Aakash Kapoor

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Education

Indian Institute of Technology Bombay CPI : 9.18
Bachelor of Technology in Electrical Engineering, Minor in Computer Science *July 2016 – May 2020*

Work Experience

Research Engineer Jan. 2021 – Present
Samsung R&D Institute India - Bangalore

- Currently working as part of the **Device Intelligence Team**, collaborating with the Visual Intelligence team to enable deployment of state-of-the-art Computer Vision models on resource-constrained mobile devices
- Working broadly in the field of optimization, including zero-order and first-order techniques, model compression and related areas to reduce model size, power consumption and inference time while maintaining comparable accuracy
- Proposed and worked on novel techniques for improving model execution time by first-order optimization methods ***(Patent Approval Underway, Research submitted to IEEE Conference on Computer Vision and Pattern Recognition 2022)***
- **Awarded the Samsung Excellence Award** for being the Star of the Quarter in Leading by Example for outstanding performance, dedication to work and achievements beyond the scope of regular work, including participation in internal research competition and application for patent publication

Software Intern May 2019 – July 2019
Samsung R&D Institute India - Bangalore

- Worked as part of the **Automatic Speech Recognition** Team to ascertain speaker demographics by analyzing voice samples created by processing real-life speaker audio recordings
- Surveyed relevant research and implemented **Gaussian Mixture Models-Hidden Markov Models, i-Vector, and DNN based embedding techniques like x-Vector** using Python and Kaldi framework

Data Science Intern Nov. 2017 – Dec. 2017
Jarvis Technology and Strategy Consultants Pvt. Ltd.

- **Implemented a web crawler and scraper** in Python to generate custom dataset by processing various media sources such as E-Newspapers, Social Media Websites, Blogs, etc. and accumulating relevant text data
- Investigated multiple techniques for creating supervised and unsupervised classification of the accumulated data
- Implemented **k-Means, Hierarchical, and Spectral** clustering for supervised classification of collected data
- Used NLTK from Scikit-Learn to reduce sparsity of data by only focusing on keywords for better classification

Academic Achievements

- Secured an **All India Rank 95** in the JEE Advanced Examination out of 0.2 million candidates 2016
- Secured an **All India Rank 193** in the JEE Main Examination out of 1.2 million candidates 2016
- Awarded **Certificates of Merit** for being placed in the **Top 1% students at National Level** in NSEP and **Top 1%** students at State Level in NSEA, conducted by the Indian Association of Physics Teachers 2015
- Awarded the **KVPY Fellowship** by Department of Science and Technology, Government of India for securing an **All India Rank of 201** out of 40,000 candidates in the KVPY-SA Stream 2014
- Recipient of the **National Talent Search Examination (NTSE)** Scholarship, provided by the National Council of Educational Research and Training, India 2014

Projects

Web and App Development May 2020 – Oct. 2020
Self-Projects

- Created a **Progressive Web App** with touch-gesture support for viewing and sharing the famous XKCD comics
- **Created an app**, using React Native, to share files between nearby Android devices using Android 10 or below

Bachelor's Technical Project July 2019 – Nov. 2019
Prof. Madhu Belur *IIT Bombay*

- Performed a literature survey of Markov Chains, Convergence Bounds, Graph Algorithms and related topics
- Discussed evolution of Markov Chains and their convergence time in terms of Fiedler Value and Spectral Gap
- Demonstrated transformations between continuous and discrete systems and their convergence times
- Proposed using Dijkstra and Bellman-Ford algorithms for restructuring Markov Chains such that the resultant would convergence, within a threshold of error, in the fewest steps

Butler Matrix Design July 2019 – Nov. 2019
Prof. Jayanta Mukherjee *IIT Bombay*

- Designed a Broadband 4x4 Butler Matrix using Microstrip Transmission Lines and fabricated it on FR-4 substrate

Impedance Measurement Sensor Design Jan. 2019 – May 2019
Prof. Pramod Murali *IIT Bombay*

- Designed an Impedance estimator using frequency response analysis with a frequency sweep from 100Hz-50KHz
- **Programmed a De0-Nano FPGA** as the driver of the sensor circuit for generating the sinusoidal sweep signal
- Designed a DAC, an isolating buffer circuit, an auto-balancing bridge, a phase detector circuit for measuring impedance angle and a peak detector circuit for measuring impedance amplitude
- Programmed and calibrated an Arduino board to measure and log the frequency response from the detector circuit
- Using MATLAB, generated plots from the logged data and predicted the impedance of the connected element

Multi-Cycle RISC Processor Design July 2018 – Nov. 2018
Prof. Virendra Singh *IIT Bombay*

- **Implemented a multi-cycle RISC microprocessor** based on a custom 16 instruction wide instruction set using VHDL. The microprocessor was then deployed on a De0-Nano FPGA and validated for correctness
- Performance of non-branch instructions within the instruction set were optimized by the use of pipe-lining

Vector-Valued Image Regularization with PDEs July 2018 – Nov. 2018
Prof. Ajit Rajwade *IIT Bombay*

- Analyzed the technique of vector-valued regularization using PDEs proposed by Tschumperle et al.
- Implemented the technique for Image Denoising, Image In-painting, and higher quality Image Magnification

EvalPro : Online Course Management & Grading System July 2017 – Nov. 2017
Prof. Varsha Apte *IIT Bombay*

- Using CSS, redesigned the UI to emphasize important sections and clean up navigation within the website
- Fixed bugs pertaining to resource loading, login, and permission management. Refactored the code-base, written using Django, by cleaning up redundant and/or faulty code

Positions of Responsibility

Teaching Assistant : Quantum Physics July 2017 – Nov. 2017
Department of Physics *IIT Bombay*

- Part of a 20 member team, selected on the basis of academic excellence in the course, followed by an extensive interview conducted by the professors in-charge
- Designed and conducted weekly tutorial sessions and off-line doubt clearing sessions for a batch of over 50 students
- Helped create exam solutions, graded answer scripts, and conducted crib sessions for clearing exam doubts

Head of Presidential Body Apr. 2014 – Mar. 2015
Students' Council *Brightlands School*

- **Headed a team of more than 20 members** tasked with ensuring student welfare, promoting intra-school and inter-school activities, and fostering a positive cultural spirit at the school
- Coordinated with other student bodies and management to host various intra-school events, celebrations, special occasions, and help maintain decorum and a healthy school environment for everyone
- Coordinated with other student bodies, planned and co-hosted the annual school farewell for the passing out batch

Technical Skills

- **Programming and Scripting :** Python, C/C++, JavaScript, HTML, CSS, Sh, VHDL
- **Frameworks and Tools :** ReactJS, ReactNative, Jekyll, Markdown, LaTeX, Arduino, MATLAB

Extra-Curricular Activities

- **Blogging, Poetry, and other Literary Endeavours**
  - Lead author of a career guidance blog, Prepsera, which has received over half a million page views in its lifetime
  - Co-author of a creative writing blog, Think, which has more than a 100 posts comprising poetry and short prose
  - Designed my GitHub homepage using Jekyll and here I post technically oriented articles, including viewpoints
- **Provided education in basic computer skills** to the underprivileged as part of a year long course under the Educational Outreach program of **National Service Scheme** from July 2016 to May 2017.
- Awarded the title of Mr. ISC for winning the Personality Round comprising of a talent show, improvisation and giving an extemporaneous speech at the school's Annual Farewell in December 2015
- Enthusiastic about quizzing, having won multiple intra-school and inter-school quizzing competitions during middle school, and debating, having been a part of the college's debating club for a semester