**Bioinformatics 529 Homework 5 | Amelia Lauth | 04/25/22**

**Resources used (Including websites, partners in class, etc.):**

Partners in Class: Crystal Wen, Catherine Barnier, Brad Crone, Elysia Chou, Mahnoor Gondal

Used the code solutions, implementations, and PPTs for class 25 and class 26.

<https://www.programiz.com/python-programming/methods/built-in/locals>

<https://www.geeksforgeeks.org/random-shuffle-function-in-python/>

<https://www.w3schools.com/python/ref_string_split.asp>

<https://www.geeksforgeeks.org/python-get-dictionary-keys-as-a-list/>

<https://stackoverflow.com/questions/930397/how-do-i-get-the-last-element-of-a-list>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2519162/>

**Statement of Objective (What was the purpose of this homework assignment):**

The purpose of this assignment is to build a simulation of Conway’s game of life and adding more complexity to the simulation. Here we included a “predator” that relies solely on the existence of feeder cells to survive. Meanwhile, the feeder cells follow the same rules as the live cells in the Class 25 game of life simulation. The second part of this assignment is exploring the Boolean system stimulation with nodes and updated rules. Here, we are writing a function to read the nodes and rules of the Boolean system from an input file, and then implementing simulation on this Boolean system using asynchronous method for updating the nodes. This method is where we take one node at a time, apply its respective rule to that specific node, carry over the values for the remaining nodes from the previous round, and then continuing this process until each node is visited and its rule has been applied to it. This is very different from the synchronous method where all the nodes were updated simultaneously, and each node’s value relied on the value of the other nodes.

**Procedure (Explain in general terms how you went about implementing the homework assignment):**

I copied class 25 and class 26 solution code and modified the code to complete the specific task for each function in this homework. For the Game of Life section, I had to carefully read the new rules and figure out where to implement those rules within the update\_grid function. I also had to be very careful with the order of values when building the random\_grid function, to ensure that the order of the matrix would be correct. For the Boolean problem, I used Alan’s class\_26 solution code as a skeleton for my code, but I had to review again what asynchronous really meant in this case. Once I figured that out, I had to start making separate dictionaries and lists to keep everything organized. Thus, my code may not be as efficient, but it made clear sense to me since there were several moving pieces and I had to keep track of what was what when comparing them in my if statements and removing certain elements from my lists. I also found it helpful to print while I was programming to make sure what I thought the code was doing was occurring. Furthermore, I copied Alan’s stimulation code from class 26 to run and I got the same output as the doctest in the homework. I took it one step further and adjusted the stimulation code to read in the read\_network function and I added “D” to the initial value dictionary and ran it to see what output I would get. I compared my output with a classmate and got the same output. Thus, I felt more confident in my functions.

**Difficulties and Roadblocks (What were the pain points in the implementation of this homework assignment):**

I had difficulty wrapping my head around what a cycle was in the Boolean stimulation. I drew it out many times to conceptually understand what was going on. I finally realized I was supposed to apply the respective Boolean rule to one node at a time in the shuffled list. I also realized I needed to carry over the original values from the previous column for all the rest of the nodes in that certain column. I then knew I had to ultimately compare two characters with an if condition and move forward with filling in the matrix based on the condition and rules. After that concept clicked, it was somewhat straightforward to code.