Hunter D. Rehm

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Objective

Doctoral candidate in pure mathematics focusing on graph theory with experience in probabilistic network analysis and computer programming.

Education

Ph.D., Mathematical Sciences, University of Vermont - Anticipated Spring, 2023
Featured coursework: Statistical Network Analysis, Probabilistic Combinatorics, Random Networks and Combinatorial Optimization.

B.Sc., Mathematics, Computer Science minor, University of Wisconsin-La Crosse - 2018
Featured coursework: Graph Theory, Probability and Statistics, Software Design, Theory of Computation.

Publications

K. Fallon, C. Giles, H. Rehm, S. Wagner, and N. Warnberg, Rainbow numbers of [n] for $\sum_{i=1}^{k-1} x_i = x_k$, Austral. J. Combin., 77(1), (2019), 1-8.

H. Rehm, A. Schulte, and N. Warnberg, Anti-van der Waerden numbers on graph products, Austral. J. Combin. 73(3), (2018), 486-500.

Publications in Preparation

H. Rehm, M. Matar, P. Rombach, and L. McIntyre, The effect of the Katz parameter on node ranking, with a medical application, (2022). Submitted for peer review.

H. Rehm, P. Rombach, and R. Short, Local Domination Algorithm for Satellite Networks, (2022). Manuscript in progress.

Coding Languages

- Python
- JavaScript
- SageMath
- R
- Java
- Manim (Mathematical Animation)

Teaching

Graduate Teaching Assistant, UVM Department of Mathematics and Statistics, 2018 - May, 2023

- *Instructor of record for 7 courses* (college algebra and calculus) with class sizes in the range 25-50.

Experience

Graduate Student Researcher, UVM, Department of Mathematics and Statistics, 2018 - present

- *Vermont Space Grant Graduate Fellowship.* One of 6 students to receive this Graduate Fellowship at UVM for 2022-2023. Working with Dr. Robert Short at NASA on a Local Domination Algorithm described below.

- *Local Domination Algorithm for Satellite Networks.* Designing and analyzing an algorithm to find a collection of satellites which are critical for the transfer of information in a communication network. Manuscript in Progress.

- *NASA Graph Analysis Intern.* Using measures of centrality developed in network theory to analyze disease progression in order to improve estimates of mission medical risk. Started as a summer intern and invited back in the fall. Manuscript submitted to journal.

Graduate Research

- *Boundary Detection in Random Geometric Graphs.* Developing a new algorithm to find the boundary of a geometric graph embedded in n-dimensional space. Manuscript in progress.

- *Research mentor* to 3 undergraduate students at UWL on projects led by Prof. Nathan Warnberg. Manuscript in progress.

- *Presented at 8 conferences* (all of which were funded) including at NASA HRP Investigators' Workshop Conference and Contagion on Complex Social Systems 2022

Undergraduate Research

Undergraduate Research Assistant, UWL, Department of Mathematics and Statistics, 2015 - 2018

- *Rainbow Numbers.* Studied colorings of $1, \ldots, n$ that guarantee coloring $\sum_{i=1}^{k-1} x_i = x_k$ distinctly. Found the exact number for $k = 3$, proved using the binary expansion of n. Project funded for 15 weeks.

- *Anti-van der Waerden numbers.* Studied the number of colors needed to color the vertices of a graph to guarantee coloring certain patterns distinctly. Proved a new upper bound for graph products. Project funded for 12 weeks.

- *Machine learning for the prediction of the outcome of endovenous laser ablation.* REU held at the California State University, Fresno in summer 2016. Compared a new Bayesian logistic model to existing linear models and showed that it performed better at predicting surgical outcomes using Monte Carlo cross-validation. Project funded for 8 weeks.