

Daily Log

Tuesday September 3

Began the project. Remembered what I wanted to do. Researched J-Link / Mathematica Python Library. Decided to use java because J-Link is older and more refined. Began developing shell code to start my programming.

Thursday September 5

Finished shell code and created functional code to generate basis vectors. The code formats into a string which directly inputs into mathematica. Started plugging in numbers. Found a result of $40/124$ is about .322

Friday September 6

Did more research into how to establish a link between Java and Mathematica. Plugged in more numbers. Found a result of $18/56$ by duplicating 0s. $18/56$ is about .321

Timeline

Date	Goal	Met
8/25	None	N/A
9/2	None	N/A
9/9	Have functional code and plug in numbers	Yes, I have code that works for about 124 distinct vectors by plugging things into Mathematica.
9/16	Find a better algorithm for Maximal Independent Vertex Set and work to establish J-Link	
9/23	Finish implementing J-Link	

Reflection

This week, I tried to build off some of my data from last week. I proved a minimum lower bound on varying amounts of

This week I got started on my project. I got to work in trying to gain some intuition based off trial and error. I plugged in the data set $\{-2, -1, 0, 1, 2\}^3 - \{0\}^3$ to get a result of $\frac{40}{124} \approx .3226$ I later plugged in the data set $\{-1, 0, 0, 1\} - \{0, 0\}^3$ to get a result of $\frac{18}{56} \approx .3218$. From wikipedia, the best known algorithm for Maximum Independent Vertex Set is $\approx O(1.2^n)$, which conveniently puts my maximum for n at around 125.

Therefore, I feel as though I have hit some sort of a ceiling in terms of the capabilities of Mathematica. Regardless, I still plan to implement J-Link both as a learning experience and so that I can try more small sets without having to manually transfer data between the two platforms. Going forward, I will explore other ways to approach the Maximum Independent Vertex Set, or ways to exploit the inherent symmetries in my data sets.