

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
AISSE - 12th Board; 92.6%
2017 - 2019
- **Jawahar Navodaya Vidyalaya** Bokaro, India
AISSE - 10th 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-PERF: Personalized Response Generation Using Dynamic Knowledge Retrieval and Persona-Adaptive Queries** at AAAI Spring Symposium 2024.

EXPERIENCE

- **Thomson Reuters Lab** India
Applied Research Scientist Aug 2024 - Current
 - **Document Update Pipeline:** Architected an end-to-end automation pipeline for processing **legal** documents based on Alert. Engineered **XML parsing** for MS Word files while preserving document integrity. Implemented **Section-Matching algorithm** to identify update requirements with detailed reasoning chains and alert-point mapping for **Explainability**. Developed **Human-In-Loop** validation interfaces enabling auditable update processes. Integrated LLM for content analysis with **Multi-Threaded** processing, resulting in **80% reduction** in manual processing time while maintaining high accuracy through human verification.
 - **Search-and-Replace Agent:** Developed an automated MS Word updating tool achieving **96% accuracy** while preserving the original formatting and styles. Implemented a versatile solution that seamlessly processes multiple document types, resulting in **widespread adoption between teams** and **90%** reduction in manual content updates.
- **Microsoft Research** India
Research Intern (LLMs & AI4Code) Jan 2024 - July 2024
 - **Programming with Representations (PwR):** Worked on building programming workflows using Conversational AI, built a intermediate representation layer to represent workflows and also bridge understanding between users and Large Language Models, addressing issues like **hallucination** and enhancing non-technical user interactions.
 - Built **Jugalbandi(JB) Manager**, **open-source** chatbot infrastructure supporting multiple channels, including WhatsApp with a built-in support for 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. We have also submitted out work at AAAI-25.
 - 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 **10-15x** 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

- **Ingmar Weber** Professor
Interdisciplinary Institute for Societal Computing (I2SC), Saarland University iweber@cs.uni-saarland.de
- **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

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.