

AYUSH RAJ

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Education

National Institute of Technology, Patna

Bachelor of Technology in Electrical Engineering

Nov. 2021 – June 2025

CGPA: 7.97

Lyceum International School

Class XII(CBSE)

July 2018 – July 2020

Percentage: 93.6%

D.A.V Public School, Malighat

Class X(CBSE)

April 2016 – June 2018

Percentage: 96%

Research Interests

- Deep Learning
- Computer Vision
- Generative AI
- NLP & LLMs
- Machine Learning
- Image Processing

Experience

Khalifa University

Research Intern

March 2024 – Present

- Currently working remotely on improving state-of-the-art models to detect metallic objects and other items prohibited at Airports under the supervision of **Prof. Naoufel Werghi**.

Projects

Safety Surveillance System | *Computer Vision, Python, PyTorch*

 [GitHub](#)

- Collaborated with a peer to execute a dual-phase project focusing on **Object Detection** using **Faster R-CNN** and **YOLOv8**, applied to the [Kaggle Safety Helmet Dataset](#).
- This involved a rigorous process of scripting in the PyTorch Framework, **Training** both the models to handle complex object detection tasks effectively and **Comparing Model Performances** in terms of accuracy and processing speed, providing a clear understanding of each model's strengths.
- **Faster R-CNN** achieved a **mAP@0.5** score of **25.3%**, reflecting its lower performance in our evaluation.
- **YOLOv8** exhibited promising results, achieving a **mAP@0.5** score of **63.4%**.
- Leveraged the potential of **Real-Time Object Detection** of YOLOv8 by building an **Object Counting Tool** which predicts number of safety helmets in the frames of Video Feeds. This can find applications in monitoring of construction site workers(the data it is trained on), but also on traffic signals.
- Co-authored a **Series of 7 Blogs on Medium** detailing the project's methodology, model comparison insights, and practical applications, visual demonstrations of models applied to video feeds and also explained key concepts such as efficient neural network training, Faster R-CNN and YOLO model architectures, and the significance of evaluation metrics. [Blog Series](#)

Multi-Label Text Classification | *Natural Language Processing, Large Language Models(LLMs), PyTorch*

 [GitHub](#)

- Engineered structured data from raw text for two distinct **BERT** models, each tailored to a label in a multi-label text classification task on a custom dataset.
- Conducted in-depth **Exploratory Data Analysis** (EDA), handling missing values and removing duplicates to ensure data integrity.
- Applied a variety of **Text Pre-Processing** Techniques such as lowercase conversion, character spacing normalization, punctuation and number removal, spelling and grammatical error correction, stopword removal, and lemmatization.
- Transformed textual target columns into **vector representations** for efficient modeling. Optimized each BERT model for precise classification, demonstrating proficiency in NLP feature engineering and deep learning methodologies.

Electric Load Prediction | *Time Series Analysis, Python, PyTorch, TensorFlow*

 [GitHub](#)

- Developed and deployed **ARIMA** and **LSTM** models to analyze time series data of electric load consumption.
- Engineered solutions for non-stationarity by applying differencing techniques and enhanced data quality using **Wavelet Transform** for noise reduction.
- Attained outstanding results under the supervision of **Dr. Rajib Kumar Mandal, Head of the Department**, with the research project currently in progress for publication in the **IEEE Journal**, a prestigious academic publisher.

Code Assistant Application | *LLMs, LangChain, Gradio*

 [GitHub](#)

- Developed a multi-programming code assistant using **Code Llama** (Llama2) Open-Source LLM using **LangChain** and **Gradio** Frameworks.
- It can also be a **RAG** Application where we can fine-tune it on an application-specific dataset.

Traffic Sign Classification | *Image Classification, Python, TensorFlow*

 [GitHub](#)

- Deployed a **CNN** model with layers including a **Dropout** rate of 40% for identifying **43** different classes of traffic signs.
- Trained the model for **100 epochs** on a dataset of **32x32 RGB** images with an accuracy of **94%** on **12000** images.

Technical Skills

Technologies: Computer Vision, NLP, LLMs, Supervised ML, Data Mining
Languages: C/C++, Python, Java, Javascript, HTML/CSS, SQL
Tools & Softwares: Git, GitHub, Jupyter Notebook, Google Colab, Azure, AWS Bedrock, MLflow, labelImg, Roboflow
Libraries/Frameworks: PyTorch, Pandas, NumPy, Matplotlib, scikit-learn, OpenCV, PIL, Tensorflow, Keras










Achievements

- Secured an All India Rank of **20,204** out of 0.25 million students who appeared for Joint Entrance Examination(JEE) Advanced 2021.
- Secured an All India Rank of **497** in the COMEDK-UGET Examination.
- Cleared **NTSE**(National Talent Search Exam) Stage-I Examination, 2018.
- Secured an **All India Rank of 9** in the National Engineering Olympiad(NEO) in First Year Engineering.
- Solved **500+** Coding Problems on Different Platforms including CodeChef, Codeforces & LeetCode.

Coursework

- **Electrical Engineering:** Electrical Machines, Linear and Modern Control Systems, Power System Analysis, Network Analysis, Instrumentation & Control, Analog & Digital Electronics, Power Electronics, Industrial Drives & Control, Advanced Microcontrollers & ARM Processors
- **Computer Science:** Introduction to C, Object Oriented Programming, Data Structures & Algorithms, Computer Networks, Database Management Systems, [Cloud Computing](#) from NPTEL, [Fine-Tuning LLMs](#) from DeepLearning.AI, [LangChain](#) from DeepLearning.AI

Certifications

Microsoft Certified: Azure AI Fundamentals(AI-900). Achieved a score of 928 out of 1000 , well above the passing threshold of 700 .	
Amazon Certified: AWS Re:Skill Challenge(May 2022). Ranked among the Top 200.	
Coursera Certified: Convolutional Neural Networks from DeepLearning.AI .	
Coursera Certified: Neural Networks and Deep Learning from DeepLearning.AI .	
Coursera Certified: Supervised ML: Regression and Classification from Stanford .	
NPTEL Certified: Python Course(IIT Madras, 2023). Scored 90% , Standing out among 10k+ Candidates .	
NPTEL Certified: Operating Systems Course(IIT Kharagpur, 2023). Ranked in the Top 5% of Candidates.	
NPTEL Certified: Deep Learning Course(IIT Madras, 2024).	
NPTEL Certified: Internet of Things(IoT) Course(IIT Kharagpur, 2024).	
UiPath Certified: Intoduction to RPA and Automation.	