ALEXANDER B. POWERS

Prospective Ph.D. Candidate in Fall 2020
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EDUCATION

B.S.E. Computer Science and Engineering **05/2020**
The University of Iowa, Iowa City, IA GPA: 3.85/4.0
Graduating with Honors in the Major & University Honors
Minors in Mathematics & French

RESEARCH EXPERIENCE

Undergraduate Research Assistant 12/2017 - Present
ADV: **Prof. Hans Johnson** *SINAPSE Lab*

- Successfully executed two fellowships applying machine learning techniques to medical imaging problems.
- Helped develop a novel **reinforcement learning** system for multiple landmark identification in 3D MRI of the human brain.
- Implemented **deep convolution neural networks** and image preprocessing for tracheal tube segmentation in chest x-ray scans.
- Utilized traditional machine learning techniques to do **active learning** of cerebellum tissue data labels in 3D MRI.

PUBLICATIONS

- Arjit Jain, **Alexander Powers**, Hans J. Johnson "Robust Automatic Multiple Landmark Detection on Missing Data" International Symposium on Biomedical Imaging 2020. (**Accepted with Revisions**)

POSTER PRESENTATIONS

- **Robust Automatic Multiple Landmark Detection in 3D MRI**
  Fall Undergraduate Research Festival, Iowa City, IA 11/2019
- **Data Augmentation for Deep Learning Image Segmentation**
  Spring Undergraduate Research Festival, Iowa City, IA 3/2019
  Engineering Research Open House, Iowa City, IA 3/2019
- **Bootstrapping using Machine Learning to Create Training Datasets for Automatic Cerebellum Segmentation**
  Spring Undergraduate Research Festival, Iowa City, IA 3/2018
  Engineering Research Open House, Iowa City, IA 3/2018

TEACHING EXPERIENCE

Teaching Assistant - ECE:3330 (Intro. to Software Design) 08/2018 - 12/2018
Under **Prof. Guadalupe Canahuate** *&* **Prof. Thomas Casavant** *UIOWA ECE*

- Introduced **eight** new programming assignments spanning topics from object-oriented programming and inheritance to graph algorithms and machine learning.
- Proctored over **50** Oral Exams, in which I evaluated student understanding of key course topics including multi-threading, networking, and polymorphism.

Teaching Assistant - ENGR:2730 (Computers in Engineering) 08/2017 - 05/2018
Under **Prof. Guadalupe Canahuate** *&* **Prof. Hans Johnson** *UIOWA ECE*

- Created an automatic grading script using **BASH**, **CMake**, and **C++** unit testing.
- Held weekly office hours to answer questions and provide direction on design choices, paradigms, and best practices.

STUDENT ORG. & WORK EXPERIENCE

Director of Logistics & Peer Mentor 08/2017 - 05/2019
HackIowa (Student Org), Iowa City, IA

- Arranged free transportation for students to attend hackathons throughout the Midwest.
- Mentored a team of five of my peers in developing their first microservice-based application for stock trading and stock price prediction.

Software Consulting Intern 05/2019 - 08/2019
Pariveda Solutions, Chicago, IL

- Developed mobile and web applications in **Angular.js** for Lumity (501(c)(3)), a Chicagoland non-profit, to track student feedback from educational STEM programs.
- Worked with AWS services for data storage, CI/CD, authentication, and serverless API development.

Full Stack Software Developer 05/2018 - 08/2018
Department of Electrical and Computer Engineering, Iowa City, IA

- Developed a web application to generate questions for the PrairieLearn system, which allowed professors to take a mastery learning approach to teaching.

AWARDS

ICRU Fellowship, Iowa Center for Research by Undergraduates 08/2019 - Present

EE Undergraduate Scholarship, Dep. of Electrical Engineering 08/2019 - Present

Old Gold Scholarship, The University of Iowa 08/2016 - Present

Deans List (6x), The University of Iowa 08/2016 - Present

ICRU Fellowship, Iowa Center for Research by Undergraduates 08/2018 - 05/2019

PROFESSIONAL AFFILIATIONS

The Iowa Initiative for Artificial Intelligence - Member

The Iowa Institute for Biomedical Imaging - Member

Institute of Electrical and Electronics Engineers - Student Member

IEEE Signal Processing Society - Student Member

Tau Beta Pi - Member

RELEVANT PROJECTS

CIFAR100 Multi-Task Learning
Explored different **hard parameter sharing** architectures on the CIFAR100 dataset.

CIFAR10 Transfer Learning
Leveraged a pre-trained VGG19 network to drastically reduce training time and improve classification accuracy on the CIFAR10 dataset.

Categorical Sentiment Classification
Toxic sentiment classification using LSTM, GRU, and CNN architectures.

HackEye Segmentation
Eye and brain tissue segmentation in 3D MRI images using a HighRes3DNet.

Semantic Similarity
K-Means clustering of word vectors to group semantically similar words.

Pneumonia Diagnosis
Binary classification of pneumonia based on patient chest x-rays.

TECHNICAL SKILLS

Programming Languages	Python, C/C++, Java, BASH, MATLAB, Ruby, SQL TypeScript, Node.js, AVR Assembly, Haskell, Agda
Software & Tools	TensorFlow, NumPy, Pandas, Matplotlib, Angular, LaTeX, MongoDB, SimpleITK, Nipype, ITK, Django, CMake, Rails, PyTorch, scikit-learn,
Spoken Languages	English (Native), French (Working Proficiency)

RELEVANT COURSEWORK

Core Courses
Algorithms
Operating Systems
Embedded Systems
Computer Architecture
Programming Language Concepts
Communication Networks
Numerical Analysis

Elective Courses
Deep Learning
Machine Learning
Big Data Analytics
Optimization Techniques (upcoming)
Computational Geometry (upcoming)
Software Engineering Languages and Tools
Multi-Dimensional Image Analysis

REFERENCES

Hans Johnson
Position: Associate Professor, Electrical and Computer Engineering
Institution: The Unversity of Iowa
Relationship: **Research Advisor**, TA Supervisor, and Instructor
Email: hans-johnson@uiowa.edu

Guadalupe Canahuate
Position: Associate Professor, Electrical and Computer Engineering
Institution: The Unversity of Iowa
Relationship: **Academic Advisor** and TA Supervisor
Email: guadalupe-canahuate@uiowa.edu

Thomas Casavant
Position: Professor, Biomedical Engineering,
Institution: The Unversity of Iowa
Relationship: TA Supervisor and Instructor
Email: tom-casavant@uiowa.edu