Russel Shawn Dsouza

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EDUCATION

Masters, Artificial Intelligence & Machine Learning
University of Birmingham, UK   *2022 – 2023*

Bachelors, Electronics & Communications Engineering
National Institute of Technology Karnataka, India   *2017 – 2021*

K-12
Little Rock Indian School, India   *2004 – 2017*

RESEARCH INTERESTS

Multi-modal Indexing & Retrieval, Compression & Representation learning
Real-time Machine Learning

RESEARCH EXPERIENCE

Research Intern
CMInDS and CSRE, IIT Bombay, India   *May 2021 – Sep 2021*
– Designed and developed model variants for multi-modal, pixel-wise classification of land-use from hyper-spectral and LiDAR satellite imagery with vision transformers and CNNs.
– Improved model peak-performance by over 10% through the use of state-of-the-art Bayesian hyper-parameter optimisation.

Winter Research Intern
Deep Learning Lab, NIT Karnataka, India   *Dec 2019 – Mar 2020*
– Implemented cutting-edge models and established high-performance 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 an average size of 4 billion pixels.
– Created an open-source project to benchmark segmentation models on histopathology datasets, resulting in improved reproducibility and standardisation of results.
– Presented a comprehensive report reviewing the state-of-the-art methods for nuclear segmentation in histopathology, providing valuable insights and recommendations for future research.

Summer Research Intern
Deep Learning Lab, NIT Karnataka, India   *May 2019 – Jul 2019*
– Revamped and maintained high-performance data pipelines for deep learning-based image segmentation and classification models, resulting in improvements in accuracy and processing speed.
– Streamlined classical image processing algorithms for large datasets, achieving a 20% reduction in processing time in some cases.
– Conducted extensive literature surveys and reproduced state-of-the-art results from seminal papers in automated histopathology, contributing to the lab's cutting-edge research.

Selected as a **full-time research intern** at the Robert Bosch Center for Cyber-Physical systems, Indian Institute of Science, Bangalore, to work on "Simultaneous Localisation 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*

PUBLICATIONS

Lal, S., **Dsouza, R.**, Maneesh, M., Kanfade, A., Kumar, A., Perayil, G., Alabhya, K., Chanchal, A.K. and Kini, J.
"A Robust Method for Nuclei Segmentation of H&E Stained Histopathology Images."
2020, 7th International Conference on Signal Processing and Integrated Networks (SPIN) (pp. 453–458). IEEE.

[*] Could not undertake due to COVID-19

MASTER'S DISSERATION	**Examining adversarial alignment-subversion in generative language models**
	Advisor: Dr Venelin Kovatchev *Jun 2023 – Sept 2023*

– Exploring the automation of detection of adversarial attacks on language models.
– Analysing intermediate layers of large language models to better understand triggers for adversarial attacks.

BACHELOR'S DISSERTATION	**Low-light image enhancement on low-power devices** *19/20*
	Advisor: Dr Ramesh Kini *Aug 2020 – May 2021*

– Designed hardware- and software-optimised algorithms to capture vibrant and detailed low-light photos with inexpensive camera sensors, without using obtrusive flashlights.
– Optimised the neural network to have less than 100k parameters and require only about 5 GFlops of compute for a 256×256 colour image, resulting in a 35% reduction in model size and a 20% improvement in processing speed.
– Redesigned the entire image processing pipeline on the edge-device using C++, resulting in a 10% reduction in latency and a 50% reduction in memory usage.

SKILLS

Languages: Python, Java, C++, C, SQL, JavaScript, Go, Rust, MATLAB

Frameworks: PyTorch, Keras, OpenCV, scikit-learn, Numeric & Scientific Python

Tools: git, Docker, bash, vim, Linux

Hardware: Verilog, ngSPICE, Arduino, Xilinx Artix

WORK EXPERIENCE	**Frontend Developer and UI Designer**
	IRIS, NIT Karnataka, India *Aug 2018 – Apr 2019*

– Debugged and maintained critical parts of the front-end code at IRIS, the official student portal with over 10k daily active users
– Created 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.

NOTABLE PROJECTS	**Fashion discovery for video commerce** *Oct 2021 – Mar 2022*

– Worked on "Exact street-to-shop" i.e. matching products in consumer photos 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.

Multi-lingual speech enhancement   *Feb 2021 – May 2021*
– Developed a deep neural network to improve the quality and intelligibility of noisy speech recordings by up to 30%, even in out-of-sample languages.
– Conducted extensive experiments on a large dataset of diverse languages and noise types, demonstrating that our approach outperforms state-of-the-art methods in terms of intelligibility without sacrificing 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 summarising 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.

Detecting Ponzi schemes in Ethereum Smart Contracts   *Aug 2019 – Sep 2019*
– Designed and developed a custom model using CNNs and stacked auto-encoders to accurately classify smart contracts deployed on the Ethereum blockchain into 16 categories, delivering results in under 48 hours for a coding sprint.
– Trained the model on raw bytecode of smart contracts extracted from the blockchain using Google BigQuery, publicly available Solidity source code of popular smart contracts, and a dataset of 184 known Ponzi schemes.