Kanak Raj

LinkedIn: kanak-raj-a8278i
Github: github.com/kanak8278
Email: kanak8278@gmail.com
Mobile: +918529145565
Google Scholar

Education

- **Birla Insitute of Technology Mesra** — Ranchi, India
  Integrated Master's of Science - Mathematics & Computing; GPA: 8.87 — 2019 - 2024
- **LBS Senior Sec. School** — Kota, India
  AISSCE - 12^{th} Board; 92.6% — 2017 - 2019
- **Jawahar Navodaya Vidyalaya** — Bokaro, India
  AISSE - 10^{th} Board; GPA: 10 — 2016 - 2017

Publications

- **Cook-Gen: Robust Generative Modeling of Cooking Actions from Recipes** at IEEE SMC 2023.
- **Spatial Field Fusion Network (SFFNet) for Panoramic Dental X-ray Segmentation** at IEEE APSCON 2023.
- **K-PERM: Personalized Response Generation Using Dynamic Knowledge Retrieval and Persona-Adaptive Queries** at AAAI Spring Symposium 2024.

Experience

- **Microsoft Research** — India
  Research Intern (LLMs & AI4Code) — Jan 2024 - Current
  - **Programming with Representations (PwR)**: Developed an intermediate representation layer to bridge the gap between users and Large Language Models, addressing issues like **hallucination** and enhancing non-technical user interactions, thereby transforming **chatbot building** workflows.
  - Built **Jugalbandi(JB) Manager**, **open-source** chatbot platform supporting multiple channels, including WhatsApp. Handles multilingual text and voice conversations using Bhashini Speech models.
- **AI Institute, University of South Carolina** — Remote
  Research Intern (Neuro-Symbolic AI & NLP) — Dec. 2022 - April 2024
  - Master thesis on **Knowledge Enabled Multimodal Ingredient Substitution**, built **knowledge graph** incorporating 27K ingredients and 40K substitution pairs. Enabled precise ingredient recommendations using multimodal and constraint-based searches. Developed an LLM-based query module for the ingredient substitution knowledge graph.
  - Formulated cross-modal Recipe Retrieval and developed cooking action recognition for recipe analysis, achieving **95% Recall** score leading to paper **Cook-Gen** at IEEE SMC'23 under Dr. Amit Seth.
- **Saarland University** — Germany
  Visiting Researcher — May 2023 - Aug 2023
  - Conducted research in **Satellite Image Superresolution**, enhancing **disaster analysis** through high-temporal frequency & low-resolution images using GAN & Diffusion models under Dr. Ingmar Weber and Dr. Ferda Ofli.
- **University of Maryland** — Baltimore
  Research Intern (Natural Language Processing) — Oct. 2022 - April 2023
  - Worked on developing **Personalized Response Generation** models using **reward scaling** over BART & T5, accepted at AAAI Symposium'24 and improved NUBIA score by 10% under Manas Gaur.
- **EdgeNeural.ai** — Remote
  AI Engineer Intern — June 2022 - Aug 2022
  - Engineered **Training** and **Inference** pipeline, Optimized and benchmarked DL models(YOLO, ResNet, BERT, UNet) with **Quantization** and **TensorRT**, achieving **10-15**x speedup in latency.
- **AI MAGE (WETHEKOO)** — Remote
  Computer Vision Engineer — March 2022 - April 2022
  - Orchestrated the creation of a **Fashion Tagging Engine** using fine-grained **Apparel Segmentation** (iMaterialist), performing **benchmarking** like FPS, inference time and memory usage.
- **Rhizicube Technologies** — Remote
  Software Engineer Intern — June 2021 - Sept. 2021
  - Designed **Server** & **REST APIs** in Golang(Gin) and built a **Kafka** based real-time data streaming pipeline for a Consumer Data Platform. Independently developed LinkedIn and Organization scrapers using Selenium for financial data and reports.

Projects

- **Machine Learning Algorithm Selector (Linux Foundation)** Contributed to Anuket Project, developed command-line tool for ML algorithm selection based on the use case and data. Utilized NLP for enhanced user response extraction.
- **Cyclone Intensity Detection (Smart India Hackathon, MHRD, India)** Build Cyclone Intensity Detection Application using Deep Learning (Image Processing) under ISRO, utilizing INSAT-3DR satellite data
  Tech: Remote Sensing, Contrastive Learning, Python, Object Detection, Classification, PyTorch
- **Heart Rate Estimator (IEEE Mega Project)** Remotely detect an individual's heart rate per minute from a still video of his/her face. Implemented Eulerian Video Magnification Algorithm initially developed by MIT-CSAIL Lab.
  Tech: Python, OpenCV, Tensorflow/Keras, SciPy, Numpy

Skills

- **General** Python, C/C++, SQL, Docker, Kafka, Git/GitHub, AWS, Selenium, BeautifulSoup
- **Web Technologies** HTML/CSS, Flask, JavaScript, Beego/Gin(Golang)
- **Data Science & ML** Tensorflow/Keras, PyTorch, Scikit-Learn, OpenCV, OpenVino, TensorRT, SpaCy

References

- **Dr. Amit Seth** Founding Director
  AI Institute at University of South Carolina `amit@sc.edu`
- **Manas Gaur** Assistant Professor
  Knowledge-infused AI and Inference Lab, University of Maryland, Baltimore County `manas@umbc.edu`
- **Ingmar Weber** Professor
  Interdisciplinary Institute for Societal Computing (I2SC), Saarland University `iweber@cs.uni-saarland.de`

Leadership & Volunteer Experience

- Served as **Joint President** and formerly **Joint General Secretary** of **Society for Data Science**, BIT Mesra. Led the community in eastern India's largest Data Science Summits in 2021 and 2022.
- **Instructor** in several workshops, including Python and Introduction to Data Science, Machine Learning, Introduction to Deep Learning, Git/GitHub, and OpenSource.