Matthew Ernst

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Education

Masters of Science in Computer Science May 2021 - Fall 2021
Colorado State University GPA: 4.0 *Fort Collins, CO*

Bachelor of Science in Biological Systems Engineering December 2018
Iowa State University *Ames, IA*

Research

Sparse Reconfigurable Artificial Neural Systems May 2021 – Present
Dead ReLU Problem, Vanishing Gradient, Late Residual Neural Network *Advisor: Dr. Darrell Whitley*

- Researched underlying structure of ReLU networks and the presence of dead neurons from vanishing gradients.
- Implemented new neural network architecture to mitigate dead neurons named a "Late Residual Neural Network".
- Investigated correlations between learning rates and optimizers to an increased quantity of dead neurons.
- Explored activation functions such as variations of PLU and Hard Sigmoid to improve deep learning.

Experience

Instructor - Introduction To C++ Programming June 2021 – August 2021
Front Range Community College, Department of Computer Science *Fort Collins, CO*

- Developed new course designs with focus on hands on programming through in class work and projects
- Brought software engineering technologies into the course, introducing tools such as Git, GitHub, and testing.
- Fostered learning through multi-week project designing a raytracing engine, showing the capabilities of C++ and giving students a meaningful way to connect to the course.

Graduate Undergraduate Teaching Assistant (Object-Oriented / AI) January 2021 – Present
Colorado State University, Department of Computer Science *Fort Collins, CO*

- Developing new workflow for department scheduling of undergraduate TAs, such as assignments and office hours.
- Designing new labs and assessments for students in an attempt to increase retention across semesters.
- Mentoring team members to promote independence and workplace success within the department.

Projects

Chord - A Peer to Peer System September 2021 – Present

- Created a Python distributed system under Chord protocol for equal workloads and partitioning of data.
- Generated a hashable 16-bit ID space to accurately store up to 64,000 peers and keys in a given ring.
- Built a robust system that will converge a given query in a worst case scenario of $log(n)$ hops away.

Ideal Traffic Sign Images Classification For Convolutional Neural Networks January 2021 – May 2021

- Investigated advanced CNN's such as VGG16 to see ideal images for input for specific traffic sign classifications.
- Developed variations of the VGG16 network utilizing TensorFlow and the Mapillary Traffic Dataset.

King's Corner - A Modern Chess Web App October 2020 – Present

- Wrote top to bottom GraphQL application in Javascript using the Apollo Federation framework and libraries.
- Allows users to play chess in real time using tools such as websockets, all written in semantic React with Apollo.

Technical Qualifications

Languages: Java, Python, C++, C, JavaScript, Prolog, GraphQL, Rust, SQL, NoSQL
Frameworks / Libraries: Tensorflow, PyTorch, OpenCV, Spark, Hadoop, Node, React, Electron, Apollo, Webpack, Jest, JUnit, Maven, Gradle, MongoDB, MySQL
Tools: Linux, Git, Scrum, Docker, Postman, Jenkins, GCP, AWS, Azure, Visual Studio, Serverless
Engineering Principles: Agile Development, Object Oriented Programming, Cloud Computing, Test Driven Development, Unit Testing, Coverage Testing, Continuous Integration/Deployment
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