Noel Elias

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EDUCATION

The University of Texas at Austin, Austin, TX December 2024

Bachelor of Science in Computer Science & Mathematics

Coursework: Grad Cryptography, Grad Computer Security, Distributed Systems, Trustworthy Machine Learning, Stochastic Processes, Cloud Computing, Linear Algebra, Honors Vector Calculus, Algorithms, Computer Architecture, Data Structures, Operating Systems, Number Theory, Real Analysis, Algebraic Structures

SKILLS

Technical Skills: *Python, Rust, Java, C/C++, MATLAB*

Tools/Frameworks: *PyTorch, Circom, NumPy, OpenCV, Rest APIs, CI/CD Pipelines, Docker, Kubernetes*

EXPERIENCE

LINC Lab & UT Cryptography Group, UT Austin August 2023 - Present

Undergraduate Researcher

- Creating succinct cryptographic primitives utilizing polynomial techniques with paring and lattice assumptions.
- Developed Rust based tools for mathematical proof verification utilizing incrementally verifiable computation protocols like Nova.
- Implemented efficient and robust large language models with encoded and private data distributions using information-theoretic approaches.

Apple, Boulder, CO May - August 2023

Software Engineering Intern

- Built an internal Python package that can analyze results, catalog failures and deploy notifications. 5000+ users.
- Designed and developed an automated evaluation system of computer vision/machine learning algorithms used for the Vision Pro.

Applied Research Laboratories, Austin, TX Jan - December 2022

Machine Learning Researcher

- Built and deployed binary, one-class, and siamese Python machine learning pipelines utilizing novel CNN architectures for various passive sonar data distributions.
- Developed novel denoising algorithm for extracting spectrographic signatures from noisy audio signal data utilizing Score-CAM analysis.

Thinkery, Austin, TX Nov 2018 - August 2021

Software Engineering Intern

- Led the development and production of an AR app implementing MIT Media labs computational thinking strategies to teach students programming.
- Implemented Vuforia Augmented Reality SDK for feature tracking and detection, Unity Scripting APIs in C# and JavaScript for 3D animations, and Android Studio for the building the app framework

PROJECTS

MULTI-THREADED WEB SERVER

- Built multi-threaded HTTP Web Server in C and Rust by safely implementing thread pools to reduce response time with concurrency. Implemented asynchronous optimized HTTP requests and evaluated scaling performance by deploying unit test testing pipelines. Used: Rust & C, POSIX Threads, C Socket-Lib, Rust Thread & TCP API

TEXAS COVID-19 WEB APP

- Created, tested, and validated LSTM neural networks, DBSCAN unsupervised clustering algorithms, and regression algorithms to create models to predict the spread of COVID-19 using a variety of contributing factors with a 92% accuracy. Devised automated pipeline with cron and AWS back end and Dash front end for Heroku web app. Used: AWS (EC2, S3 storage, and Elastic Beanstalk), TensorFlow, Pandas, Jupyter Notebooks, Numpy, Matplotlib, Scikit-learn, Heroku, Dash, Cron, Seaborn

PUBLICATIONS

Pairing-Based Batch Arguments for NP with a Linear-Size CRS
In Progress

MultiTok: Variable-Length Tokenization for Efficient LLM Training Utilizing LZW Compression
In Submission

Lova: A Novel Framework for Verifying Mathematical Proofs with Incrementally Verifiable Computation
In Submission

TexShape: Information Theoretic Sentence Embedding for Language Models [pdf]
Kaan Kale, Homa Esfahanizadeh, Noel Elias, Oguzhan Baser, Muriel Medard, Sriram Vishwanath. *IEEE International Symposium on Information Theory (ISIT)*, 2024.

A Novel Score-CAM based Denoiser for Spectrographic Signature Extraction without Ground Truth [pdf]
Noel Elias. *IEEE International Joint Conference on Neural Networks (IJCNN)*, 2023.

Audio Classification of Low Feature Spectrograms Utilizing Convolutional Neural Networks [pdf]
Noel Elias. *IEEE International Conference on Machine Learning and Applications (ICMLA)*, 2022.

Robust estimation of bacterial cell count from optical density [pdf]
Jacob Beal, Natalie G. Farny, et. all & iGEM Interlab Study Contributors. *Communications Biology,* 2020.