Nathaniel Morgan
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Education

Massachusetts Institute of Technology (MIT), Cambridge, MA — May. 2027
Candidate for Bachelor of Science | Major 6-3 Computer Science and Engineering — GPA: 4.5
Relevant Coursework: Fundamentals of Programming, Comp Thinking and Data Sci, Deep Learning
Mathematics for Computer Science, Data Structures and Algorithms, Linear Algebra, Machine Learning

Skills

Computer Science: Python, Java Script, Bash, SQLite,
DevOps: Google Cloud Platform, Kubernetes, Docker, Kubectl, Minikube, Tmux, Vim
Software: Google G-suite, Microsoft 365 Office, Adobe Creative Cloud
Languages: English, Spanish

Internships

SALIERI.AI, Boston MA — May. 2024 - Aug. 2024
Full-stack / NLP AI Engineer Intern
Developed a server-less SaaS deployment with an autoscaling Kubernetes cluster hosted on GCP to facilitate structuring LLM output into parsable JSON based on business text document stores

- Utilized Node.js to create a web-hook API from scratch, enabling communication with a Python "child process" via inter-process communication (IPC).
- Developed 3 containerized micro-processes for scalability and created network for intra-container communication
- Restricted LLM output using Context-Free Grammars in GBNF format and JSON to ensure valid generation (token generation constraint)
- Built and optimized an autoscaling Kubernetes cluster with MySQL data store on Google Cloud Platform, with containers stored in Google Artifact Registry and configured using Helm Chart for long-term sustainability.

Research

CSAIL, Cambridge, MIT — Sep. 2024 – Dec 2024
Undergraduate Researcher, Dynamic Data Storage and Retrieval [DDSR]
Spearheaded investigation into the utilization of Modern Continuous Hopfield Networks to model Memory for LLMs

- Constructed tensor-based data processing pipeline utilizing Kaggle sentence dataset and tokenization via. Mistral tokenizer
- Trained network with PyTorch and evaluated results with matplotlib

CSAIL, Cambridge, MIT — Jan. 2024 – May 2024
Undergraduate Researcher, LLM NLEP Benchmark Creation
Conducted research within the CSAIL Spoken Language Systems Group (SLS) at MIT for the creation of a benchmark for LLM natural language embedded program generation.

- Produced >50 ground truth python programs for synthetic data generation to create evaluation dataset.
- Created API calls for aggregate data collection and processing from Google Data Commons

Publications

Phillip Schroeder, Nathaniel W. Morgan, Hongyin Luo, James R. Glass. — May. 2024
THREAD, “Thinking Deeper with Recursive Spawning” [NAACL 2025] (arXiv preprint arXiv:2405.17402 2024)

Projects and Leadership

ARK (Automated Resource Knowledge Base), Open Source Project — Apr 2023 – Present
Ongoing project aiming to simulate the data retrieval and storage process of the human brain with a computer

- Configured Local LLM Inference with Llama CPP and open-source Mistral 7b weights provided hosted on Huggingface Hub
- Created Vector DB for information storage and retrieval facilitated by Local LLM Implemented Speech-to-Text and Text-to-Speech for vocal interactions with Python database shell

Presentations

- SIPB Cluedumps: “AI for Dummies” — Jan. 2024
- HackMIT Blueprint: “AI for Dummies” — March. 2024
- TEDXBoston: “Visual Embedded Identification for Legitimacy” — Jan. 2025

Awards & Accomplishments

MIT Student Information and Processing Board (SIPB) (Keyholder) — Dec. 2023
Harvard x MIT CO-OP (Student Board Member) — Aug. 2024
International Science and Engineering Fair (Finalist) — Oct. 2021