Ayush Hariharan

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Education

University of California, Berkeley – College of Engineering — Berkeley, CA

- *Major – B.S in Electrical Engineering and Computer Science* — *GPA – 3.96 | Graduation – May 2023*
  Activities – Quant for Fintech at Berkeley. Data Consultant for Vivensity.

Work Experience

- **Jenova Valuation Inc** — New York City, NY
  Machine Learning Intern — *Jun 2021 - Present*
  - **Stock Prediction Model**: Preprocessed training data and built ML models for regression including Random Forest and Multilayer Perceptron. Trained models while optimizing for MAPE in both the present day and 3 month time frame. Developed an evaluation script to calculate VP Ratio, Price Correlations, Decile Differentials, and Percentile Differential.
- **Blue Cloak LLC** — Sterling, VA
  Software Engineer & Consultant — *Jun 2019 - Aug 2021*
  - **ML Anomaly Detection Model (Project Lead)**: Built ensemble model to detect features on sensor data and characterize network traffic. Detected anomalies with 95% accuracy, as measured by rand score, using Isolation Forests, K-Means Clustering, Histogram-Based Outlier Clustering (HBOS Score), and Cluster Based Analysis (CBLOF Score).
  - **Audio Deepfakes**: Used primarily CNN-based voice-transfer models for in and out of dataset speakers to simulate target speech patterns. Modified CorentinJ's voice cloning model including the WaveRNN vocoder, the Tacotron Synthesizer, and GE2E encoder, to improve deep fake practicality. Implementation was theoretical as models tended to have high variability.
  - **NLP User Classification**: Used NLP and sentiment analysis to classify websites, to generate keyword trees for specific users, and to determine overall interests. Tested system by simulating 7 pseudo-users on LARIAT's web-crawling tool.
  - **Pwnagotchi Capturing Method**: Researched the open-source Pwnagotchi which uses AI and deep RL through the A2C model to maximize the crackable WPA captured. The resulting PCAP data is read, deciphered, and analyzed with ML.

Research

- **CAMLPAD: Cybersecurity Autonomous Machine Learning Platform for Anomaly Detection**
  Published Author & Lead Programmer — *Jun 2019 - Mar 2020*
  - **Publication Link**: https://arxiv.org/abs/1907.10442 **Conference Link:** https://tinyurl.com/ficc2020
- **A Quantum-Genetic Algorithm for Cybersecurity Budget Optimization**
  First Author & Independent Researcher — *Aug 2018 - Jun 2020*
  - **Description**: Quantum Save applies genetic algorithms for knapsack optimization. With IBM's Qiskit Toolkit, qubit populations are initialized, measured, and manipulated. After implementing a 10% amplitude reduction and a disaster-algorithm at 5 generations, Quantum Save had a 49.2% improvement. With cybersecurity budgets, the algorithm had a $\mathcal{O}(n)$ complexity and far outperformed existing allocation methods (as determined by histogram comparison).

Projects

- **Fantasy Football Lineup Generator (Aug 2021 - Pres)**: Created a pipeline to predict fantasy production on user-inputted players which includes a web-scraping script for data collection, an ensemble ML regression model, and a lineup optimizer. Incorporated pipeline into a web application with React frontend and Flask backend
- **Visual Odometry (Jan 2021 - Aug 2021)**: With Berkeley Underwater Robotics, using CNN's and SuperPoint architecture to determine optical flow of camera feed. Researching into ML-based (KLT algorithm) and geometric models for determining a submarine's relative velocity from video input and image analysis. Creating ML and deep learning models for SLAM.
- **Stock Analysis Tool (May 2021 - Jul 2021)**: Used Streamlit to develop a web application for stock analysis with both a visualizer and an ML model-building environment. Visualizer includes a candlestick and moving average plotter. ML environment supports both traditional multi-layer perceptrons and CNNs. Link: www.tinyurl.com/stock-predictor.
- **Smart Contract for Sports Betting (Jan 2021 - Pres)**: Used solidity to develop a contract to place bets and transfer funds from a linked MetaMask account. Worked with Provable Oracle to obtain game results and complete final payouts. Uploaded contract to the Robsten test network using Truffle and Infura. Integrated contract into a React Native Application.
- **Quantum Computing Projects (Mar 2019 - Aug 2020)**: Implemented Grover's Algorithm and Shor's Factoring Algorithm on IBM Circuit Composer. Tested run time of both the IBM Q32 quantum simulator along with the Q5 and Q14 computers. Designed basic circuits demonstrating entanglement and superposition using IBM Qiskit.

Programming Skills

- **Languages**: Python, Java, Linux, HTML, SQL, Scheme, Javascript, IBM Qiskit
- **Technologies**: BeautifulSoup, AWS, Elasticsearch, TensorFlow, Scikit Learn, Django, Ansible, Redis, Celery, Flask, Quantum Genetic Algorithms, PyTorch, Docker, OSINT, React, Bootstrap, Cytoscape, Multichain.