

# Ramnarayan

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Pursuing a Minor in Machine Learning & Data Science at Centre for Machine Intelligence & Data Science (C-MinDS)

## SCHOLASTIC ACHIEVEMENTS

- Among top 1% in **NDA-146**, qualified for SSB Interview among **400k+** candidates, Ministry of Defence, India (2021)
- Received INR **251K** from the Government of Rajasthan for achieving **1st** district rank in Intermediate exam (2020)
- Among the **top 300** students from Rajasthan who got selected for **RMO** (Regional Mathematics Olympiad) (2018)

## PROFESSIONAL EXPERIENCE

### AI Research Intern | MBZUAI | Abu Dhabi, UAE

(Jun'24 - Aug'24)

Among 44 from 1000+ applicants from 82 nations and Received **Letter of Recommendation** by **Reporting Manager**

#### • LLMs vs. Linguistics Olympiad: A Quest for Mastery

Collaborated with team of 7 to develop an advanced LLM for Linguistic Olympiad problems

<b>Objective</b>	Developed a <b>Multi-LLM</b> framework to solve complex linguistic challenges in the Olympiad Problems
<b>Approach</b>	<ul style="list-style-type: none"><li>Designed a <b>benchmarking</b> pipeline to evaluate LLMs (GPTs, Llama, Mistral) on 4 custom datasets</li><li>Implemented <b>Code Generation, Multi Agent reasoning</b> Algorithms for improvement of the result</li><li>Applied <b>Prompt Eng.</b>(tree of thoughts, principled), enhance LLM performance &amp; reduce hallucinations</li></ul>
<b>Impact</b>	Achieved state-of-the-art performance with accuracy of <b>71%</b> , marking an <b>11%</b> improvement over previous models, with <b>COT Prompt</b> , Discovered significant data <b>contamination</b> in current LLMs

#### • Multilingual Multitask Zero-Shot Generalization Of Encoder Models

- Created **translation encoder** models, implemented **statement-tuning** methodology, for **22** different language pairs
- Improved translation accuracy by **XLMR & mBERT**, **19.13%** over existing Decoder models, on mCOPA dataset

### Data Science Intern | Attentions.ai | Pune

(May'24 - Jun'24)

- Generate **SQL** Query using LLM, made pipeline for visualization and extract **insights** from various custom datasets
- Finetuned **phi3-128k** model on custom dataset for SQL query generation, extract data insights, with **83%** Accuracy
- Deployed trained model on AWS using **S3**, Amazon **SageMaker**& **Lambda** for scalable machine learning operations
- Developed End to end full stack Application using **MongoDB, Express, React & Nodejs** for production purpose

### Computer Vision Intern | Assert Secure Pvt Ltd | Mumbai

(Jun'23 - Jul'23)

Received **Letter of Recommendation** by **CEO** for a dedicated performance during the internship

- Worked with **IRB** Infrastructure Company, enhance security on toll plaza using **detection** and tracking algorithms
- Trained **Yolo** model on **Darknet** framework with **100,000+** CCTV images, deployed on **Jetson Nano**, real-time object detection and tracking using **DeepStream** with RTSP, significantly enhancing security monitoring capabilities
- Achieved **99.3%** mean average precision (**mAP**) on detection and **88.15%** accuracy in Multiple Objects tracking

## KEY PROJECTS

### The Smart PDF Reader | Academic Project

(Feb'24 - Apr'24)

Guide: Prof. Amit Sethi — Data Science and machine learning Intelligence

- Developed a **RAG** system using **LangChain** to generate relevant answers based on large documents with **Llama 3.1**
- Integrated document processing, embedding generation, and **retrieval** mechanisms to enhance the accuracy of QA
- Optimized query handling by implementing **embedding** strategy, ensuring rapid, precise retrieval of relevant sections

### Synthetic Dataset Generator | Academic Project

(Jul'22 - Aug'24)

Guide: Prof. Asim Tiwari — Data Science and machine learning Intelligence

- Developed & implemented **GAN**, used generator-discriminator model architecture to generate new artificial samples
- Minimised **MSE** for model in TensorFlow using Leaky-ReLU and tanh activations, along with the **Adam optimizer**
- Fine-tuned hyperparameters to improve model performance, achieving a **9.68 RMSE** on GAN-generated dataset

Guide: Prof. B. Palaniappan — Data Science and machine learning Intelligence

- Conducted EDA, data cleaning, feature engineering & **Chi-Square test**, correlation analysis for variable relationship
- Utilized **Random Forest**, Decision Tree, **XGBoost**, SVM & **Voting Classifier** to identify creditworthy applicants
- Achieved **F1-score 0.88**, test Accuracy **81%** with Voting Classifier model, analyzed Confusion Matrix & AUC-ROC

**Attention Is All You Need | Self Project**

(Sep'23 - Dec'23)

Implementation of transformer architecture mentioned in Attention Is All You Need paper

- Implemented transformer Architecture using **self & multi-head attention** mechanisms, inplace of RNNs and CNNs
- Used positional embedding, Uniform **Length Batching** & Automatic Mixed Precision, reduced training time by **72%**
- Applied **Parameter Sharing** between layers, used Leaky ReLU as activation, to achieve a loss of **1.6** in 28 epoch

**OTHER PROJECTS****ML Assisted Stock Price Prediction | Self Project**

(Feb'23 - Apr'23)

- Utilized Python libraries such as pandas, numpy, **yfinance**, Scikit-learn & **TensorFlow** to fetch historical stock data
- Implemented **ARIMA**, **SMA20** & **Naive** models on reliance time series data for precise stock price forecasting
- Achieved the Root mean squared error (**RMSE**) of 2.27 by implementing **LSTM** model after parameter optimization

**Facial Recognition | Self Project**

(Jan'23 - Feb'23)

- Developed a PyTorch class for **triplet loss**, handling loading and transforming anchor, positive, and negative images
- Implemented **Siamese** network using ResNet-50 for face recognition, enhancing model accuracy by **transfer learning**

**Automated Custom Messaging | Self Project**

(Feb'23 - Mar'23)

- Automated the WhatsApp messaging using **Selenium** and **Pandas** library to send images and text **18% faster**
- Offered as an option in the institute general elections which saved **20+** hours and reduced accounts blocking by **40%**

**SAHARA | Startup Course Project | Team Project**

(Aug'22 - Dec'22)

Guide: Prof. Raj Jaswa — Desai Sethi Centre For Entrepreneurship

- Led a team of **6** in brainstorming and ideation of innovative idea that connects **households** with service providers
- Identified target market, developed Business Model Canvas, Go-To-Market strategy, Unique Selling Proposition (**USP**)

**POSITIONS OF RESPONSIBILITIES****Overall Head | Mess Council | Hostel 2, IIT Bombay**

(Mar'23 - Apr'24)

Representative of Hostel 2 in Institute Mess and Hostel Affair Council

<b>Initiative</b>	<ul style="list-style-type: none"> <li><b>Digitized</b> mess card system with insti app &amp; launched a portal to improve <b>transparency</b> in mess</li> <li>Orchestrated <b>Zero Waste Campaign</b>, resulting <b>82.5%</b> food wastage reduction on daily basis in mess</li> </ul>
<b>Roles &amp; Budget</b>	<ul style="list-style-type: none"> <li>Superheaded of a team of <b>2</b> mess secretaries to oversee and manage the functioning of mess &amp; canteen serving <b>500+</b> hostel inmates, coordinated with other head to win overall <b>sports</b> general championship</li> <li>Managing a total budget of <b>INR 10 M+</b> per Sem., Purchased kitchen utensils worth <b>INR 0.6 M</b></li> </ul>

**Mentorship and Assistant | IIT Bombay**

(Feb'23 - Mar'23)

- Codewars Mentor** : Mentored **2** teams during the Codewars and helped them develop a bot for game development  
Conducted strategy development sessions to help my teams come up with different strategies
- NEC Assistant** : Assisted in the mentoring of **30+** teams across India, to set up their own Entrepreneurship Cell  
Collaborated weekly with a team of **28** to brainstorm, design, and implement **20+** key initiatives

**TECHNICAL PROFICIENCY & COURSES UNDERTAKEN**

**Languages/Libraries :** C++, Python, SQL, Power BI, Tableau, Matplotlib, Pytorch, Scikit-learn, Tensorflow, JS

**Software Skills :** Github, AWS, Microsoft Excel, Linux, LATEX, Postman, React, MongoDB, Express, Node, VS Code

**CS & DS Courses :** Introduction of Computer Programming & Algorithm, Data Analysis for Chemist, Introduction to machine learning & Advance Machine Learning, Statistical Machine Learning & Data Mining, Calculus, Algebra

**EXTRA-CURRICULARS**

- Completed a year-long course under **NCC IIT Bombay** as a cadet at 2 MAHR ENGR REGIMENT (2021)
- Volunteered for and participated in the **Powai Lake Clean-up** initiative administered by Abhyuday, IITB (2021)
- Informals Coordinator at **Mood Indigo**, Asia's largest College Cultural Festival, with **146,000+** of footfall (2022)
- Achieved top **3** position in **ERC**'s obstacle maneuvering bot competition, with **75+** participating teams (2022)
- Participated & bagged best Performing Arts Festival (**PAF**), winning **12/12** genre awards, 10-year milestone (2023)
- Bagged 1st position in **5 Km** run under the Hostel **Crossy** GC organized by Aavhan, representing Hostel 2 (2024)
- Interests** - Trekking | Running | Cricket | Traveling | Cycling | Chess | Reading | Gym | Photography