Irfan Hamid

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EDUCATION

The University of Edinburgh, Edinburgh, UK September 2023-November 2024

- *Master of Science in Artificial Intelligence*
- *Relevant Courses:* Applied Machine Learning, Machine Learning practical, Probabilistic Modelling and Reasoning, Machine Learning Theory, Image and Vision Computing, Accelerated Natural Language Processing, Advanced Robotics

Vellore Institute of Technology, Vellore, India June 2017-June 2021

- *Bachelor of Technology in Electrical and Electronics Engineering*
- *Relevant Courses:* Signals and System, Neural Networks and Fuzzy Control, Data Structures and Algorithms, Digital Signal Processing, Robotics and Control, Advanced Control Theory, Applied Linear Algebra
- *Awards:* Ranked 4th in the Electrical and Electronics Engineering cohort for the academic year 2018-2019 at VIT Vellore, awarded for outstanding academic performance

EXPERIENCE

Forest Research (Northern Research Station), *Student Researcher,* Edinburgh, UK March 2024 - August 2024

- Conducted an industry-partnered machine learning research with Forest Research (the research agency of the Forestry Commission, UK government) for my MSc dissertation, focusing on the classification of tree species in the Forest of Dean using high-resolution multispectral satellite imagery from Planet Labs' SuperDove 8 satellites
- Implemented and trained deep learning models, including ResNet-34, DenseNet-40 and Vision Transformers (ViT) to perform species classification. Utilized QGIS for geospatial preprocessing, spatial analysis, and visualization of labelled tree data
- Performed a comparative evaluation of the models and analyzed classification accuracy across various tree species. Additionally, examined species spectral curves to understand and explain model predictions, highlighting the strengths and limitations in classification performance, contributing to advancements in precise forestry and remote sensing applications

Wipro Limited, *SAP BW Consultant*, Chennai, India July 2021 - June 2023

- Designed and optimized SAP BW process chains for the client, Nomad Foods Europe Limited**,** leading to improved automation and data integration. Enhanced data loading efficiency and reduced manual intervention by developing models using Advanced DataStore Objects (aDSO) and composite providers, ensuring timely and reliable data availability
- Developed customized SAP BW queries to meet Nomad Foods' reporting needs, resulting in more accurate, actionable insights. Enabled real-time data analysis for critical decisions by transforming and modeling data to align with business KPIs
- Implemented SAP BW/4HANA data provisioning and ETL processes, ensuring faster and more reliable data acquisition. Enhanced BI report performance, supporting the client's operational and strategic planning with accurate, timely data flows

PROJECTS

Retrieval-Augmented Generation (RAG) Pipeline for Textbook Search December 2024 – January 2025

- Extracted and preprocessed text from PDF textbooks, formatted it into chunks and converted them into numerical embeddings
- Designed a vector-based retrieval system to identify and extract relevant text chunks based on user queries
- Generated context-aware prompts using retrieved passages and utilized Large Language Models (LLMs), specifically Google's Gemma-7B-it, to generate accurate, context-driven responses to queries derived from textbook content

Non-Self-Referential Attention in Transformer Models January 2024 - May 2024

- Explored modifications to Transformer architecture and developed a method called Non-Self-Referential Attention
- Driven by the observation that self-attention values (main diagonal of the attention matrix) were often disproportionately high yet minimally informative, this method attenuated those values by a tunable factor to diversify attention distributions and improve performance on tasks like machine translation
- Applied this approach to the 'en-pt' translation subset of the opus_books dataset, achieving a 2.12% BLEU score improvement

TECHNICAL SKILLS

- *Programming Languages, Libraries & MLOps:* Python, PyTorch, NumPy, Pandas, scikit-learn, SQL, OpenCV, spaCy, NLTK, Transformers (Hugging Face), LlamaIndex, AWS, Docker, Git, GitHub Actions, DVC, MLflow, Kubernetes
- *Machine Learning:* Deep Learning Architectures (Transformers, CNNs, RNNs, VAEs), Bayesian Inference, Approximate Inference, Computer Vision, Natural Language Processing (NLP), LLMs, LLM Fine-Tuning (including PEFT methods like LoRA), RAG, LLM Compression