Russel Shawn Dsouza

Contact Information

National Institute of Technology Karnataka (NITK)
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Research Interests

Real-time Computer Vision, Augmented Reality, Low Power Computing

Education

National Institute of Technology Karnataka (NIT Karnataka) 8.58
Bachelor of Technology, Electronics and Communications Engineering *Jul 2017 – May 2021*

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.
DOI: 10.1109/SPIN48934.2020.9070874

Research Experience

Research Intern, CSRE, IIT-Bombay
Multi-modal Land-use Classification
Advisor: Prof. Biplab Banerjee *Jun 2021 – Aug 2021*

- Worked on multi-modal, pixel-wise land-use classification from hyperspectral & LiDAR satellite imagery.
- Iteratively designed & developed novel model variants using vision transformers & CNNs with Bayesian hyperparameter optimisation.

Winter Research Intern, Deep learning lab, NIT Karnataka
Segmentation of nuclei in histopathology images of kidney, liver and bladder tissues
Advisor: Dr. Shyam Lal *Dec 2019 – Feb 2020*

- Implemented state of the art models and designed data pipelines for nuclear segmentation in histopathology images of kidney and liver tissues.
- Worked on the detection of Urothelial Carcinoma from whole slide images (average dimensions of 80000×50000) of bladder tissues.
- 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
Advisor: Dr. Shyam Lal *May 2019 – Jun 2019*

- Designed and debugged efficient implementations of classical image processing algorithms on large datasets.
- Developed and maintained data pipelines for deep learning based image segmentation and classification models.
- Worked on reproducing results from seminal papers in the field of automated histopathology.

Work Experience

Frontend Developer and UI Designer
IRIS, NIT Karnakata *Aug 2018 – Apr 2019*

- Debugged and maintained parts of the frontend code at IRIS — The official student portal of NIT Karnataka.
- Designed a new UI system from the ground up in Figma.
- Developed the design system in Vue and worked on an integration with the legacy Rails code.

Python Developer
Pinnacle Media, Manipal *May 2018 – Jun 2018*

- Built and 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.

Skills

Languages: Python, Go, C++, C, SQL, Rust, MATLAB, JavaScript, Verilog, SPICE

Frameworks and packages: PyTorch, Keras, OpenCV, scikit-learn, Numerical Python

Tools: git, Docker, bash/zsh, vim, Linux

Hardware: Raspberry Pi, Arduino, Xilinx Artix 7

Notable Projects

Fashion Discovery for Video Commerce *Sep 2021 – Present*

– Working on designing and building the data and model pipelines to solve the "Exact street-to-shop" - cross-domain image-based image retrieval problem.

Low-light image enhancement on low power devices *Aug 2020 – May 2021*

– Working on the design of hardware and software-optimized algorithms to capture vibrant and detailed low-light photos with inexpensive camera sensors.
– Working on model compression algorithms to fit memory and speed constraints.
– Building tools for better testing, deployment and to prevent model regressions.

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

– Working on developing a multi-sensor, multi-modal algorithm for change detection in bi-temporal Synthetic Aperture Radar (SAR) images.

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

– Working on improving the quality and intelligibility of noisy speech recordings using deep neural networks that generalize over multiple out of sample languages.

Information extraction from PDFs *Apr 2021*

– Designed a system to detect tables and extract information embedded in the table cells, as a part of a system to automate the summarisation of insurance policies.

Image Restoration *Jul 2020*

– Reproduced a very deep persistent memory network to perform image restoration by removing noise and predicting uncorrupted images; achieved results comparable to the original paper.

Segmentation of brain tumours in MRI images *Dec 2019*

– Reproduced state of the art semantic segmentation models in Keras/TFv1 to segment brain tumours and surrounding edema from MRI images

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

– Designed a custom model to detect Ponzi smart contracts deployed on the Ethereum blockchain using CNNs and stacked auto-encoders, in under 48h as a part of a coding sprint.
– The model was trained on the raw bytecode of Ethereum smart contracts mined from the Ethereum blockchain using Google BigQuery, publicly available Solidity source code of popular smart contracts, and a publicly available dataset of known Ponzi schemes.

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

– Built a model to classify news articles into 6 different categories based on their truth level.
– The model was trained on the LIAR-PLUS dataset containing news articles and fact-checking justifications from trusted sources.

Relevant Coursework

Neural Networks & Deep learning, Application of Machine Learning in Medical Imaging,
Image and Video Processing, Speech and Audio Processing, Digital Signal Processing
Statistical Analysis, Numerical Analysis
Embedded Systems, Digital System Design, Microprocessors, VLSI Design, Control Systems
Data Structures & Algorithms, Digital Electronics & Computer Architecture

Miscellaneous

Selected as a full-time research intern at the Robert Bosch Center for Cyber-Physical systems, IISc, Bangalore to work on "Simultaneous localization and mapping (SLAM)" *July 2020*

– Had to refuse offer due to conflicts with college schedule, arising from the pandemic.

Selected for a **research internship** at HEPIA-Hesge, Geneva, Switzerland *Mar 2020*
to work on "NavTrack: A portable obstacle tracker for the rehabilitation of spatial neglect"

– Offer rescinded due to pandemic-induced travel restrictions & lockdowns.