potential improvements to the algorithms currently in use
- 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
- Deployed 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/visualisation
- Supporting 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) for data ingest, training and inference for ML algorithms

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

- Worked under Prof. Andrea Vedaldi 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

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

- 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

Research Engineer - CERN, Large Hadron Collider Unidentified Falling Objects (UFOs) Group 2016-2017

- 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 causing 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

Parallel ADMM for robust quadratic optimal resource allocation problems

2018-2019

- 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>)

Recognising vehicles using Convolutional Neural Networks on an android phone

2017

- 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

Digital camera calibration for computer vision

2016

- 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

Line follower robot

2015

- 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 Thrust, CUBLAS), Python (including OpenCV, Tensorflow, Pytorch), MATLAB(including Simulink, computer vision toolbox), Basic Javascript, Basic R

Operating systems: MS Windows, Linux, Mac OS

Tools/applications: Docker, Flask, Kubernetes, AWS, CMAKE, ONNX, Working knowledge of SQL/NoSQL DBs and data management, unittest, pylint, MS Visual Studio, Eclipse, Vector CANalyzer, SolidWorks

Version control: Git, SVN

Languages: Urdu, good written and spoken