Aditya Ganesh Kumar

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PERSONAL STATEMENT

Driven graduate with a Masters in AI from NUS, Singapore. Completed internships at Samsung Research and HPE applying deep learning to real-world problems. Worked as student researcher for a year in Mulitmodal AI, defending a successful dissertation in text-to-image retrieval. Led research initiatives advancing state-of-the-art in image enhancement and grammatical error correction. Seeking AI/ML and Data Science roles.

EDUCATION

- **National University of Singapore** — Singapore
  Master of Computing (AI Specialisation), GPA: 3.75/5 — *Aug 2022 - Jan 2024*
  - **Coursework:** • AI Planning and Decision Making • Intelligent Robots: Algorithms and Systems • Big Data Systems • Uncertainty Modelling in AI • Neural Networks & Deep Learning • Natural Language Processing
  - **Dissertation:** "Image-text retrieval of novel objects in dynamic indoor environment using fine-grained natural language descriptions" under Prof. Lee Wee Sun
  - **Teaching Assistant** DBA5106: Foundation in Business Analytics
- **SRM Institute of Science and Technology** — Chennai, India
  B.Tech in Computer Science and Engineering, CGPA: 9.76/10 — *Jun 2018 - May 2022*
  - **Relevant courses:** Artificial Intelligence, Artificial Neural Networks, Calculus and Linear Algebra, Probability and Queuing Theory, Advanced Calculus and Complex Analysis (achieved highest grade in each subject)
  - **Final Year Project:** "An End-to-End Pipeline for Storage and Retrieval of Multi-dimensional Medical Images Selectively Encrypted Using Deep Learning"
  - **Merit Scholarship:** Awarded by SRMIST from 2019-2021 for consistent high performance in academics.
  - **Dare2Compete Top 5 College Champions 2021:** In recognition of excellent performance in corporate hackathons (Semi-finalist in Flipkart GRiD 2.0 and Optum Stratethon)

WORK EXPERIENCE

- **Samsung Research Institute's PRISM R&D Internship** — Bangalore, India
  Intelligent tool to Auto Identify KPIs (Certificate of Excellence) — *Sep 2021 - Feb 2022*
  - Designed and developed a **data-agnostic PySpark solution** to auto-identify KPIs from tabular data, using outlier tracking, correlation analysis and semantic text similarity.
  - Our team was awarded **Certificate of Excellence**.
- **HPE Education Applied Deep Learning Academic Internship** — Singapore
  (Certificate of Completion) (Letter of Recommendation) (Code) — *Aug 2021 - Sep 2021*
  - Created a deep learning solution for brain tumour segmentation.
  - Designed the ML pipeline, trained Residual U-Net model on Azure Compute instances to achieve 0.73 Dice co-efficient and integrated the containerized model with an Azure Web App.
- **NUS Data Analytics Academic Internship** — Singapore
  (Certificate of Completion) (Letter of Evaluation) — *Jun 2021 - Sep 2021*
  - Built a web application to help insomniac patients know the sleep period for current night using Fitbit watch data.
  - Implemented and trained time-series forecasting models like Bi-LSTM to achieve MAE of 1 hour.

PROJECTS

- **NUS NLP Capstone: Improved Grammatical Error Correction through Convolutions (Code)**
  - Improved "Qorib et al. 2022. Frustratingly Easy System Combination for Grammatical Error Correction" - a GEC model consisting of 6 baseline transformers.
  - Increased context understanding in the model by incorporating 1D convolutions, thereby boosting precision by 0.5%, recall by 0.2% and F0.5 by 0.5% on the CoNLL-2014 test set.
- **NUS Intelligent Robots Capstone: Self-Driving Car in Duckietown Environment**
  - Built 3 different solutions for lane following - baseline OpenCV solution using Hough transforms, Behaviour Cloning using NVIDIA DAVE-2's CNN network and **Imitation Learning using DAgger**.
  - Implemented path planning using A* algorithm.

- **Focus Mode for Messaging Applications**
  - Developed work mode feature for a custom-built mobile messaging app to filter distracting texts and images.
  - Used BERT and ResNet to develop ML APIs achieving **98% accuracy in detecting distracting messages** on our curated datasets.
  - Led to a publication in the **2022 International Interdisciplinary Humanitarian Conference for Sustainability (IIHC)**, and added to IEEE Xplore.
- **Bell Bottoms or Ripped Jeans? (Code)**
  - An Azure web app to classify bell bottom jeans and ripped jeans with **98% accuracy**, utlizing ResNet model running as an **ONNX runtime**.
  - Constructed a **custom dataset** using Bing Image Search API and also leveraged **Grad-CAM** to explain predictions.

RESEARCH WORK

- **Image-text retrieval of indoor objects using fine-grained descriptions** NUS, Singapore
  Master's Dissertation *Jan 2023 - Dec 2023*
  - Worked on overcoming CLIP's poor performance in image-text matching for detailed text queries by aligning distributions of text queries and images using LLMs.
  - Experimented with multiple ideas including constructing graphical model of concepts, hierarchical filtering using concepts and multi-task adapters for concept matching.
  - Locally hosted the LAION-5B dataset on lab server and setup a CLIP retrieval system for training concepts.
- **Low-light Image Enhancement for Face Biometrics** SRMIST, India
  Inhouse Research Project *Dec 2021 - Jan 2022*
  - Improvised performance of Zero-DCE - a recent **SOTA** zero-reference low-light image enhancement framework.
  - Incorporated residual connections into Zero-DCE, thereby obtaining **13% lower illumination smoothness loss** on the LOL (LOw-Light) dataset.
- **Energy Generation Forecasting Based on Seasonality** University of Malaya, Malaysia
  SATU Joint Research Scheme *Jun 2021 - Jan 2022*
  - Developed forecasting models to predict renewable energy output from different sources by season, thereby enabling maximal use of renewable energy.
  - Collected 8 years of Australian Energy Market Operator data and **studied fixed and random effects** to understand season's influence on fuel source availability.
  - Used **Particle Swarm Optimization** as the optimizer for forecasting model and obtained results comparable to Stochastic Gradient Descent.
- **Fast Retrieval of 3D Medical Scans through Selective Encryption** SRMIST, India
  Inhouse Research Project *Jun 2021 - Aug 2021*
  - Adopted selective encryption on 3D MRI brain scans to facilitate faster retrieval, **improving decryption speed by 47%** on the MICCAI MRBrainS18 dataset.
  - Used 3D ResNet model for Region of Interest extraction, and chaotic maps for **lossless encryption/decryption**.
- **A Framework for Secure Cloud Storage of DICOM Medical Images** SRMIST, India
  Inhouse Research Project *Jun 2020 - Dec 2020*
  - Developed a framework to encrypt DICOM images of different modalities losslessly through Elliptic Curve Cryptography and store resulting image on a decentralized cloud.
  - Documented the work in a research paper and submitted it to a peer-reviewed journal for review.

PUBLICATIONS

- J. P. R. Ilango, A. Paul, **A. G. Kumar**, S. Y. Sait, R. Kayalvizhi and S. S. Safiullah, "Disturbance Detection in Mobile Instant Messaging Apps using Deep Learning," 2022 International Interdisciplinary Humanitarian Conference for Sustainability (IIHC), Bengaluru, India, 2022, pp. 1602-1607, doi: 10.1109/IIHC55949.2022.10060602.
- S., N., Rawat, P., **Ganesh, A.**, Ramakrishnan, A., Sankaranarayanan, S., Khairuddin, A. S. B. M. (2022). Energy Generation Forecasting Based on Seasonality Using Deep Learning. In Proceedings of International Technical Postgraduate Conference 2022. International Technical Postgraduate Conference 2022. AIJR Publisher. https://doi.org/10.21467/proceedings.141.5

TECHNICAL SKILLS

- **Programming** Python, SQL, ROS, R, Java
- **AI, ML, Data Science** PyTorch, TensorFlow, Keras, Scikit-learn, NumPy, Pandas
- **Big Data and Deployment** Apache Spark, Apache Hadoop, CI/CD, AWS, Azure, Docker, Ngrok, Flask
- **Other Skills** Mutimodal Deep Learning, Model Optimization, Predictive Analytics