Andrew McGehee

andrewjmcgehee.us@gmail.com
https://andrewjmcgehee.github.io
+1 (205) 300-0030

EDUCATION

Auburn University // Bachelor of Software Engineering — 2017 - Present
Expected Graduation: December 2020
Cumulative GPA: 4.0 / 4.0

RESEARCH EXPERIENCE

Auburn University — May '18 - Present
Undergraduate Research Assistant

BIOINFORMATICS

- Investigating applications of variational autoencoders and generative adversarial networks (GANs) to synthetically deepen shallow multiple sequence alignment (MSA) inputs in evolutionarily meaningful ways for deep learning models which predict inter-residue distance maps
- Developed an open source 3D protein folding simulator (PolyFold) in Java which allows users to visualize distance-based protein folding processes through highly convergent stochastic optimizations — namely gradient descent and simulated annealing

EVOLUTIONARY COMPUTING

- Investigating applications of genetic programming (GP) in reinforcement learning (RL) agents for tailoring agents to specific adversary classes for cyber defense tasks
- Introduced novel architecture of a closed feedback loop in which GP primitives benefit from RL informed search of future states, and deep Q networks receive evolved GP heuristics as inputs

National Water Center Comet Cooperative Proposal — Jan. '18 - Jan. '20
Software Consultant

OPTIMIZATION & DATA MINING

- Designed and implemented an efficient pipeline in Cython for interpolating the stages of ~2.7 million water catchments with a given discharge for a given range of stream orders
- Built a web scraper in Python for automatically downloading nationwide stream data within a given time interval

PUBLICATIONS & PRESENTATIONS

- *PolyFold: an Interactive Visual Simulator for Distance-Based Protein Folding*
  arXiv:2002.11592
- *PolyFold: Augmenting Human Intuition with Machine Learning for Protein Folding*
  Auburn Student Research Symposium 2019, Oral Presentation

PROFESSIONAL EXPERIENCE

Google
Summer 2019

Software Engineer Intern

WORK

- Integrated black-box hyperparameter optimization tools in C++ into an evaluation pipeline for deep learning computer vision models
- Increased F1 score by 1.5% in initial proof of concept
- Wrote hypothesis testing tools in Python to allow insignificant difference of means to trigger early exit in hyperparameter optimization
- Wrote visualization tools in Python to intuitively demonstrate the progress and relative success of the automated hyperparameter tuning process

PROFESSIONAL DEVELOPMENT

- Delivered live demo and oral presentation to > 100 senior engineers and peers
- Attended weekly mentor meetings with a senior engineer discussing career trajectory, graduate studies, technical skills, and soft skills

Equifax
Summer 2018

Software Engineer Intern

WORK

- Developed 3D augmented reality (AR) web application in JavaScript to facilitate virtual tours for new interns and full time hires
- Developed a microservice in Python which automated the assignment of new employee access privileges, eliminating hours of manual HR labor

HONORS

Awards, Honors, & Scholarships

- Auburn University Undergraduate Research Fellow
- Auburn University Engineering Alumni Council Student Panel (4 / 6000+ selected)
- Auburn University CSSE Business Advisory Council Student Panel (20 / 1000+ selected)
- Auburn University Board of Trustees Scholarship
- Barbara Drummond Thorne Scholarship
- Thomas Goode Jones Scholarship

RELEVANT SKILLS

General Programming Languages

C / C++	●●●●●
Java	●●●●●
JavaScript	●●●○○
Python	●●●●●

Markdown & Scripting Languages

Bash	●●●●○
GitHub Markdown	●●●●●
HTML / CSS	●●●●○
LaTeX	●●●●○

Foreign Languages

German ●●●○○
Russian ●●●○○

Operating Systems

Arch Linux ●●●●○
Debian ●●●●●
Ubuntu ●●●●●

A.I. / Machine Learning & Data Science

TensorFlow, Keras, PyTorch, Sci-kit Learn, Numpy, Scipy, Pandas, R

Soft Skills & Competencies

Leadership, Communication, Accountability to Results, Integrity, Creativity, Delegation

RELEVANT COURSEWORK

Introduction to Evolutionary Computing

Implemented and statistically analyzed evolutionary algorithms, genetic programming, and co-evolution (cooperative and competitive) as applied to NP Hard problems and game A.I.

Introduction to Deep Learning

Implemented SVM, softmax, and neural network classifiers as well as convolutional neural networks from scratch (Numpy only). Designed and now implementing semester long project in which GANs are trained on spectrogram representations of popular songs to generate novel spectrograms from which novel audio may be recovered

Research Methods in Evolutionary Computing

Formulated and executed semester long research proposal in standard NSF format in which the hybridization of GP and RL will be explored for tailoring agents to adversary classes for cyber defense tasks

LEADERSHIP & SERVICE

Auburn A.I. Club

Aug. 2019 - Present

Founder, President

RESPONSIBILITIES & ACHIEVEMENTS

- Devised and taught a 12 week beginner friendly curriculum covering topics including: regression, classification, clustering, neural networks, reinforcement learning, and evolutionary algorithms
- Created interactive, take-home Jupyter notebook exercises as well as "from scratch" (Python and Numpy only) implementations of each topic covered to reinforce concepts
- Delivered 45 minute lectures weekly
- Average weekly attendance: 50

Auburn ACM

Aug. 2018 - Present

President

RESPONSIBILITIES & ACHIEVEMENTS

- Oversaw team of 6 officers responsible for ACM and all sub-clubs: A.I. Club, Ethical Hacking Club, and Auburn Competitive Programming Team
- Increased weekly attendance across sub-clubs from < 50 members to ~150 members

Auburn Competitive Programming Team

Aug. 2017 - Present

Coach, Member

RESPONSIBILITIES & ACHIEVEMENTS

- Delivered biweekly lectures covering problem solving strategies for technical interviews, common algorithms, and data structures to ~30 members
- Placed 3rd out of 86 teams in 2019 ICPC Southeastern Regional — Division II
- Placed 8th out of 82 teams in 2018 ICPC Southeastern Regional — Division II

REFERENCES

Debswapna Bhattacharya, Ph.D.

Auburn University

Assistant Professor, Computer Science & Software Engineering

bhattacharyad@auburn.edu

Daniel Tauritz, Ph.D.

Auburn University

Associate Professor, Computer Science & Software Engineering

dtauritz@auburn.edu

Anh Nguyen, Ph.D.

Auburn University

Assistant Professor, Computer Science & Software Engineering

anhnguyen@auburn.edu

Nels Beckman, Ph.D.

Google

Senior Software Engineer

nbeckman@google.com

Vasil Denchev, Ph.D.

Google

Senior Software Engineer

denchev@google.com

Tom Weng, Ph.D.

Google

Software Engineer

zweng@google.com