

KOREY MACVITTIE

SOFTWARE ENGINEER • DATA SCIENTIST • TEMPORAL LOGICIAN
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US CITIZEN • DOD SECRET CLEARANCE (CURRENT)

SUMMARY

Seasoned data scientist and software engineer with eight years of experience. Skilled in C, Java, and Python; expertise in ML, including computer vision, generative adversarial networks, and reinforcement learning, with multiple publications in the field. Seeking positions that will afford me the opportunity to expand my skills and continue to research and publish.

My ultimate goal is to pull forth thought from the void: it is my belief that strong AI is not only possible, but achievable within my lifetime. Thus, my overall emphasis is on machine learning, but I study other fields – including cognitive science, psychology, neurobiology, and so forth – intent on understanding the nature of intelligence and the boundaries of ML.

PROFESSIONAL EXPERIENCE

DATA SCIENTIST • PRECISIONHAWK • REMOTE (RALEIGH, NC) • APR 2022 – OCT 2023

- Assisted in researching and implementing image classification methods for identifying utility line and solar power transmission components, utilizing a model development and deployment pipeline that included Python and AWS
- Implemented a blur-detection algorithm for images that would reduce resource usage and paved the way for implementing additional anomaly detection algorithms to be introduced into the pipeline in the future

DATA SCIENTIST • PEOPLETEC • REMOTE (HUNTSVILLE, AL) • NOV 2020 – MAR 2022

- Assisted in researching and implementing image classification methods for unusual image identification tasks, such as graph convolutional networks, applied to a number of datasets, including but not limited to malware code translated into images, using Python and Jupyter Notebooks in a Windows environment
- Assisted in investigating potential use cases of deep reinforcement learning for penetration testing and computer network hardening

DATA SCIENTIST • COLSA CORPORATION • HUNTSVILLE, AL • FEB 2020 – OCT 2020

- Assisted in the research and development of means for UAV autonomous flight, including collision avoidance, object detection, mesh networking, and swarming behavior, using Python and Docker in a Linux environment
- Participated in feasibility studies of and research into utilizing Kubernetes and other technologies with the intent of building out an MLOps pipeline
- Oversaw the activities of four interns during their summer internship, providing guidance on tasking and assisting in project execution and completion

ENGINEER SCIENTIST • ARCARITHM • HUNTSVILLE, AL • JUL 2019 – JAN 2020

- Designed and developed an application for parsing video files into frames and sending that information across a network using a variety of messaging frameworks, using Python, Javascript, Java, RabbitMQ, and SocketIO
- Designed and implemented a GAN for synthetic data production, using Python, Tensorflow, and MongoDB

SOFTWARE ENGINEER • BARRIOS TECHNOLOGY • HUNTSVILLE, AL • OCT 2015 – JUL 2019

- As a software engineer working on a NASA contract at Marshall Space Flight Center in Huntsville, AL, my duties included the design, implementation, modification, and maintenance of telemetry software in support of both the International Space Station (ISS) and Space Launch System (SLS) programs (now the Artemis program), working primarily in C in a Linux environment, with some C# in Windows

- Took responsibility for network traffic simulation software and modified it to allow for generation of SLS-specific data, which was required for testing and verification of other telemetry subsystems for SLS, and is regularly used in ongoing development and testing of additional ISS and SLS software
- Designed and implemented an ISS simulator that allows remote payload developers to test their payloads in a simulated ISS environment, and provided modifications to other software required for those environments
- Developed software that translates MSFC data definitions into formats needed for the SLS program engine testing
- Designed modifications for an overhaul of telemetry processing management software, significantly increasing potential number of subscribers to processed data as well as reducing potential user error in server setup

OTHER EXPERIENCE

PROGRAMMER • OPEN SOURCE PROJECT(S) • GREEN BAY, WI • MAR 2011 – JUN 2015

- Dungeon Mobs
 - A Minecraft mod, written in Java using Eclipse in a Windows environment, which adds additional hostile creatures to the game intended to provide interesting tactical and environmental challenges for players
 - Sole designer and contributor to project, which was later taken up by a small team of other programmers
 - Design elements included game design, such as considerations of game balance and introduction of new elements to the game's combat engine; code design, including how to integrate into both a mod-loading system and core Minecraft code; and art design, including building out the 3-dimensional models of each creature

PUBLICATIONS

- Morgan, C.; Rodriguez, R.; **MacVittie, K.**; Slater, R.; and Engels, D. (2019) "Identifying Undervalued Players in Fantasy Football." *SMU Data Science Review*. Vol 2: No. 2, Article 14
 - We present a model to predict player performance in fantasy football, identifying high-performance players can prove to be a difficult problem. The model performs favorably in predicting athlete performance.
- Larsen, Erik; Noever, David; **MacVittie, Korey**; and Lilly, John (2021) "Overhead-MNIST: Machine Learning Baselines for Image Classification." arXiv:2107.00436 [cs.CV]
 - Algorithms were trained then scored to establish baseline comparison metrics and to select an image classification algorithm worthy of embedding into mission-critical satellite imaging systems. We present results for the overall best performing algorithm as a baseline for edge deployability.
- Larsen, Erik; Noever, David; and **MacVittie, Korey** (2021) "A Survey of Machine Learning Algorithms for Detecting Ransomware Encryption Activity." arXiv:2110.07636 [cs.LG]
 - A random forest model produces scores of 93% accuracy and 92% F1, showing that sensor-based detection is currently a viable option to detect even zero-day ransomware attacks before the code fully executes.
- Larsen, Erik; **MacVittie, Korey**; and Lilly, John (2021) "Virus-MNIST: Machine Learning Baseline Calculations for Image Classification." arXiv:2111.02375 [cs.LG]
 - A model comparison shows that Light Gradient Boosting Machine, Gradient Boosting Classifier, and Random Forest algorithms produced the highest accuracy scores, thus showing promise for deeper scrutiny.
- Larsen, Erik; **MacVittie, Korey**; and Lilly, John (2021) "Intrusion Detection: Machine Learning Baseline Calculations for Image Classification." arXiv:2111.02378 [cs.LG]
 - Cyber security can be enhanced through application of machine learning by recasting network attack data into an image format, then applying supervised computer vision and other machine learning techniques to detect malicious specimens.
- Larsen, Erik; **MacVittie, Korey**; and Lilly, John (2021) "A Survey of Machine Learning Algorithms for Detecting Malware in IoT Firmware." arXiv:2111.02388 [cs.LG]
 - To help mitigate this threat, this paper employs a number of machine learning algorithms to classify IoT firmware and the best performing models are reported. In a general comparison, the top three algorithms are Gradient Boosting, Logistic Regression, and Random Forest classifiers.

EDUCATION

M.S. DATA SCIENCE • SOUTHERN METHODIST UNIVERSITY • AUG 2019

- Specialization in Machine Learning
- Coursework in data analysis, statistical inference, database management, data mining, data and network security, machine learning (ML), data visualization, and natural language processing (NLP); using Python, R, SAS, and SQL
- Significant projects included:
 - Exploratory data analysis of home prices using linear regressions on various features of homes to estimate value
 - An in-depth analysis of fatal accident data in the US from 2015 to 2017, analyzing relationships between weather, time of day, road type, and driver condition to find proximal causes for fatal accidents
 - Significant research into generative adversarial networks (GANs) and some of their use cases, developed into a 10-minute video presentation

B.S. COMPUTER SCIENCE • UNIVERSITY OF WISCONSIN – GREEN BAY • MAY 2015

- Coursework in software engineering, object-oriented design, data structures, game engines, and artificial intelligence
- Capstone essay titled "The Many-Minded Machine: A Multi-Agent Approach to Artificial Intelligence," synthesizing concepts from psychology, neurobiology, and computer science
- Significant projects included:
 - Reinforcement-learning AIs for playing tic-tac-toe and maze solving, both utilizing Q-learning (reinforcement learning) algorithms written from scratch in Java
 - A simple 3D platformer game written in Unity, utilizing Blender for low-poly models

B.S. PHILOSOPHY • UNIVERSITY OF WISCONSIN – GREEN BAY • MAY 2015

- Coursework in symbolic and temporal logic, epistemology, consciousness, metaphysics, and causality
- Significant papers included:
 - "In The Fields of Time: An Argument for Persistent Identity and Causality," a rebuttal to Hume, presenting an argument for preservation of identity through relations and a mechanistic account of causality
 - "Last Thursday: A Rebuttal to Moore's Common Sense Argument for Realism," an argument that holds that direct realism arguments for reality are unprovable and untenable
 - "Candle Morality," a project that attempted to construct a socially-positive, life-affirming moral framework from the starting point of Nietzschean nihilism

OTHER EDUCATION

- Parker University, Summer 2021: 6 credits towards an M.S. Neuroscience; coursework in human neurobiology and advanced functional neuroanatomy
- Arizona State University, Summer 2021: 6 credits towards an M.S. Psychology; coursework in research methods and quantitative analysis

TOOLS

C • Java • Python (NumPy, pandas, scikit-learn, TensorFlow) • R • SQL • C# • SAS • Docker • Linux (RHEL 5, RHEL 7, Ubuntu) • Windows (7, 10) • Visual Studio • Eclipse • RStudio • Jupyter Notebook • MySQL • Unity • Unreal • Git (GitHub, GitLab)