

# Sarvagya Porwal

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## SUMMARY

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Passionate AI/ML engineer with a strong background in deep learning, computer vision, natural language processing, and generative AI. Proficient in Python, TensorFlow, and PyTorch. Experienced in developing large language models (LLMs). Eager to contribute to innovative projects and continuously learn. Seeking a role to develop AI solutions leveraging LLMs and generative AI.

## PROJECTS

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### AI Agent 007: Tooling up for Success (Inter-IIT Techfest 2023)

Dec 2023 – Dec 2023

Generative AI Project –  Code

Python, Langchain, GPT-4, Hugging Face

- Built a query-aware agent capable of allocating and reviewing tool outputs
- Focused on creating autonomous tools for efficient parameter extraction and downstream function calls
- Implemented a self-reflective ReAct style agent, curated dataset using given tool descriptions

### Enriched Bots-Clever Chat

June 2024 – July 2024

Generative AI Project –  Demo

Python, Django, LlamaIndex, Hugging Face

- Today's bots are plain text. Our graph-based approach enriches interactions with links, pictures, and videos.
- Query is decomposed into an acyclic graph and response is generated by topologically visiting the nodes of the graph.
- While processing a node, it gets loaded with text response and enriched media in metadata.
- Then the final response is generated by topologically visiting the processed nodes.

### Image Captioning with Transformer and ResNet-18

May 2023 – June 2023

Computer Vision and NLP

- Developed an auto-regressive Transformer-based model in TensorFlow for image captioning, utilizing the CIFAR-10 dataset, with ResNet-18 as the encoder to efficiently extract image features
- Integrated CNNs and deep learning techniques to improve image representation and enhance caption generation
- Achieved a BLEU score of 0.8 using beam search and greedy algorithms, fine-tuning the Transformer's attention mechanisms to generate accurate, concise captions for diverse images

### Wheat Seeds Classification (Research)

Nov 2023 – Jan 2024


Computer Vision

PyTorch, OpenCV

- Classification of wheat seeds into 96 varieties, fine-tuned models like DenseNet-121, ResNet-50, and GoogleNet for RGB seed image classification and developed a DenseNet-121-inspired architecture for Hyperspectral data.
- Applied **Sparse Band Attention Module (SBAM)** for band selection, ranking bands by their contribution to the classifier's accuracy, achieving 92% accuracy on Hyperspectral images.
- Employed Regression-based Ensemble (using SVM) to combine model predictions, ensuring robustness and enhancing overall accuracy to 98%.
- The research paper is currently under review. (Proof).

### Sentinel-2 Field Delineation

July 2024 – August 2024

Computer Vision –  Code

PyTorch, OpenCV, Segmentation Models

- Developed a computer vision model for field delineation using high-resolution hyperspectral multiband images, based on Solafune's competition dataset.
- Fine-tuned U-Net-based models (UNet++, FPN, DeepLabV3, Mask-RCNN) and applied OpenCV to identify polygons for predicted annotations by processing patched images.
- Built an ensemble model by stacking masks predicted by base models, enhancing segmentation over the patched images and achieving overall IOU = 0.96.

## EXPERIENCE

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### Generative AI Intern

DeepLogic AI

July 2024 – Currently

Remote work

- Contributed to the development of a Retrieval-Augmented Generation (RAG) pipeline for enterprise search, managing email and document embeddings in a Postgres vector-store on AWS, enabling high-performance information retrieval.
- Designed normalized database schemas and optimized scalable CRUD operations for metadata-filtered searches across millions of documents.
- Developed critical components such as the Retriever, Response Generator, and Re-ranker, and implemented caching strategies to enhance chatbot integration, improving overall system interaction, efficiency, and scalability.

## ACHIEVEMENTS

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### 2nd Place in Notice Translation Hackathon

- Structuring and translating unstructured text to formal notice in four different languages

### 3rd Place in Inter-IIT Techfest

- Led a team to win a hackathon in 2023 Techfest for automating AI Agentic workflow

## EDUCATION

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### Indian Institute of Technology, Roorkee

BTech in Mechanical Engineering

Roorkee, India

Nov 2021 – Currently

## TECHNICAL SKILLS

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### Generative AI

• Langchain • Llama-Index • Hugging Face • RAG • Self-Reflection • Prompt Engineering • PEFT/LORA • DsPy • KnowledgeGraph • ReAct • LLMops • AsyncIO • AWS • Web Scrapping • Grad.io • Fast-API • Docker • Flask • Django • Github • Linux • Shell Scripting

### Computer Vision, NLP

• Pytorch • Tensorflow • OpenCV • Segmentation Models • Detectron-2 • GAN • SpaCy • Object Counting • Sentiment-Analysis • Video Captioning • Bash Scripting • Distributed Training

## CERTIFICATIONS

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- Machine Learning Certificate