Gautam Kumar

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Education

Indian Institute of Technology Roorkee, India *GPA: 8.46 / 10*

B.Tech. in Electrical Engineering *July'11 - May'15*

Experience

Qualcomm *Hyderabad, India*

Machine Learning Engineer *March'18 – Present*

- Development of Snapdragon Neural Processing Engine SDK.
- Enabling deep neural networks execution on mobile devices.
- Optimizations for Hardware accelerated inferences on CPU, GPU, and DSP runtimes.
- Analysis and debugging of performance and power of the neural network.

Qualcomm *Hyderabad, India*

Chipset Power Systems Engineer *June'15 – Feb'18*

- Drive the roadmap for power management features(HW/SW) in Snapdragon processors.
- Chipset Power Lead of Snapdragon 425 SoC and Snapdragon 632 SoC.
- Designing of Power Grid for attaining best power in minimum cost constraints. Tuning of clock plans of multiple cores/sub-systems.
- Modeling and Projection of Power usage goals for Snapdragon processor.
- Investigation of HW and SW architecture involving analysis of the data flow of important use cases to find novel power optimization solutions.
- Working on development and exploration of machine learning based solutions for improving power and performance of Snapdragon chipsets.

Qualcomm *Hyderabad, India*

Software Engineering Intern *May'14 – July'14*

- Developed a a fully automated Testing Framework(JTF) for testing of Qualcomm-powered Android devices in a simple and time-efficient way.
- Automated NFC Testing using Robotic Arm and later integrated it into JTF.

Projects

Active Noise Cancellation using Recurrent Neural Networks *Qualcomm*

Deep Learning *2018*

- Implementation of a Recurrent Neural Network for audio noise suppression based on RnnNoise project by Mozilla.
- Developed an Android application which uses Tensorflow Mobile for execution of the neural networks.

Power Waveform Analyzer for Energy Residency analysis *Qualcomm*

Power Systems *2018*

- Development of a tool for analysis of power waveforms collected on mobile chipsets.
- Improved the methodology of use-case power analysis based on the energy consumption patterns across the available frequency levels for CPU, GPU, Memory, Modem, and, other cores.

Temperature Prediction using Recurrent Neural Network *Qualcomm*

Deep Learning *2017*

- Developed a Hierarchical Bi-directional Recurrent Neural Network Architecture to predict the future temperatures of the most thermally-sensitive cores inside a Snapdragon Processor, for pro-active thermal mitigation to allow the device to run near the thermal limit.
- Inputs to the network comprised of a sequence of SoC states over the past few seconds, where each state is defined by 44 features consisting of low-level CPU parameters and readings from temperature sensors.
- Improved the robustness of the model by Ensemble Averaging and K-Fold Cross Validation.

Facial Keypoints Detection using Convolutional Neural Network *Kaggle*

Deep Learning *2017*

- Implemented a Deep Convolutional Neural Network for prediction of keypoints positions on the human face which could be used for various applications such as Facial Recognition.
- Input consists of thousands of B/W images of 96x96 pixels.

Rainfall Estimation using Recurrent Neural Network *Kaggle*

Deep Learning *2016*

- Implemented a Recurrent Neural Network for prediction of Hourly Rainfall gauge levels recorded over a few months in 2014 over the US mid-western corn-growing state.
- Inputs consisted of a sequence of multiple polarimetric weather radar observations over the course of an hour, where each measurement consisted of 22 features.
- Employed Ensemble Averaging and K-Fold Cross Validation to improve the prediction accuracy.

Workload Classification using Supervised Learning *Qualcomm*

Machine Learning *2016*

- Developed a novel approach for classification of CPU workloads into two disparate classes for improving CPU Governor Algorithm.
- Used k-Nearest Neighbours Algorithm for classifying new workloads.

Lowlevel CPU stats Logger for ARM CPU *IIT Roorkee*

CPU Architecture *2016*

- Developed a logging mechanism for periodically collecting lowlevel CPU stats like Instructions Executed, Cache Accesses, DDR Accesses and Activity in real time on Snapdragon Chipsets having ARM-based Apps Processor.

Implementation of Backpropagation Algorithm in VHDL *IIT Roorkee*

Hardware Programming | Machine Learning *2015*

- The project envisages the performance of FPGA (Field Programmable Gate Array) for applications in machine learning by implementing Back-propagation Algorithm and compare the execution time with the software implementation in python.
- Implemented the Backpropagation algorithm in VHDL. Constructed different modules for the hidden nodes and output nodes which give the flexibility to constructing any network.
- Verified the accuracy and correctness of our implementation by simulating the XOR problem as a small dataset problem and Fisher Iris problem as a large dataset problem.

Virtual Keyboard *IIT Roorkee*

Digital Image Processing *2014*

- The project provides an alternate solution to the traditional physical button keyboards. It converts any plane surface into a keyboard.

Letter Image Recognition using Neural Network *Qualcomm*

Machine Learning *2014*

- The project involved the development of an artificially intelligent method to recognize the hand-written English alphabets.
- In the development process, 20000+ Character images were used, based on 20+ different fonts and each letter was randomly distorted to produce a file of 20,000+ unique stimuli, each having 15+ primitive numerical attributes which were used to train the neural network.

Coursework

Undergraduate *IIT Roorkee*

Machine Learning | Artificial Neural Networks | Computer Systems & Programming | Data Structures | Advanced System Engineering | Control System | Superconducting devices and materials | Mathematics I, II

Independent

Deep Learning | Operating Systems | Computer Architecture | Introduction to Algorithms | Introduction to Computer Science and Programming

Skills

Programming & Deep Learning Tools

C++ | C | Android | Python | MATLAB | Tensorflow | Onnx | Keras | Caffe

Scholarships & Achievements

2017	**Patent : Submitted**, Deep learning based Temperature predictor for Pro-Active Thermal Mitigation.	*Qualcomm*
2016	**Patent : Filed**, Power and Performance aware BIMC/DDR Voting Mechanism.	*Qualcomm*
2016	**Recipient**, Qualstar Hall of Fame - Diamond for ensuring coverage of all power aspects of Snapdragon 425.	*Qualcomm*
2016	**Recipient**, Qualstar Hall of Fame - Diamond for research on improving the power of Snapdragon 652.	*Qualcomm*
2014	**Recipient**, Qualstar Hall of Fame - Diamond for exceptional contributions as an Intern	*Qualcomm*
2011-15	**Recipient**, Merit-Cum-Means Scholarship for undergraduate studies (INR 25000/year)	*IIT Roorkee*