Jacob Furtaw

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Professional Summary

Innovative Machine Learning Research Engineer with an expertise in Natural Language Processing and Computer Vision. Highly skilled in developing cutting-edge AI solutions with large language models (LLMs) and multi-modal systems. I am experienced in leading technical teams and driving projects from ideation to deployment. I am passionate about solving complex problems and pushing AI boundaries. Please explore my website to view my full virtual resume and recent projects.

Skills

AI/ML & Data Science: PyTorch, TensorFlow, Transformers, HuggingFace, Langchain, Llama-Index, Scikit-Learn, Pandas, NumPy, Matplotlib, Keras, Ollama, **Retrieval-Augmented Generation (RAG)**, and Agentic RAG

Programming Languages: Python, JavaScript (Node.js), and CSS; **Familiar With:** C++ and Java

Tools & Platforms: Git, Docker, Kubernetes, Jupyter, Conda, PyCharm, VS Code, Linux, Windows

Professional Experience

Machine Learning Research Engineer | SurgePoint Software | Full-Time   Aug 2023-Present

- Developing an innovative AI Assistant using open-source LLMs like Qwen 2.5 7B, Mistral-Nemo 12B, and Llama 3.1 8B
- Utilizing **data engineering** skills to reduce 200 million lines of unstructured data into a 13-million-line structured dataset
- Designing, engineering, and testing an advanced **Retrieval-Augmented Generation** pipeline that feeds any LLM the newest data from the university website to increase semantic relevance scores and combat model hallucinations
- Leveraging **prompt engineering** skills to ensure the prompt was well-structured and the model could answer any query
- Working with a small, diverse, and time constrained group of individuals at a startup in a remote setting

Advanced Repair Agent | Geek Squad | Seasonal   Mar 2022-Present

- Recognized with a Letter of Recommendation for designing and implementing operational improvements, resulting in a 150% increase in productivity and customer satisfaction.
- Consistently ranked in the top 3% of all Advanced Repair Agents in the District and Region
- Completed tens of thousands of hardware and software repairs on various devices and operating systems

Projects

Chat RAG

- Developed a versatile RAG (Retrieval-Augmented Generation) chatbot with a Gradio user interface, supporting multiple local models from Ollama and Hugging Face and cloud-based from OpenAI, Anthropic, and NVIDIA Nims
- Engineered a modular architecture with utilities for model management, chat functionality, and UI interactions, featuring dynamic model switching, model parameter tuning, and quantization options
- Designed flexible data ingestion from diverse sources (local files, GitHub repositories, databases) and efficient memory management, showcasing adaptability to various use cases and optimal performance

Automatic Identification of Equivalent Mutants using an ASTNN

- Excelled as a member of a Scrum Team, engaged in sprint planning, daily standups, and sprint reviews
- Investigated and implemented the use of a transformer-based model for the task of binary classification
- Optimized data preprocessing, added and tuned hyperparameters, and increased the model's overall performance
- Condensed research and outcome into a comprehensive formal report my team presented at a campus research fair

Image Alter

- Developed a diffusers pipeline for text-to-image and image-to-image generation with a user-friendly Gradio UI

Education

Bachelor of Science in Computer Science, Software Engineering Concentration

Towson University, Towson, MD

- **Coursework**: Artificial Intelligence, Database Management Systems, Software Quality Testing & Assurance, Data Structures and Algorithms, Requirements Analysis and Modeling, Software Engineering, Software Project Practicum

Associate of Art in Computer Science

Howard Community College, Columbia, MD