Rajkumar Vaghashiya

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EDUCATION

Pandit Deendayal Energy University   Aug 2016 — July 2020
Bachelor of Technology in Computer Engineering   *Gandhinagar, IN*
- GPA: 9.89 / 10.0 (Gold Medalist)
- Awarded Merit-cum-Means Scholarship 2016 to 2020 (Top 3 in the class each semester)
- Thesis: Clinical AI for Ophthalmic Disorder Prognosis (@ Forus Health Pvt. Ltd.)

EXPERIENCE

Clinical Research   Jan 2021 — June 2021
Forus Health Pvt. Ltd.   *Bengaluru, IN*
- Analyzed the clinical applicability of digital retinal biomarkers in the detection of systemic disorders (such as Bipolar and Alzheimer's)
- Developed an explainable ML pipeline for the diagnosis of Diabetic Retinopathy (DR) and Hypertensive Retinopathy (HTR) using digital biomarkers extracted from the retinal vasculature. Python, OpenCV
- Achieved ROC-AUC ~ 0.70 for DR detection and stage-grading; 0.98 for HTR detection; 0.89 for HTR stage-grading
- Assessed the state of clinically applicable AI in retinal imaging-based teleophthalmology services in India

Teaching Assistant — AI for Everyone (20IC206T)   Sept 2020 — Dec 2020
Pandit Deendayal Energy University   *Gandhinagar, IN*

Clinical Research   Jan 2020 — July 2020
Forus Health Pvt. Ltd.   *Bengaluru, IN*
- Developed a clinician-in-the-loop-based AI pipeline for the extraction and quantification of retinal vascular parameters with results within $\pm 8\%$ of the research benchmark tool SIVA. Python, OpenCV, Django
- Organized weekly brainstorming sessions for ideation, need analysis, and literature review on Dry Eye Disorder screening and anterior segment imaging
- Participated in clinical immersion to analyze the confounding factors in the grading criteria used by specialists
- Formulated a decision support system plan to address the grading issues in Retinopathy of Prematurity

Machine Learning Intern   June 2019 — July 2019
Capgemini   *Gandhinagar, IN*
- Developed a test-case similarity search tool for impact analysis in software testing, with an accuracy of $\sim$ 95-98 %, that landed the first prize in Capgemini iSprint 2019 (West Division)
- Utilized NLP for tabular data processing and fine-tuned pre-trained ELMo (Embeddings from Language Models) to extract query and test-case embedding for semantic mapping
- Designed an interactive UI visualization scheme for the retrieved results using Python, t-SNE, and matplotlib

PROJECTS

MediSinGAN   July 2021 — Ongoing
Jonas Adler, EEML   *Remote*
- Implemented SinGAN architecture in JAX for the generation of realistic synthetic medical imaging data using a single training image and achieved a 20% reduction in training time
- Evaluated the model applicability in MRI cross-modality image-to-image translation, Synthetic brain tumor generation, and Medical image segmentation (Histopathology)

Portable AI-powered Microplate Reader for Point-of-Care Applications   Sept 2020 — Nov 2020
Dr. Abhijit Roy, Indian Institute of Science   *Remote*
- Developed a microplate well segmentation pipeline with adaptive calibration
- Implemented qualitative and quantitative real-time colorimetric analysis of microplate wells. Python, OpenCV

Intelligent Digital Inline Holographic Micrograph (DIHM) Cell Analyzer   Aug 2019 — Aug 2020
Dr. Mohendra Roy, PDEU   *Gandhinagar, IN*
- Developed an end-to-end pipeline to: Image cell-lines via DIH; Segment cell-lines in DIH micrograph; Enhance cell-signal using CNN-based Autoencoder; Characterize cell-line using CNNs
- ROC-AUC >0.98 for RBC, WBC, and microbeads; >0.88 for cancer cells HepG2 and MCF7
- Easy accommodation of newer cell-lines using transfer learning. Python, TensorFlow, OpenCV, Flask

SESAU: Secure and Smart University   Nov 2017 — Jan 2019
Dr. Nishant Doshi, PDEU   *Gandhinagar, IN*
- ORSP-PDEU funded IoT project to simulate a smart university for resource usage optimization
- Deployed prototype modules in Computer Lab for Light Control, Lab Temperature Control, and Authorized Personnel Access. Raspberry Pi, Arduino, MQTT, Firebase, MongoDB, Python

Publications

- Kamaraj, P., Annamalai, A., Vaghashiya, R., Kulkarni, M., Kazi, A., & Appaji, A. (2021). *Clinically Applicable Artificial Intelligence for Retinal Imaging based Teleophthalmology for Primary Eye Care in India: A Review.* Submitted.

- Vaghashiya, R., Chauhan, V., Kapadiya, K., Sanghavi, S., Seo, S., & Roy, M. (2021). *A smart and portable telemedicine device for auto characterization of pathological samples.* Submitted.

- Vaghashiya, R., Kapadiya, K., Nandwani, I., Thakore, R., Seo, D., Seo, S., & Roy, M. (2020). An Optimized Neural Network Architecture for Auto Characterization of Biological Cells in Digital Inline Holography Micrographs. In *2020 IEEE International Conference on Healthcare Informatics (ICHI)*. doi:10.1109/ICHI48887.2020.9374330

- Thakore, R., Vaghashiya, R., Patel, C., & Doshi, N. (2019). Blockchain - based IoT: A Survey. *Procedia Computer Science*, *155*, 704–709. doi:https://doi.org/10.1016/j.procs.2019.08.101

- Vaghashiya, R., Thakore, R., Patel, C., & Doshi, N. (2019). IoT – Principles and Paradigms. In *International Journal of Advanced Trends in Computer Science and Engineering* (Vol. 8(1.6), pp. 153–158). doi:https://doi.org/10.30534/ijatcse/2019/2481.62019

Extracurricular Training

Qiskit Global Summer School on Quantum Machine Learning: QGSS	July 2021
Selective Admission	*Remote*

- Certificate of Quantum Excellence (Score: 100%)

Eastern European Machine Learning Summer School: EEML	July 2021
Selective Admission	*Budapest, HU*

- MediSinGAN selected among the top 3 Projects at the School

Edge AI for IoT Developers Nanodegree: Udacity-Intel	Dec 2019 – July 2020
Selective Scholarship	*Remote*

Certifications

- Machine Learning Engineering for Production (MLOps) (Coursera)
- Generative Adversarial Networks (Coursera)
- AI for Medicine (Coursera)

Achievements

- IBM Quantum Challenge - Fall 2021: Advanced (Score: 100 %)
- IBM Quantum Challenge Africa 2021: Advanced (Score: 100 %)
- Hackdays Rhein-Neckar 2021: Schweickert Challenge winner
- Economic Times Campus Stars 2.0 (2018-19) winner

Skills

Coding: Python, Java, C, JavaScript, HTML, CSS

Tools/Technologies/Frameworks: TensorFlow, Keras, OpenCV, Image processing, Computer Vision, Intel OpenVINO, Flask, PyTorch, JAX, Qiskit, Jupyter, LaTeX, Figma, Git, Ubuntu, Shell, Google Cloud Platform, Docker, Kubernetes

Languages: English, Gujarati, Hindi

Academic Service & Extracurricular Activities

Technical Head | Encode – Coding Club of PDEU	Aug 2016 — June 2019
Logistics & Finance Head | Jharokha – Literary Club of PDEU	Aug 2016 — June 2019
Technical Head | Computer Society of India – PDEU Student Chapter	May 2017 — June 2019
Student Coordinator | Training and Placement Cell – PDEU	Feb 2018 — Feb 2019
Civic Intern | Andhjan Shikshan Mandal, Surat	June 2017 — July 2017