Rachel Jade Domagalski, PhD

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SUMMARY

Mathematician skilled in data science, social network analysis, graph theory, and combinatorics. Passionate about using data analysis to drive storytelling by translating data and algorithms into meaningful insights for the public. Successful projects in classification, forecasting, network analysis, and data visualization. Looking for opportunities to use analytical skills and creatively problem solve in a collaborative environment with both other scientists and business stakeholders.

EXPERIENCE

The Erdős Institute's Data Science Boot Camp May 2021

- Month long boot camp on data science and machine learning, including supervised learning algorithms for regression and classification, forecasting for time series data, dimensionality reduction, and neural networks.
- Completed a corporate sponsored project with three other participants called "ClassifyMyMeds: Predicting Prior Authorization Approval and Volume", which won 3rd place out of 50 teams.

The Backbone of a Weighted Graph 2018 - 2021

- Designed methods for finding statistically significant edges of weighted graphs, assisting researchers in identifying and predicting important relationships within their datasets. Models allow significant edges to be inferred from bipartite datasets, where true relationships between individuals may be difficult to determine.
- Implemented new and existing network models in the R package `backbone`, which has been downloaded over 14,000 times and is actively used by researchers in social network science, ecology, and geography fields.
- Led professional workshop on `backbone` to scientists from 13 different countries.

Permutation Statistics and Patterns 2020 - 2021

- Found and proved the number of permutations that avoid different sets of length four cyclic patterns, including a cyclic version of the Erdős-Szekeres theorem, found the generating functions for cyclic descents over certain avoidance sets. Proved a bijection between admissible pinnacle sets and ballot numbers.
- Experience collaborating with large research team, coordinating with members virtually in multiple locations.

INVOLVEMENT

American Mathematical Society Graduate Student Chapter 2018 - 2021

- Founded the Student Chapter at Michigan State University, President of organization: 2019 – 2020
- Organized speakers, community events and conference travel for the graduate student community.
- Lead workshops to teach student body how to use Git, GitHub, Zotero, and LaTeX.

Cloud Computing Fellow 2019 - 2020

- Research opportunity including workshops on aspects of cloud-based computing and hands-on support for optimizing research for cloud computing, through Michigan State University's Cyber-Enabled Research group.
- Learned how to use Microsoft Azure and develop cloud-based workflows.

Social Science Data Analytics Member 2019 – 2021

- Member of student engagement program to prepare future data scientists to take on social science questions.
- First place winner and popular vote winner for 2019 data visualization contest.
- Currently authoring a section of "The Handbook of Broader Impacts" on science communication.

SKILLS

Languages & Tools: R, Python, Mathematica, Git, GitHub, LaTeX, Jupyter, Excel, Microsoft Azure Cloud Computing
Analytical Skills: Data Science, Social Network Analysis, Graph Theory, Combinatorics, Linear Algebra, Machine Learning, Generalized Linear Models and Regression, Probability Theory, Data Visualization, Science Communication

EDUCATION

Michigan State University East Lansing, MI
Doctor of Philosophy in Mathematics August 2021
Central Michigan University Mount Pleasant, MI
Master of Arts in Mathematics May 2017
Bachelor of Science in Mathematics, Summa Cum Laude May 2016