CS-575 Parallel Programming

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Project Name: #Project-3

1) **What's your own-choice quantity was and how it fits into the simulation.**

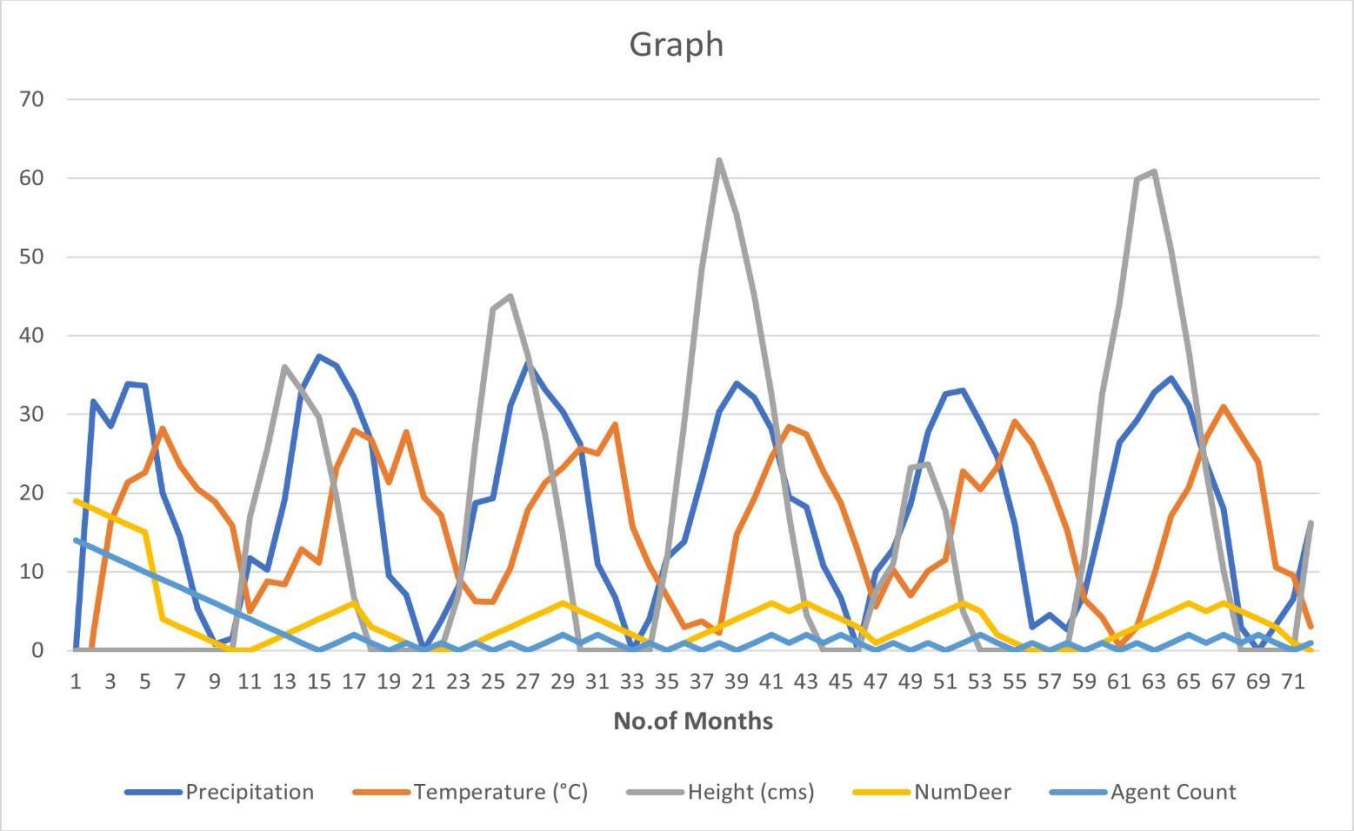
I have taken the agent_count as my own-choice quantity in the given program which kills the deer and also consumes the grain in the given conditions of time. This fits into the simulation as the number of deer count depends on the variable agent_count because my agents will eat the deer and the grain height depends on the number of deer and number of agents as they both consume the grain so the height of the grain will decrease.

2) **A table showing values for temperature, precipitation, number of deer, height of the grain, and your own-choice quantity as a function of month number.**

Year	Months	Precipitation	Temperature (°C)	Height (cms)	NumDeer	Agent Count
2022	1	0	-17.777778	0	19	14
2022	2	31.599428	2.148497	0	18	13
2022	3	28.507027	16.397667	0	17	12
2022	4	33.867993	21.35846	0	16	11
2022	5	33.633952	22.610686	0	15	10
2022	6	20.041039	28.200658	0	4	9
2022	7	14.435191	23.521368	0	3	8
2022	8	5.331507	20.562464	0	2	7
2022	9	0.802143	18.917999	0	1	6
2022	10	1.53447	15.850343	0	0	5
2022	11	11.720782	5.018692	16.922873	0	4
2022	12	10.292239	8.812353	25.572027	1	3
2023	1	19.233373	8.40399	35.999954	2	2
2023	2	33.11091	12.837986	33.046711	3	1
2023	3	37.362649	11.172121	29.652047	4	0
2023	4	36.156795	23.196695	19.492262	5	1
2023	5	32.244541	27.99483	6.792262	6	2
2023	6	26.53269	26.792861	0	3	1
2023	7	9.554208	21.39164	0	2	0
2023	8	7.096505	27.789052	0	1	1
2023	9	0	19.533619	0	0	0
2023	10	3.764805	17.161681	0.058652	0	1
2023	11	8.210198	9.134191	7.149343	0	0
2023	12	18.746196	6.267505	26.314276	1	1
2024	1	19.365414	6.171754	43.388887	2	0
2024	2	31.075669	10.456376	45.051281	3	1
2024	3	36.563277	17.856522	37.486748	4	0
2024	4	33.119548	21.359982	27.32871	5	1
2024	5	30.370733	23.186467	14.628962	6	2

2024	6	26.264388	25.686073	0	5	1
2024	7	11.05047	25.000593	0	4	2
2024	8	6.804138	28.731969	0	3	1
2024	9	0	15.67844	0	2	0
2024	10	4.031839	10.784416	0	1	1
2024	11	11.789087	6.88591	11.601466	0	0
2024	12	13.845674	2.98819	28.95419	1	1
2025	1	21.854611	3.754489	48.489986	2	0
2025	2	30.346869	2.258369	62.262014	3	1
2025	3	33.92399	14.743777	55.298994	4	0
2025	4	32.17774	19.269604	45.156192	5	1
2025	5	28.158034	24.559182	32.456236	6	2
2025	6	19.528424	28.441374	17.216236	5	1
2025	7	18.2037	27.488467	4.516237	6	2
2025	8	10.772506	22.767245	0	5	1
2025	9	6.732917	18.774626	0	4	2
2025	10	0	12.538552	0	3	1
2025	11	9.996423	5.601565	7.533595	1	0
2025	12	12.90449	10.246879	11.022249	2	1
2026	1	18.629816	6.973883	23.24813	3	0
2026	2	27.758608	10.091203	23.694176	4	1
2026	3	32.572227	11.512994	17.716259	5	0
2026	4	33.030554	22.74626	5.016663	6	1
2026	5	28.978565	20.498127	0	5	2
2026	6	24.601415	23.31941	0	2	1
2026	7	16.059291	29.109374	0	1	0
2026	8	3.000438	26.238064	0	0	1
2026	9	4.512217	21.311429	0.001154	0	0
2026	10	2.672361	15.300034	0.226662	0	1
2026	11	7.279772	6.485575	12.233441	0	0
2026	12	16.605503	4.216826	32.476821	1	1
2027	1	26.437723	0.598109	44.068008	2	0
2027	2	29.255421	2.965082	59.798162	3	1
2027	3	32.842254	9.659044	60.871139	4	0
2027	4	34.639184	17.111717	50.821743	5	1
2027	5	31.195283	20.702159	38.125885	6	2
2027	6	23.7885	27.016144	22.885887	5	1
2027	7	17.992496	30.950809	10.185887	6	2
2027	8	2.966731	27.350464	0	5	1
2027	9	0	23.914354	0	4	2
2027	10	3.259311	10.535956	0	3	1
2027	11	6.539939	9.536482	0	1	0
2027	12	16.014776	3.084573	16.242863	0	1

3) **A graph showing temperature, precipitation, number of deer, height of the grain, and your own-choice quantity as a function of month number. Note: if you change the units to °C and centimeters, the quantities might fit better on the same set of axes.**



4) **A commentary about the patterns in the graph and why they turned out that way. What evidence in the curves proves that your own quantity is actually affecting the simulation correctly?**

The grain height is dependent on the population of deer and the count of agent as they are the main sources of consumption of grain. It also depends on the precipitation and the temperature which is a primary factor for the growth.

The temperature and precipitation are generated by using the random value generator functions ranf and rand given in the code using sine and cosine patterns.

From the graph, as the number of deer increases the height of the grain decreases because of the consumption.

I have written the condition in the code where if the month number is in between 34 and 44 or 58 and 68 the height of the grain is increased more than the other months depending on the decrease of number of agents and deer.

Because of this agent count the grain height is modified which made an impact on the simulation.