

Project #3: Functional Decomposition

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

I use Wolf as my selection quantity. I control it by two limits. The number of tigers and deer. The first restriction is that if the number of wolves is less than one-half of the number of deer, the number of wolves will increase because wolves can prey on more deer. On the contrary, the number of wolves will decrease. The second restriction is that the number of wolves is greater than or equal to 2. If 2 wolves are a pack, then the pack will capture a deer and the deer will reduce the number of wolves. Otherwise, wolves do not have the ability to capture deer, so the number of deer remains the same.

```
void Wolf(){
    float NextWolf = 1;
    if (NowNumWolf < NowNumDeer/2) {
        NextWolf = NowNumWolf + 1;
    }
    else {
        NextWolf = NowNumWolf - 1;
    }
    if (NextWolf < 1) {
        NextWolf = 1;
    }
    #pragma omp barrier
    NowNumWolf = NextWolf;
    #pragma omp barrier
}
```

```
if (NowNumWolf >= 2) {
    NextNumDeer = NextNumDeer - NowNumWolf ;
}
else{
    NextNumDeer = NextNumDeer + 0;
}
```

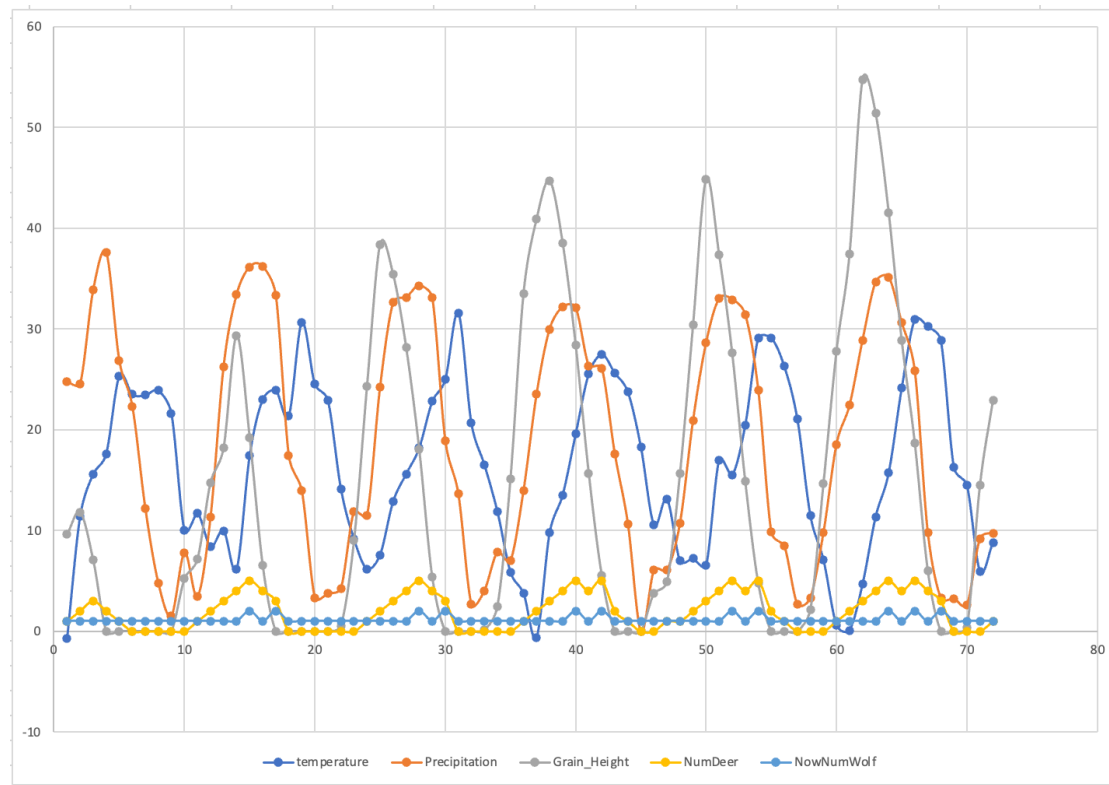
2.A table showing values for temperature, precipitation, number of deer, height of the grain, and your own-choice quantity as a function of month number.

	monthid	temperature	Precipitation	Grain_Heigh	NumDeer	NowNumWol
	1	-0.727	24.768	9.604	1	1
	2	11.417	24.563	11.791	2	1
	3	15.607	33.868	7.072	3	1
	4	17.63	37.578	0	2	1
	5	25.325	26.873	0	1	1
	6	23.521	22.324	0	0	1
	7	23.438	12.163	0	0	1
	8	23.899	4.747	0	0	1
0	9	21.602	1.534	0.001	0	1
L	10	10	7.776	5.198	0	1
2	11	11.688	3.46	7.178	1	1
3	12	8.404	11.345	14.765	2	1
4	13	9.962	26.279	18.2	3	1
5	14	6.191	33.418	29.324	4	1
5	15	17.445	36.157	19.244	5	2
7	16	23.014	36.189	6.544	4	1
3	17	23.917	33.365	0	3	2
9	18	21.392	17.443	0	0	1
0	19	30.665	13.928	0	0	1
L	20	24.515	3.302	0	0	1
2	21	22.913	3.765	0	0	1
3	22	14.115	4.266	0.553	0	1
4	23	9.143	11.914	8.986	0	1
5	24	6.172	11.477	24.353	1	1
5	25	7.581	24.244	38.4	2	1
7	26	12.876	32.619	35.428	3	1
3	27	15.608	33.12	28.175	4	1
9	28	18.205	34.315	18.059	5	2
0	29	22.81	33.096	5.359	4	1
L	30	25.001	18.939	0	3	2
2	31	31.608	13.636	0	0	1
3	32	20.659	2.686	0.002	0	1
4	33	16.536	4.032	0.101	0	1

	34	11.867	7.845	2.48	0	1
	35	5.864	7.014	15.161	0	1
	36	3.754	13.966	33.542	1	1
	37	-0.617	23.515	40.914	2	1
	38	9.763	29.98	44.684	3	1
	39	13.518	32.178	38.542	4	1
	40	19.578	32.102	28.395	5	2
	41	25.566	26.36	15.695	4	1
	42	27.488	26.093	5.535	5	2
	43	25.643	17.604	0	2	1
	44	23.756	10.677	0	1	1
	45	18.29	0	0	0	1
	46	10.583	6.052	3.775	0	1
	47	13.123	6.073	4.892	1	1
	48	6.974	10.741	15.668	1	1
	49	7.215	20.927	30.409	2	1
	50	6.532	28.628	44.861	3	1
	51	16.995	33.031	37.368	4	1
	52	15.517	32.923	27.602	5	2
	53	20.444	31.433	14.908	4	1
	54	29.109	23.948	4.748	5	2
	55	29.114	9.832	0	2	1
	56	26.292	8.457	0	1	1
	57	21.052	2.672	0	0	1
	58	11.467	3.335	2.175	0	1
	59	7.093	9.774	14.65	0	1
	60	0.598	18.549	27.811	1	1
	61	0.089	22.424	37.467	2	1
	62	4.678	28.898	54.778	3	1
	63	11.36	34.639	51.411	4	1
	64	15.721	35.14	41.571	5	2
	65	24.14	30.62	28.871	4	1
	66	30.951	25.881	18.711	5	2

	67	30.226	9.799	6.011	4	1
	68	28.895	3.272	0	3	2
	69	16.287	3.259	0	0	1
	70	14.517	2.596	0.381	0	1
	71	5.96	9.183	14.497	0	1
	72	8.809	9.753	22.934	1	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.



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?

As you can see from the graph, there are roughly 6 peaks, representing the 6 years of the simulation, i.e., 2022 to 2027, and the temperature and rainfall will change with the month of each year, while the grain height will change with the temperature and rainfall. And the number of deer changes with the height of grain (food for deer), when more food is available, the number of deer will increase while the number of deer increases, the number of wolves will also increase. On the other hand, when the number of tigers increases, the number of deer starts to decrease, which proves that my simulation of the first problem is correct.