

AAKASH KATHA

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EXPERIENCE

Avyuct

Full Stack and AI Developer

- Spearheaded the development and deployment of machine learning algorithms for **DICOM** medical image analysis, enabling the detection of anomalies in collaboration with professional radiologists.
- Designed a robust back-end system that uses **Flask** and **RabbitMQ** to enable multiple machine learning models to operate as standalone consumers, supporting asynchronous processing for time-intensive training and inference tasks.
- Integrated advanced libraries such as Niivue and Papaya Viewer into **React.js** to deliver interactive 3D visualizations of brain CT scans, enhancing the identification and localization of vessel occlusions.
- Collaborated closely with a Harvard-affiliated radiologist to strategize and design a user-friendly product for pneumothorax detection, focusing on usability and providing actionable insights to radiologists.
- Parallel research and development was conducted to integrate the product with **PACS** servers, ensuring seamless compatibility with industry-standard systems used by healthcare providers and radiologists.
- Developed and fine-tuned AI algorithms using **U-Net** and U-Net 3+ architectures for detecting pneumothorax in chest X-ray images and brain tumors in CT scans, leveraging hyperparameter optimization to enhance model accuracy and performance for pneumothorax detection.
- Led the design and development of an AI-driven chatbot using the Large Language Model (**LLM**) and Retrieval-Augmented Generation (**RAG**) architecture, with a focus on seamless integration into the company's proprietary knowledge base.

📍 Remote, India

📅 April'23-Present

Navia life care

Full Stack Developer

- Contributed to the development of a comprehensive doctor-patient interaction platform, implementing APIs and backend logic to support features such as appointment scheduling, booking, prescription creation, and video calling, thereby improving healthcare accessibility and enhancing user experience.
- Designed and implemented complex models using **Django** Django ORM, including custom managers and query optimizations, to enhance database performance. Also customized the Django Admin interface for non-technical users to manage platform content efficiently.
- Integrated third-party **OAuth** authentication (Google, Facebook) for seamless user login across multiple platforms, enhancing user convenience and security.
- Integrated **Twilio** APIs and Django Channels to manage WebSocket connections for real-time, asynchronous communication, enabling seamless video calls, live chat, and appointment notifications, enhancing the platform's interactivity and scalability.
- Streamlined the deployment process by implementing **CI/CD** pipelines on GitLab for automated deployment of the web application to AWS servers, ensuring smooth and efficient updates.
- Integrated **Elasticsearch** for fast retrieval of medicine information and utilized **MongoDB** for storing large documents, optimizing queries to ensure efficient data retrieval and significantly improving search performance and response times.
- Developed a secure **Razorpay** payment flow for the "Arogya Pay" project, facilitating medical emergency loans and enabling users to make secure payments.

📍 Gurugram, India

📅 Feb'21-march'23

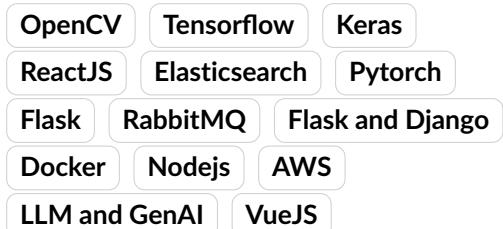
EDUCATION

- **Indian Institute of Technology, Madras**
Diploma in Programming and Data Science
📅 2021-2024
- **Indian Institute of Technology, Madras**
MS in Computation Biology
📅 2018-2020
- **Indian Institute of Technology, Madras**
BS in Biological Science and Engineering
📅 2015-2018

PROGRAMMING



SOFTWARE



AREA OF INTEREST



REFERENCES

- Dr. N Manoj**
Prof. Biotechnology IIT, Madras
@ <https://iitm.irins.org/profile/51067>
✉ nmanoj@iitm.ac.in, Ms project guide
- Dr. R Agarwal**
Faculty, George Mason University
@ <https://www.linkedin.com/in/rajesh-aggarwal-aa269120/>
✉ ragarwal@avyuct.com, Founder Avyuct

KEY PROJECTS

Machine Learning Model Management with RabbitMQ

Oct'24-Dec'24

- Designed and implemented a robust, scalable system for managing machine learning models as independent consumers within isolated environments using [RabbitMQ](#), ensuring that each model runs independently without interference from others.
- Improved scalability and reliability by decoupling the models from each other. This setup not only isolates problems but also makes it easier to add new models in the future by using a plug-and-play approach for new consumers.
- Streamlined training and inference workflows by making them asynchronous. This change significantly boosted efficiency for time-consuming tasks, such as model training and predictions, by allowing them to run in parallel without waiting for one another.
- Built a notification system that sends users alerts via email and SMS when training or inference tasks are completed, improving user experience by keeping them informed about the status of long-running tasks.
- Showcased expertise in system architecture, implementing techniques like isolated environments and asynchronous processing to create a solution that is efficient, flexible, and easy to scale as more machine learning models are added.

Video Calling System for Communication

April'21-Oct'21

- Designed and built a real-time video calling system using [Twilio](#) and Django Channels, allowing doctors and patients to communicate seamlessly through secure video calls.
- Developed an optimized [WebSocket](#)-based backend to manage asynchronous communication, ensuring reliable, low-latency video calls and a smooth user experience during telehealth interactions.
- Enhanced the telehealth platform's functionality, improving accessibility and convenience for both healthcare professionals and patients, making virtual consultations easier and more efficient.

Automated Pneumothorax Detection

Aug'24-Dec'24

- Developed a powerful detection system for pneumothorax using advanced image segmentation techniques, such as YOLO, U-Net, MONAI, SegNet, and [U-Net3+](#). This system was designed to identify pneumothorax in X-ray images, which is crucial for timely diagnosis.
- Improved model performance by experimenting with various loss function strategies and applying data augmentation techniques, resulting in more accurate segmentation and better handling of diverse image variations.
- Implemented cross-validation on a large dataset to enhance the model's generalizability, ensuring that the system works reliably across different datasets and minimizing the risk of overfitting to specific data.
- Demonstrated expertise in medical imaging and AI, optimizing models and applying advanced AI techniques to healthcare problems, with an emphasis on life-critical applications where accuracy and speed are essential.

Intelligent Radiology Chatbot with RAG Architecture

Sept'24-Nov'24

- Developed an advanced radiology chatbot using Retrieval-Augmented Generation ([RAG](#)) architecture to provide precise, contextually relevant responses by leveraging the company's proprietary knowledge base, enhancing the decision-making process for healthcare professionals.
- Integrated OpenAI libraries and the [LangChain](#) framework to implement sophisticated embedding techniques, allowing efficient retrieval of relevant medical knowledge and seamless integration with the chatbot's responses, ensuring high-quality, accurate interactions.
- Demonstrated expertise in large language models ([LLM](#)), knowledge retrieval, and conversational AI by using cutting-edge techniques to develop an intelligent assistant capable of understanding and generating accurate responses in the domain of radiology.

MS PROJECT

Evolution of Algae to Trees

Jan'19-April'20

Under Prof. N Manoj, IITM

- Performed computational analysis of [DNA](#) sequence data(fasta format) from algae and trees to investigate their evolutionary relationships, with a focus on identifying genetic markers that highlight key evolutionary transitions.
- Constructed phylogenetic trees using advanced tools like MAFFT and RAxML, to map common ancestors and better understand the evolutionary divergence from algae to trees.
- Visualized evolutionary data through interactive platform [iTOL](#), making complex phylogenetic findings more accessible and easier to interpret for both researchers and non-experts.

INTERNSHIP

Acumensa Tech

Jul'20-Oct'20

- Contributed to the development of an innovative agricultural platform, designed to facilitate direct communication between farmers and government officials, as well as provide a marketplace for farmers to sell crops online.
- Led the design and development of critical user-facing features, including land registration forms and crop selling functionalities, ensuring a seamless and intuitive experience for farmers and stakeholders.
- Integrated [Google Maps](#) API for interactive location-based features, enabling farmers to accurately allocate land coordinates and visually define land areas on the map, streamlining the land registration process.
- Developed dynamic and responsive user interfaces using [ReactJS](#), focusing on performance and usability, and leveraged Ant Design ([AntD](#)) for consistent and modern page styling, enhancing overall user experience.
- Acquired strong foundational knowledge in ReactJS and web development best practices, enhancing both technical proficiency and collaborative skills, and contributing to the project's success in meeting key objectives.

ADVANCED COURSES

Computation Biology | Computer Vision |
Modern Application Development (Flask) |
Machine learning practices | Modern Application
Development (Vue.JS+Flask) | Data Structure and
Algorithm in python | Databases and
Management System | Machine Learning
Practices | Buisness Analytics | Buisness Data
Management | Introduction to Python

