April James

CS475 Parallel Programming

Assignment 3: Functional Decomposition

Tourists in Nara: A Super Tiny Simulation

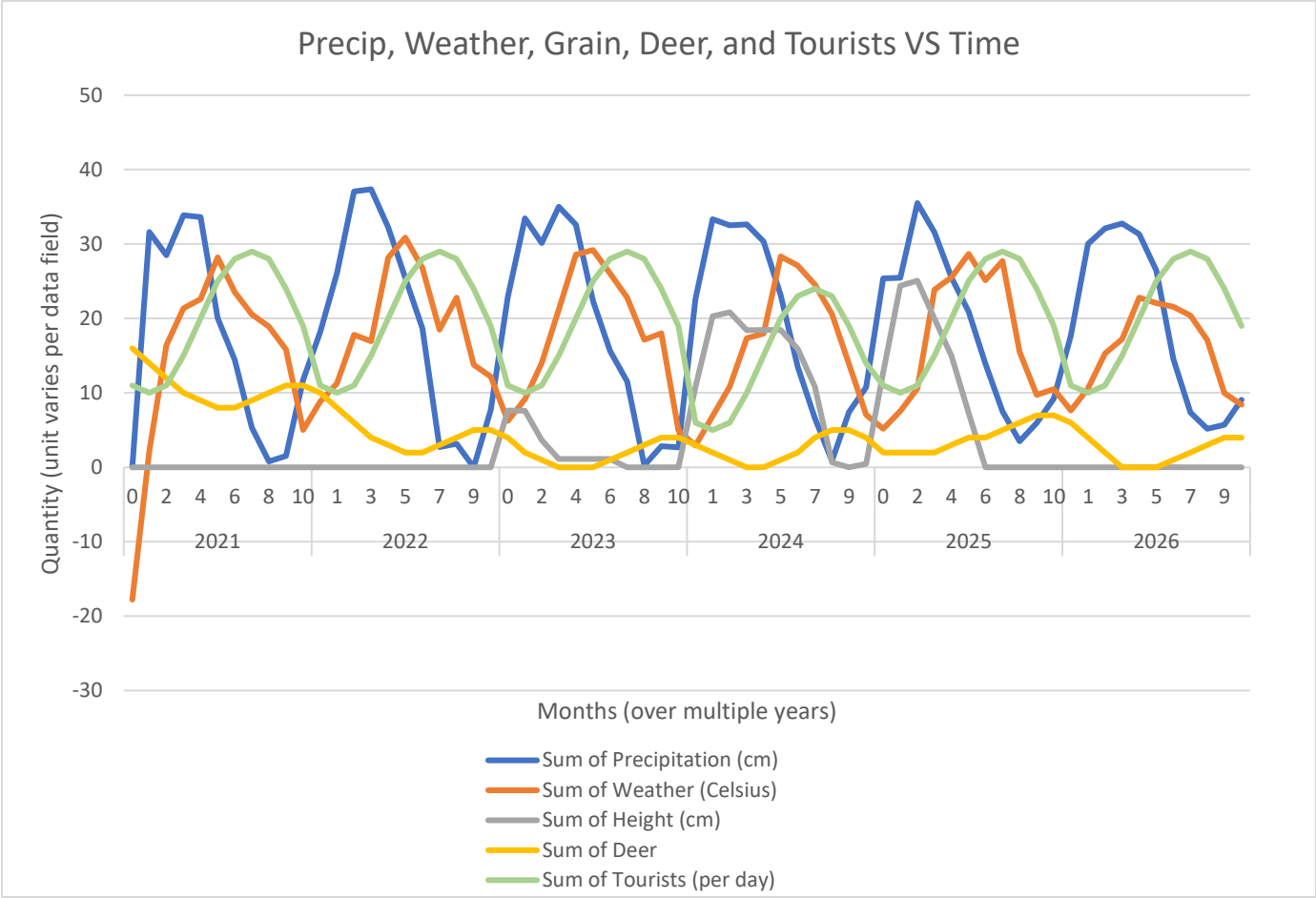
1. Data of choice: the number of tourists that visit the park per day. In my simulation, I'm imagining this location to be modern Nara, Japan, where semi-wild deer roam freely and are more common than people in some parks. This simulation tracks a small park, and keeps statistics on the average daily number of visitors each month. These tourists are provided with deer snacks upon entrance to the park, and feed the deer lots of food as they visit. Tourists are more prevalent during the warm, summer and fall season, and drop off in the winter. Unfortunately, in most Asian cultures, the number 4 is unlucky, and many people forgo large decisions such as travelling. Therefore, we see a dip in population at year 2024, which picks back up again the next year.
   Unfortunately, the deer became codependent with the tourist appearances, since they provide more delicious treats than the grain (even though it tastes good too). If there are more than around 20 tourists a day, the deer population will increase by either 1 or two, depending on the number of people. If there are less than 20, the deer population will decrease on a similar scale.

2. Table of data

| Row Labels | Sum of Precipitation (cm) | Sum of Weather (Celsius) | Sum of Height (cm) | Sum of Deer | Sum of Tourists (per day) |
|---|---|---|---|---|---|
| **2021** | **181.4734648** | **156.809** | **0** | **118** | **220** |
| 0 | 0 | -17.77777778 | 0 | 16 | 11 |
| 1 | 31.599378 | 2.1485 | 0 | 14 | 10 |
| 2 | 28.506928 | 16.39766667 | 0 | 12 | 11 |
| 3 | 33.868106 | 21.35844444 | 0 | 10 | 15 |
| 4 | 33.633918 | 22.61066667 | 0 | 9 | 20 |
| 5 | 20.0410318 | 28.20066667 | 0 | 8 | 25 |
| 6 | 14.435201 | 23.52138889 | 0 | 8 | 28 |
| 7 | 5.3315108 | 20.56244444 | 0 | 9 | 29 |
| 8 | 0.80214216 | 18.918 | 0 | 10 | 28 |
| 9 | 1.53446988 | 15.85033333 | 0 | 11 | 24 |
| 10 | 11.7207792 | 5.018666667 | 0 | 11 | 19 |
| **2022** | **208.5166518** | **207.9626111** | **0** | **52** | **220** |
| 0 | 18.1810406 | 8.812333333 | 0 | 10 | 11 |
| 1 | 26.065226 | 11.27977778 | 0 | 8 | 10 |
| 2 | 37.055298 | 17.81894444 | 0 | 6 | 11 |
| 3 | 37.362638 | 16.92366667 | 0 | 4 | 15 |
| 4 | 32.21228 | 28.17766667 | 0 | 3 | 20 |
| 5 | 25.4127 | 30.87061111 | 0 | 2 | 25 |
| 6 | 18.6438794 | 26.79283333 | 0 | 2 | 28 |
| 7 | 2.7222958 | 18.51588889 | 0 | 3 | 29 |
| 8 | 3.1520892 | 22.80805556 | 0 | 4 | 28 |
| 9 | 0 | 13.78211111 | 0 | 5 | 24 |
| 10 | 7.7092048 | 12.18072222 | 0 | 5 | 19 |
| **2023** | **209.5348311** | **197.3866111** | **23.37212979** | **21** | **220** |
| 0 | 22.9309168 | 6.258444444 | 7.6550012 | 4 | 11 |
| 1 | 33.466786 | 9.143277778 | 7.601331 | 2 | 10 |
| 2 | 30.141672 | 14.0285 | 3.6471098 | 1 | 11 |
| 3 | 35.019996 | 21.18888889 | 1.10935262 | 0 | 15 |
| 4 | 32.618934 | 28.58905556 | 1.10935262 | 0 | 20 |
| 5 | 22.343237 | 29.21672222 | 1.10935262 | 0 | 25 |
| 6 | 15.6500322 | 26.06222222 | 1.1093577 | 1 | 28 |
| 7 | 11.543665 | 22.81027778 | 0 | 2 | 29 |
| 8 | 0.27416252 | 17.14383333 | 0 | 3 | 28 |
| 9 | 2.8597352 | 17.99944444 | 0 | 4 | 24 |
| 10 | 2.6856944 | 4.945944444 | 0.031272226 | 4 | 19 |
| **2024** | **213.8562042** | **177.5492222** | **135.232521** | **27** | **165** |
| 0 | 22.6969574 | 2.927666667 | 10.8503212 | 3 | 6 |
| 1 | 33.341818 | 6.885888889 | 20.3204572 | 2 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 32.51073 | 10.84494444 | 20.8457292 | 1 | 6 |
| 3 | 32.630872 | 17.36277778 | 18.400268 | 0 | 10 |
| 4 | 30.346904 | 17.97183333 | 18.4588404 | 0 | 15 |
| 5 | 23.1476804 | 28.35205556 | 18.4588404 | 1 | 20 |
| 6 | 13.5126222 | 27.12633333 | 15.9188404 | 2 | 23 |
| 7 | 6.6054224 | 24.55916667 | 10.8388658 | 4 | 24 |
| 8 | 0.86331044 | 20.58461111 | 0.68081652 | 5 | 23 |
| 9 | 7.4273918 | 13.88016667 | 0 | 5 | 19 |
| 10 | 10.7724956 | 7.053777778 | 0.45954188 | 4 | 14 |
| **2025** | **204.3839702** | **190.0020556** | **104.4545536** | **44** | **220** |
| 0 | 25.3980188 | 5.166333333 | 12.7767842 | 2 | 11 |
| 1 | 25.448514 | 7.557555556 | 24.3962682 | 2 | 10 |
| 2 | 35.493452 | 10.58255556 | 25.0752864 | 2 | 11 |
| 3 | 31.56966 | 23.85516667 | 19.995388 | 2 | 15 |
| 4 | 25.461722 | 25.56311111 | 14.9154134 | 3 | 20 |
| 5 | 20.9267044 | 28.68044444 | 7.2954134 | 4 | 25 |
| 6 | 13.9071096 | 25.12127778 | 0 | 4 | 28 |
| 7 | 7.5335384 | 27.72722222 | 0 | 5 | 29 |
| 8 | 3.4815526 | 15.51716667 | 0 | 6 | 28 |
| 9 | 5.9363102 | 9.711111111 | 0 | 7 | 24 |
| 10 | 9.2273882 | 10.52011111 | 0 | 7 | 19 |
| **2026** | **212.2288364** | **173.0692222** | **0.004573572** | **26** | **220** |
| 0 | 17.7211482 | 7.648833333 | 0 | 6 | 11 |
| 1 | 30.009338 | 10.57894444 | 0 | 4 | 10 |
| 2 | 32.113728 | 15.30005556 | 0 | 2 | 11 |
| 3 | 32.776668 | 17.21805556 | 0 | 0 | 15 |
| 4 | 31.326328 | 22.80605556 | 0.000390261 | 0 | 20 |
| 5 | 26.437844 | 22.06311111 | 0.001368433 | 0 | 25 |
| 6 | 14.5347182 | 21.55433333 | 0.002814879 | 1 | 28 |
| 7 | 7.3452482 | 20.39155556 | 0 | 2 | 29 |
| 8 | 5.1977544 | 17.11172222 | 0 | 3 | 28 |
| 9 | 5.6982614 | 9.969666667 | 0 | 4 | 24 |
| 10 | 9.0678 | 8.426888889 | 0 | 4 | 19 |

3. Graph




4. Commentary

As seen from the graph, the carrying capacity of grain no longer guides the rise and fall of deer population, due to the deer's livelihood being overran by food-bearing tourists. Because of this, deer have started to control the height of the grain instead- the more deer, the lower the grain height because they continue to munch grain even though tourists are feeding them food. When tourists rise, deer levels rise as well, showing a correlation between their offerings and deer population. Surprisingly, the population dip in 2024 did not seem to affect the deer dramatically. This is likely due to the high presence of grain during this period of time.