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Machine Learning Researcher

Data Structures & Algorithms · Competitive Programming · Data Science · Probability and Statistics · NLP · LLMs Computer Vision · Graph Neural Networks · AI/ML-Ops · Generative AI · Recommendation Systems · System Modelling

M. Tech. CS with AI/ML Specialisation. 1 year internship at Siemens as ML Researcher. Experienced in Data Science, Probability & Statistics, Machine Learning, Deep Learning, NLP, Computer Vision, Generative Adversarial Networks, Graphical Convolutional Neural Networks, Graph Neural Networks, Neural Subgraph Matching, Prompt Engineering, Reinforcement Learning, AI/ML-Ops, Recommendation Systems for System Modelling, and LLMs.

Education & Certifications

M. Tech CS (AI/ML spl.), IIIT Bangalore — 2022 – 2024
B. Tech CSE, Savitri Bai Phule Pune University, Pune — 2018 – 2022

Google Advance Data Analytics Professional Certificate [Coursera/Google] — March-Current,2024
CompTIA A+ (220-1001&220-1002) [Udemy] — Feb-March,2022
DeepLearning Specialization [Coursera/DeepLearning.AI] — Aug-Oct,2021

Technical Skills

Languages: Python, C, C++, SQL, NoSQL (Graph DBMS)
Frameworks/Libraries: TensorFlow, Keras, Matplotlib, Seaborn, NLTK, SpaCy, Gym, NetworkX, DeepSnap, OpenCV, Pillow, Tableau, Plotly, Pyviz, PyTorch, PyTorch Geometric, Scikit-learn, Neo4j, Pydantic, Langchain, Streamlit, multiprocessing, abstract base classes, coroutines, concurrent_futures.

Experience

Siemens Technology, Bangalore — May 2023 – June 2024
Machine Learning Researcher - Intern

- Implemented Graph Neural Networks (GNNs) for “Recommendation Systems for System Modelling” applications.
- Explored and Reviewed research papers on GNNs, translating theoretical insights into practical implementations.
- Published the **research paper in PLMSS 2023** on **Graph-Based Smart Neural Recommendation Mechanism.**
- Winners of Siemens **AVISHKAAR Innovation Hackathon:** for developing a framework to drive product circularity through a **Sustainable Decision Recommendation Mechanism (SDeRM)** for **Machinery-As-A-Service**.
- using GNNs to achieve scalability, increase sustainability and re-usability, and reduce overall carbon footprint.
- Created an ML pipeline for the Recommendation system application, automating operations, validation, and improving efficiency.

Projects

Knowledge graph from Interactive User Queries | Pydantic, Langchain, Networkx, RAG — Jan 2024

- Leveraged Pydantic schema and Langchain to extract structure and Knowledge from unstructured data(text).
- Constructed a dynamic knowledge graph within Neo4j and implemented similarity measures to fetch the most similar existing graphs and potentially retrieve relevant information.

Sustainable Decision Recommendation Mechanism (SDeRM) | GCNNs — Aug 2023

- Utilized reports and metadata and used a geometrical representation of products to create a detailed Graph.
- Used Graphical Convolutional Neural Networks (GCNNs) for spatial neighbourhood aggregation.
- Result Node Embeddings are then compared with historical data using similarity measures, to tell, whether the complete graph or subgraph or some node(s) need sustainable measure.

Graph-based Smart Neural Recommendation Mechanism (SNeRM) | Neural Subgraph Matching, GNNs — May 2023

- Did Implementation of, code to Heterogenous Graph, conversion methods using nested class abstractions.

- Performed Neural Subgraph Matching techniques on the generated graph and utilised subgraph prediction function to get subgraph score for each target graph(s) and query graph using an Alignment metric.
- Leveraged the prediction score to identify and retrieve top subgraphs containing the query graph. This facilitated the development of a recommendation system for node prediction by implementing various filtering methods.

Night Vision Enhancement | GANs, Image Processing, VAEs, K-means Clustering Aug 2022

- Employed Variational Autoencoders (VAEs) and K-means clustering to classify images based on their brightness levels (low or high). This pre-processing step facilitated the training process for the GAN model.
- Transformed low-light images captured in night-time conditions into clearer and visually more comprehensible representations using GANs.

Inverse Imaging: Reconstructing High-Resolution Images | U-Net, Stable Diffusion April 2022

- Collected images from different sources (of pets), pre-processed and resized them.
- Used the Bilateral Filter method and constructed U-Net architecture from scratch to achieve high-resolution images.
- Co-authored the paper, published in ICITS Conference, 2022.

Deep Q-Learning for Slither.io | Deep Q-Learning, Reinforcement Learning, Experience Replay Feb 2022

- Developed model-based agent using Deep Q-Learning and trained agent to play slither.io and achieved basic human-like behaviour.
- Created a simulator to capture game dynamics and utilised **Experience Replay** techniques to enhance the agent's sampling efficiency.

Hate Speech Detection | NLP, LLMs, Sentiment Analysis April 2021

- Implemented hate speech detection using deep learning, and LLMs to automatically detect and flag instances of hate speech for a better user-friendly experience.
- Curated and preprocessed a diverse dataset to ensure model generalisation and mitigate biases.

Publications

SNeRM: Graph-based Smart Neural Recommendation Mechanism | PLMSS 7 Nov 2023

- Published a journal in Product Lifecycle Modeling, Simulation & Synthesis (PLMSS) Conference 2023.
- Co-authored the research paper and implemented SNeRM using Neural Subgraph Matching and filtering techniques to generate graph-based recommendation systems for system modelling.

Inverse Imaging: Reconstructing High-resolution Images | ICITS Springer 27 April 2022

- Published a journal in ICITS Conference 2022.
- Implemented inverse imaging using U-Net architecture.
- Effectively Applied stable diffusion methods to reconstruct high-resolution images in a deep prior fashion.

Leadership

- **Siemens Hackathon "AAVISHKAR"(2023):** Led the team, GreenCreators, to victory in the Siemens Hackathon, securing the coveted **"Best Audience Choice Award".**
- **Project Leader, Inverse Imaging (2022):** I spearheaded the development of a machine learning pipeline. This involved delegating tasks effectively, managing project workflow and proposal, time management and corporation.
- **Vice-President, Ethical Hacking Club(2021):** Elected Vice President, demonstrating the trust and confidence of my peers. During my term, I organised workshops to enhance club members' skills" and "increased club membership by 20%".