Geoffrey Aaron Converse

I am a fourth year PhD candidate in the Applied Mathematical and Computational Sciences program at the University of Iowa, and am advised by Dr. Suely Oliveira. My research interests include Educational Data Mining, Machine Learning, Data Science, and Numerical Analysis. Most recently, I have worked on developing parameter estimation techniques in Item Response Theory using Variational Autoencoders, a class of neural networks.

Publications

- Converse, Curi, Oliveira. "Variational Autoencoders for Baseball Player Evaluation." In Proceedings of the Fuzzy Systems and Data Mining Conference (FSDM), 2019.
- Converse, Curi, Oliveira. "Autoencoders for Educational Assessment." In Proceedings of the Conference on Artifical Intelligence in Education (AIED), 2019.
- Curi et. al. "Interpretable Variational Autoencoders for Cognitive Models." In Proceddings of the International Joint Conference on Neural Networks (IJCNN), 2019.
- Bruns et. al. "Modeling the Spread of Palmer Amaranth in Iowa." Iowa Soybean Association Farmer Research Conference, 7 February 2018, Des Moines, Iowa.
- Jiang et. al. "Efficient Nonmyopic Active Search." International Conference on Machine Learning (ICML), August 2017, Sydney, Australia.
- Converse, Grove, Pape. "Maximizing Potential in a Fantasy Football Draft." Joint Mathematics Meetings (JMM), 11 January 2015, San Antonio, Texas.

Awards and Fellowships

Fall 2020	**Graduate College Post-Comprehensive Research Fellowship** University of Iowa Graduate College
Summer 2019	**AMCS Summer Merit Fellowship** University of Iowa Department of Mathematics
Summer 2018	**AMCS Summer Merit Fellowship** University of Iowa Department of Mathematics

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Academic Work

Period	**Summer 2017**	
Employer	**Simpson College**	Indianola, Iowa
Position	**Undergraduate Researcher**	

I worked with a number of students on an interdisciplinary research project to model the spread of Palmer Amaranth, an invasive and noxious weed, throughout Iowa. While some students came from biology or philosophy backgrounds, my role was to quantify the risk of infestation throughout the state. To do this, I analyzed various datasets, both geographic and demographic, and produced a "risk map" of the state of Iowa. This work was presented at the Iowa Soybean Research Days in February, 2018.

Period	**Summer 2016**	
Employer	**Washington University in St. Louis**	St. Louis, Missouri
Position	**Undergraduate Researcher (REU)**	

Advised by Dr. Roman Garnett and Dr. Ben Moseley in the Computer Science department, I researched various Machine Learning techniques for Active Search problems. Our goal was to query a massive chemical database with MatLab to detect potentially useful drugs. We developed new algorithms and extended existing code to broader applications. Graduate students have continued this work, and was presented the NIPS Workshop on Bayesian Optimization in Barcelona, Spain.

Period	**Summer 2014**	
Employer	**Simpson College**	Indianola, Iowa
Position	**Undergraduate Researcher**	

I was a part of the Bryan Summer Research Program with two other students and advised by Dr. Bill Schellhorn. We created a computer program in R designed to select the best fantasy football team from a fantasy football draft. To do this, our program learned what strategies opposing teams were using and predicted future rounds. We presented our research at the Joint Mathematics Meetings in San Antonio in January 2015.

Education

Period	**August 2017 — Current**	
Degree	**PhD (candidate) in Applied Mathematical and Computational Sciences** **Master of Science in Mathematics**	
Adviser	**Suely Oliveira, Department of Computer Science**	
University	**The University of Iowa**	Iowa City, Iowa

Period	**August 2013 — May 2017**	
Degree	**Bachelor of Arts in Mathematics** **Bachelor of Arts in Computer Science** **Minor in History**	
Honors	**Summa Cum Laude, Epsilon Sigma Honor Society**	
GPA	**3.98**	
University	**Simpson College**	Indianola, Iowa

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Teaching

Fall 2019	**MATH 1560**: Multivariable Calculus, Grading TA
Spring 2019	**MATH 1850**: Calculus I, TA
Fall 2018	**MATH 1460**: Calculus for the Biological Sciences, Lead TA
Spring 2018	**MATH 1460**: Calculus for the Biological Sciences, Lead TA
Fall 2017	**MATH 1460**: Calculus for the Biological Sciences, TA
2016 — 2017	**Mathematics Tutor**, Simpson College

Other Work Experience

raggedleftPeric	**Summer 2020**
raggedleftEmpl	**ACT, Inc.**
raggedleftPosit	**Machine Learning Intern**

I worked in the AI/ML research group at ACTNext on a Knowledge Tracing problem, where the goal is to estimate student's concept mastery as they progress through an assessment. Our approach involved using Transformers, a neural network architecture designed for natural language processing. This work was done in Python, using the Tensorflow library.

Period	**Summer 2015**	
Employer	**John Deere Intelligent Solutions Group**	Moline, Illinois
Position	**Software Development Intern**	

As an intern at John Deere ISG in Moline, Illinois, I was part of a team that developed a debugging and support tool for an application used in agricultural equipment. I programmed in Scala and HTML, and used MongoDB to access necessary information.

Skills

Programming Languages	Python, R, MatLab, Java, Scala
Databases	MongoDB, SQL
Other	LaTeX, Vim, Git

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