

# Center for Science of Information

NSF Science and Technology Center

## Channels Scholar Seminar 2021



Natalie McGuckin  
CSol Channels Scholar  
Undergraduate, Data Mine LLC  
Purdue University

Thursday, March 18  
2:00pm EDT

ONLINE

<https://www.soihub.org>  
See under Events & Activities

### Building Visualization Tools for Mathematical Structure

#### Abstract:

I am conducting research to design a visualization in the area of game theory. This research team includes faculty and colleagues from five universities. We are analyzing the results of over 100 years of computation on Purdue's clusters, resulting in more than 100 Petabytes of data. The goal is to understand the underlying structure of the mathematics for a large game theory problem. We have built a tool where we can pick any three points in the parameter's space of the problem and have our visualization show us the structure of the game in that region. At any  $(x,y,z)$ -coordinate, we can use an interactive "hover" feature that reveals the underlying mathematical structure to the user. We are using D3.js, a JavaScript library, to visualize the data. The visualization approach is crucial because the mathematical structure is recursive. We routinely use the visualization tool to zoom into the space, revealing the fine-grain details of the attributes for the space, in a way that would be impossible without this tool. This research is related to a foundational game theory problem that has been open since the 1960s. By conducting this research, we will further the understanding of this foundational game theory problem.

#### Bio:

Natalie is an undergraduate student pursuing a double major in Data Visualization and Web Programming & Design. On campus, Natalie serves her community as a Resident Assistant. Prior to this role she was the inaugural Chair of the Data Mine Advisory Board. This is her 3rd year participating in the Data Mine Learning Community. In this Learning Community she acts as a Corporate Partner Mentor for the Corporate Partner's cohort. Natalie is most passionate about her research. This is her third year as a Data Science, Mathematical Modeling, and Visualization Researcher. She enjoys learning new tools and techniques to expand her Data Visualization and Data Science skills.



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