Russel Shawn Dsouza

Contact Information

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Education

Master of Science, Artificial Intelligence & Machine Learning
University of Birmingham — *2022 – 2023*

Bachelor of Technology, Electronics & Communications Engineering — *8.57*
National Institute of Technology Karnataka, India — *2017 – 2021*

K-12 — *X: 10.0, XII: 95.6%*
Little Rock Indian School, India — *2004 – 2017*

Skills

Languages: Python, Java, C++, C, SQL, JavaScript, Go, Rust, MATLAB
Frameworks: PyTorch, Keras, OpenCV, scikit-learn, Numeric & Scientific Python
Web Dev: NodeJS, ExpressJS, postgreSQL
Tools: git, Docker, bash, vim, Linux
Hardware: Verilog, ngSPICE, Arduino, Xilinx Artix

Research Interests

Real-Time Computer Vision for Augmented Reality
Image and Video Retrieval, Neural Hashing

Research Experience

Research Intern
CMInDS and CSRE, IIT Bombay — *May 2021 – Sep 2021*
- Designed & developed novel model variants with vision transformers & CNNs for the multi-modal, pixel-wise classification of land-use from hyperspectral & LiDAR satellite imagery.
- Improved model search times with state of the art Bayesian hyperparameter optimisation.

Winter Research Intern
Deep Learning Lab, NIT Karnataka — *Dec 2020 – Mar 2020*
- Implemented state of the art models and set up data pipelines for nuclear segmentation in histopathology images of kidney and liver tissues.
- Collaborated on the detection of Urothelial Carcinoma from whole slide images of bladder tissues with average dimensions of 80000×50000.
- Built an open-source project benchmarking segmentation models on histopathology datasets.
- Presented a report reviewing the different methods to perform nuclear segmentation.

Summer Research Intern
Deep Learning Lab, NIT Karnataka — *May 2019 – Jul 2019*
- Revamped and maintained data pipelines for deep learning based image segmentation and classification models.
- Refined efficient implementations of classical image processing algorithms on large datasets.
- Conducted in-depth literature surveys and reproduced results from seminal papers in the field of automated histopathology.

Work Experience

Frontend Developer and UI Designer
IRIS, NIT Karnataka — *Aug 2018 – Apr 2019*
- Debugged and maintained parts of the frontend code at IRIS — The official student portal with 10,000 daily users.
- Createad a new, streamlined UI system from the ground up in Figma.
- Developed the design system in Vue.js and spearheaded the integration of JavaScript with legacy Rails code.

Python Developer
Pinnacle Media, Manipal, Karnataka — *May 2018 – Jul 2018*
- Deployed real-time face detection and recognition, using OpenCV, dlib, and scikit-learn, on a Raspberry Pi as a part of an 'employee attendance' system.

Bachelor's Thesis

Low Light Image Enhancement on Low Power Devices *19/20*

Advisor: Dr Ramesh Kini *Aug 2020 – May 2021*

- *Objective:* Design of hardware and software-optimized algorithms to capture vibrant and detailed low-light photos with inexpensive camera sensors without the use of obtrusive flashlights.
- Optimised the network to have just 79416 parameters and require just 5.21 GFlops of compute for a $256 \times 256 \times 3$ image.
- Redesigned the entire image processing pipeline on the edge device in C++ to reduce latency and memory.

Notable Projects

Fashion Discovery for Video Commerce *Oct 2021 – Mar 2022*

- Researched the "Exact street-to-shop" i.e. matching products in consumer images to those in manufacturer catalogues - a cross-domain image-based image retrieval problem.
- Pitched the prototype software to a top-3 short-video platform in India.

Change detection in SAR images *Feb 2021 – May 2021*

- Developed a multi-sensor, multi-modal algorithm for change detection in bi-temporal Synthetic Aperture Radar (SAR) images and presented findings in a report as part of a course-project.

Multi-lingual speech enhancement *Feb 2021 – May 2021*

- Improved the quality and intelligibility of noisy speech recordings by upto 30% using deep neural networks that generalize over multiple out of sample languages.
- Reported findings that improved upon the state of the art in intelligibility without a significant drop in quality.

Information extraction from PDFs *Apr 2021*

- Developed a program to extract information embedded in table cells within PDFs with upto 70% accuracy, as part of a system to automate the summarisation of insurance policies.

Muon Physics *Mar 2020 – Jun 2020*

- Conceptualised and programmed a custom model to classify muon momenta trained on monte-carlo simulated data from the Cathode Strip Chambers at the CMS experiment of the Large Hadron Collider at CERN.

Segmentation of brain tumours in MRI images *Dec 2019*

- Reproduced state of the art semantic segmentation models in Keras/TF to segment brain tumours and surrounding edema from MRI images with upto 83% accuracy.
- Presented results on multi-class segmentation with a custom model variant on the BRATS dataset as part of a workshop on medical imaging.

Detecting Ponzi schemes in blockchain smart contracts *Aug 2019 – Sep 2019*

- Designed a custom model to classify smart contracts deployed on the Ethereum blockchain into 16 categories using CNNs and stacked auto-encoders, in under 48 hours for a coding sprint.
- Trained the model on raw bytecode of smart contracts mined from the blockchain using Google BigQuery, publicly available Solidity source code of popular smart contracts, and a publicly available dataset of 184 known Ponzi schemes.

Predicting truth level of news articles *Jul 2019 – Aug 2019*

- Fashioned a model to classify news articles into 6 different categories based on the truth level and justifications provided by trusted news sources.

Honours

Offered the Australian National University Chancellor's International Scholarship to pursue the Master of Computing at ANU's School of Computing. *Mar 2022*

Selected as a **full-time research intern** at the Robert Bosch Center for Cyber-Physical systems, Indian Institute of Science, Bangalore, India's top research university, to work on "Simultaneous Localization And Mapping - SLAM". *July 2020*

Selected for a **funded research internship** at the Haute école du paysage, d'ingénierie et d'architecture de Genève, Haute Ecole Spécialisée de Suisse occidentale, Geneva to work on "NavTrack: A portable obstacle tracker for the rehabilitation of spatial neglect". *Mar 2020*