Rajat Kumar

Data & AI Engineer

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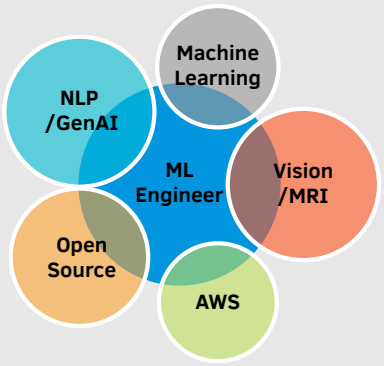
Technical Skills

Overview



Programming

Python • C • C++

Pytorch • Keras

Docker • AWS

SageMaker • Colab • Java • SQL

Education

M. Tech, ICT (CGPA: 8.18)
Specialization: Machine Learning
Dhirubhai Ambani Institute (DA-IICT)
2018 - 2020 | Gandhinagar, India

B. Tech CSE (CGPA: 7.21)
Gurukul Kangri University
2013 - 2017 | Haridwar, India

Intermediate/+2 (Percentage: 94.8%)
High School (Percentage: 95%)
Lord Mahavira Academy
2010 - 2013 | Saharanpur, India

Professional Summary

Data & AI Engineer with 5+ years of experience, **300+ citations**, 9 publications, and 2 patents, specializing in **clinical-grade ML systems in the MR imaging domain** including **MR-based cardiac, spine, and advanced imaging applications**. I collaborate with **Research Scientists, Clinical Specialists, Product Owners, System Architects, and Annotation teams** across global sites to deliver clinically robust ML solutions. Within the **MR business**, I build production-ready algorithms and **end-to-end ML pipelines** spanning model development, large-scale training, reproducible workflows in **AWS**, CI/CD automation, deployment, and comprehensive **FDA/clinical validation documentation, technical reports, component testing, and publications**.

Previously, as a **Researcher at TCS Innovation Labs**, I developed transformer-based NLP models (BERT, DistilBERT) and gained experience in energy disaggregation during my **IIT Gandhinagar** internship. I hold an **M.Tech in Machine Intelligence from DA-IICT** and a **NAACL main-track publication (20% acceptance)** with an associated patent. Skilled in **Python, PyTorch, Hugging Face, nnU-Net**, **3D MRI heart/spine imaging**, and **end-to-end model development**, with certifications in **LLMs, OpenAI, RAG, indexing, vector databases, and prompt engineering**. I have also **managed two data scientists and supervised two interns**.

Experience

Oct 2022 - Present

Data & AI Engineer - Philips

- Contributed to Philips' **SmartHeart** and **SmartSpine** AI solutions automating MRI cardiac and spine planning. For SmartHeart, developed and integrated a four-model pipeline—**Heart Mask**, **IQ Assessment**, **Landmark**, and **Plane Prediction** models—enabling automated cardiac view selection from low-resolution surveys and delivering **50% time savings**, with a projected business impact of **XM EUR over five years** at **YK EUR per license**. Also supported **PDLM** milestones, BU innovation roadmap inputs, and **RSNA 2025** deliverables, with the project featured publicly on LinkedIn **[link]**. For SmartSpine, built a **nnU-Net–based segmentation model** for cervical, thoracic, lumbar, and combined 3D surveys, generating multiple **3D planning boxes** for automated sagittal and axial prescriptions, reducing manual effort and improving planning consistency.

Sep 2020 - Sep 2022

Researcher - TCS Innovation Labs

- Worked in the NLP subgroup of the Deep Learning and AI group. Published and patented research on Intent Detection and Discovery, published at NAACL (A-rated).
- Utilized Transformer-based models like BERT, DistilBERT, and STS models, along with techniques like contrastive loss and contextual augmentation for NLP tasks.
- Tools: Python, PyTorch, Keras, Google Colab, Jupyter, GitHub, and Docker.

May 2019 - Jul 2019

Summer Research Intern - IIT Gandhinagar

- Guide: Dr. Nipun Batra (Assistant Professor at IIT-GN)
- Worked on the open-source toolkit NILMTK (Non-Intrusive Load Monitoring Toolkit) on GitHub, which aims to improve the interface for energy disaggregation problems.
- Tools: Google-Colab, Python, Jupyter Notebook, GitHub
- Published a paper in ACM Buildsys 2019.
- Upgraded the NILMTK library in GitHub.

May 2016 - Jul 2016

Summer Intern at Raman Classes, Roorkee

- Guide: Dr. Ankush Mittal (PhD. at NUS Singapore)
- Worked on Research Based Projects.
- Understood basic ML and Statistics.

Projects

- **SmartHeart — Automated Cardiac MRI Planning**
  - Developed core components of an AI-driven solution that automates cardiac MRI planning by selecting optimal heart views from low-resolution 3D survey images, reducing operator dependency and enabling **50% time savings** in scan preparation.
  - Built and integrated the four-model pipeline: **Heart Mask** (heart localization, ROI extraction, shim volume), **IQ Assessment** (survey quality monitoring), **Landmark** (anatomical landmark detection), and **Plane Prediction** (cardiac plane segmentation).
  - Contributed to **PDLM** milestones, BU innovation roadmap planning, and scientific deliverables for **RSNA 2025**; project expected to generate **XM EUR over five years** at **YK EUR per license**.
  - Project was publicly highlighted on LinkedIn Video (**LinkedIn**).
- **SmartSpine — Automated Spine MRI Planning**
  - Contributing to the development of an AI-driven solution that automates MRI spine planning across **cervical, thoracic, lumbar, and combined (C, T, C+T, C+L+T)** 3D surveys, reducing manual planning effort and improving workflow consistency.
  - Building a **nnU-Net–based segmentation model** to localize spinal anatomy from 3D MR surveys with high accuracy.
  - Generating multiple **3D planning boxes** to enable automated sagittal and axial prescription, supporting standardized and operator-independent spine planning.
  - Integrated SmartSpine advancements into the broader MR automation roadmap alongside SmartHeart to strengthen Philips' autonomous MR planning capabilities.
- **Resume-Aware Chatbot using GenAI (Independent Project)**
  Try the Bot
  - Built a **resume-aware chatbot** using **RAG**, **Sentence Transformers**, and **FAISS** for semantic search, integrated with the **Mistral LLM** for context-aware responses. Developed a complete solution with a **FastAPI backend** and **Streamlit frontend**, enabling intelligent, automated resume insights.
- **Motion Correction in MRI Spine Images**
  - Simulated **voluntary and involuntary motion artifacts** to generate realistic training and test datasets for deep learning–based motion correction. Collaborated with a **Clinical Scientist** and **DS Architect** to design and evaluate models aimed at improving robustness of **MRI spine imaging**.
- **Modeling Performance and Power on Disparate Platforms (Open Source)**
  GitHub Link
  - Built ML models to **predict system performance and power consumption** using CPU architecture and memory features, applying **transfer learning** for generalization across hardware platforms.
  - Conducted under the supervision of **Prof. Amit Mankodi** and co-supervised by **Dr. Amit Bhatt** (DA-IICT).
- **NILMTK Contrib Library (Open Source)**
  GitHub Link
  - Developed a **high-level API** for the **NILMTK-Contrib** library, enabling seamless execution of multiple energy disaggregation algorithms as extensions to the NILMTK toolkit.
  - Implemented state-of-the-art **energy disaggregation models** including **Denoising Autoencoders, RNNs, LSTMs**, along with classical NILM algorithms.
- **Customer Support Chatbot**
  GitHub Link

- Built a **seq2seq conversational chatbot** using **LSTM-based encoder–decoder models** to address customer queries.
- Guided by **Dr. Prasenjit Majumdar** (DA-IICT), gaining strong foundational experience in **NLP, Information Retrieval**, and conversational modeling.

Publications

- **Intent Detection and Discovery from User Logs via Deep Semi-Supervised Contrastive Clustering**, NAACL 2022 (Main Track).
  Paper Link
- **Towards reproducible state-of-the-art energy disaggregation**. In Proceedings of the 6th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys '19). ACM, New York, NY, USA, 193–202.
  Paper Link
- **"Image based Indian monument recognition using convoluted neural networks"** 2017 International Conference on Big Data, IoT and Data Science (BID), Pune
  Paper Link
- **"Evaluating Machine Learning Models for Disparate Computer Systems Performance Prediction"** 2020 IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT)
  Paper Link
- **"Cross-Platform Performance Prediction with Transfer Learning using Machine Learning"** 2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT)
  Paper Link
- **Book Chapter (Springer) - "Modeling Performance and Power on Disparate Platforms using Transfer Learning with Machine Learning Models"** International Conference on Modeling, Simulation and Optimization CoMSO 2020
  Paper Link

Patents

- System and method for intent discovery from user logs using deep semi-supervised contrastive clustering (Granted in USA)
  Patent Link

Certifications

- **Learning LLM Foundations: Vector Databases for Caching and RAG**
  LinkedIn, Issued Jan 2025
  Skills: Large Language Models (LLM), Vector Databases, AI
- **Building Apps with AI Tools: ChatGPT, Semantic Kernel, and Langchain**
  LinkedIn, Issued Dec 2023
  Skills: Generative AI, ChatGPT
- **Generative AI: Working with Large Language Models**
  LinkedIn, Issued Dec 2023
  Skills: Generative AI, NLP, LLM
- **Amazon SageMaker**
  AWS, Issued Jan 2023
- **Award: Take Ownership to Deliver Fast**
  Philips, Issued Dec 2022
- **Certificate of Excellence in Reviewing**
  Asian Journal of Probability and Statistics, Issued Dec 2020
  Credential ID: 63898
- **ACM Certificate of Participation**
  Association for Computing Machinery, Issued Feb 2020
- **Fundamentals of Deep Learning for Computer Vision**
  NVIDIA Deep Learning Institute, Issued Mar 2019

- **Gold Medal**
  Lord Mahavira School, India, Issued Oct 2013

Recent Reviews

- 18th International Conference on Natural Language Processing (ICON 2021)
- Asian Journal of Probability and Statistics (ISSN- 2582-0230)
- The Eleventh International Conference on Smart Grids, Green Communications and IT Energy-aware Technologies (Energy 2021 IARIA)

Position of Responsibility

- Teaching Assistant, DA-IICT ; Subject Taught: Algorithms
- Mentor at Raman Classes, Roorkee ; Addressed queries related to Gate Subject

Achievements

- GATE EXAM AIR (2017): 3,301 ; JEE MAINS AIR (2013): 24,236
- Merit Certificates and Gold Medals in X and XII.

Hobbies

- **Boxing & Running** – Practicing discipline, agility, and endurance through regular training.
- **Continuous Learning** – Staying curious by exploring new technologies, AI advancements, and personal growth skills.