Andrew McGehee

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EDUCATION

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

RESEARCH EXPERIENCE

Auburn University

Undergraduate Research Assistant   May '18 - Present

BIOINFORMATICS
- Investigating generative approaches 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
- Applying evolutionary methods to the automated design of novel adaptive resonance theory (ART) algorithms which are highly tailored to specific problem classes.
- Investigating applications of genetic programming (GP) and population based methods for improving training stability in deep reinforcement learning (RL) agents.

National Water Center Comet Cooperative Proposal

Software Consultant   Jan. '18 - Jan. '20

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 Presenter
- *Preparing for Technical Interview with the Big 4*
  Auburn University, Intro to Algorithms Fall 2018 - Guest Lecturer

PROFESSIONAL EXPERIENCE

Google

Software Engineer Intern   Summer 2020

    WORK
- Designed and implemented tools which map BigQuery data to valid AutoML training data for retail forecasting models.
- Designing a data augmentation API which supplements user specified data sets with publicly available data sets which are relevant to forecasting demand.

Software Engineer Intern   Summer 2019

    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

Software Engineer Intern   Summer 2018

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

Foreign Languages
German ●●●○○
Russian ●●●○○

A.I. / Machine Learning & Data Science
PyTorch, Keras, TensorFlow, Sci-kit Learn, Numpy, Scipy, Pandas, R

Operating Systems
Arch Linux ●●●●○
Debian ●●●●●
Ubuntu ●●●●●

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
Founder, President   Aug. 2019 - Present

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

President Aug. 2018 - Present

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

Coach, Member Aug. 2017 - Present

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
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Daniel Tauritz, Ph.D.
Auburn University

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