

Cody Malick
CS 475
Assignment 4

1. My own twist on this assignment was adding aliens! Essentially, there is a one in three chance, given more than one deer, you can attract aliens with your graindeer. If you are unlucky enough to attract these aliens, then the aliens will eat a graindeer! If the aliens eat all the graindeer, then the aliens starve to death!

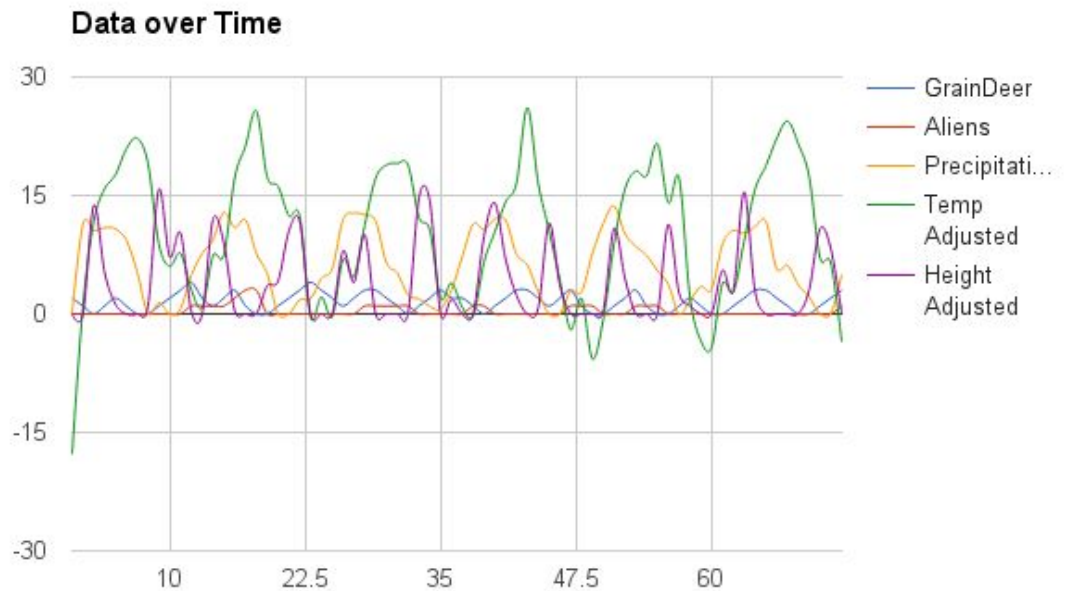
2.

| Month | GrainDeer | Aliens | Precipitation | Temp Adjusted | Height Adjusted |
|-------|-----------|--------|---------------|---------------|-----------------|
| 1 | 2 | 0 | 0 | -17.77777778 | 0 |
| 2 | 1 | 0 | 11.375037 | 0.9697344444 | 0 |
| 3 | 0 | 0 | 10.58576 | 11.69809333 | 13.72756208 |
| 4 | 1 | 0 | 10.906654 | 15.85609444 | 5.25790414 |
| 5 | 2 | 0 | 10.758124 | 17.60559944 | 1.21687082 |
| 6 | 1 | 0 | 9.361834 | 20.88141111 | 0 |
| 7 | 0 | 0 | 5.316273 | 22.24041833 | 0 |
| 8 | 0 | 0 | 0 | 19.04528278 | 1.00072952 |
| 9 | 1 | 0 | 1.421152 | 8.845007222 | 15.77971444 |
| 10 | 2 | 0 | 0 | 6.023614444 | 7.22356188 |
| 11 | 3 | 0 | 0.630386 | 7.686865 | 10.26606532 |
| 12 | 4 | 1 | 4.897646 | 3.035403333 | 0.3598164 |
| 1 | 2 | 1 | 7.650063 | 0.7958494444 | 0 |
| 2 | 1 | 1 | 9.412707 | 7.396314444 | 11.979529 |
| 3 | 2 | 1 | 12.875211 | 7.421400556 | 8.9412191 |
| 4 | 3 | 2 | 10.928814 | 17.22609389 | 0.39545006 |
| 5 | 1 | 3 | 11.918747 | 21.27590611 | 0 |
| 6 | 0 | 3 | 7.656896 | 25.72503389 | 0 |
| 7 | 0 | 0 | 5.099993 | 17.31266444 | 3.56410514 |
| 8 | 1 | 0 | 0.014045 | 16.177775 | 4.12367984 |
| 9 | 2 | 0 | 0 | 12.40578556 | 10.48267398 |
| 10 | 3 | 0 | 1.813277 | 12.35350056 | 11.71142184 |
| 11 | 4 | 0 | 1.9164 | -0.4493427778 | 0 |
| 12 | 3 | 0 | 4.497229 | 2.159142222 | 0 |
| 1 | 2 | 0 | 5.710035 | -0.3813255556 | 0 |

| | | | | | |
|----|---|---|-----------|---------------|-------------|
| 2 | 1 | 0 | 11.965879 | 6.941426667 | 7.9727679 |
| 3 | 2 | 0 | 12.749693 | 4.727492778 | 3.9647749 |
| 4 | 3 | 1 | 12.547001 | 11.25408611 | 10.03884962 |
| 5 | 3 | 1 | 11.762941 | 17.19123611 | 0 |
| 6 | 2 | 1 | 6.468787 | 18.84736778 | 0 |
| 7 | 1 | 1 | 5.193765 | 19.06984556 | 0 |
| 8 | 0 | 1 | 2.386576 | 18.84163333 | 0.14649196 |
| 9 | 1 | 0 | 1.900324 | 12.20421056 | 14.67456044 |
| 10 | 2 | 0 | 0.941319 | 10.62164333 | 14.26634942 |
| 11 | 3 | 0 | 0.620659 | 1.948712778 | 0 |
| 12 | 2 | 0 | 3.037727 | 3.935580556 | 1.84349644 |
| 1 | 2 | 0 | 7.280728 | 0.8350544444 | 0 |
| 2 | 1 | 1 | 11.386649 | -0.289415 | 0 |
| 3 | 0 | 1 | 10.699982 | 6.535716667 | 9.77377014 |
| 4 | 1 | 0 | 12.02133 | 10.389485 | 14.07115042 |
| 5 | 2 | 0 | 11.869856 | 14.18571056 | 6.89127146 |
| 6 | 3 | 0 | 7.534691 | 16.57779278 | 2.34510326 |
| 7 | 3 | 0 | 6.187101 | 26.11863889 | 0 |
| 8 | 2 | 0 | 2.756443 | 16.55883389 | 0.72854312 |
| 9 | 1 | 0 | 0 | 10.58865889 | 11.47850638 |
| 10 | 2 | 0 | 0 | 4.284375556 | 3.64922308 |
| 11 | 3 | 1 | 2.93124 | -2.018129444 | 0 |
| 12 | 1 | 1 | 2.745206 | 1.990505 | 0 |
| 1 | 0 | 1 | 7.639168 | -5.704406111 | 0 |
| 2 | 0 | 0 | 11.433832 | -0.7449383333 | 0.35902646 |
| 3 | 1 | 0 | 13.665175 | 8.863830556 | 10.82904616 |
| 4 | 2 | 0 | 10.169477 | 15.76171 | 4.55505058 |
| 5 | 3 | 1 | 8.555569 | 18.08130056 | 0 |
| 6 | 1 | 1 | 7.398597 | 17.45090056 | 0 |
| 7 | 0 | 1 | 5.469409 | 21.54716056 | 0 |
| 8 | 0 | 0 | 3.757334 | 14.05459944 | 11.34368826 |
| 9 | 1 | 0 | 0 | 17.20860778 | 2.63259824 |
| 10 | 2 | 0 | 1.686604 | 2.169316667 | 1.04358186 |
| 11 | 1 | 0 | 3.449635 | -3.366055 | 0 |

| | | | | | |
|----|---|---|-----------|--------------|-------------|
| 12 | 0 | 0 | 3.099613 | -4.283929444 | 0 |
| 1 | 0 | 0 | 8.831695 | 3.856676111 | 5.52139612 |
| 2 | 1 | 0 | 10.56036 | 2.726425556 | 2.9728414 |
| 3 | 2 | 0 | 10.194116 | 9.206316111 | 15.42801334 |
| 4 | 3 | 0 | 11.012735 | 15.73458778 | 2.90577524 |
| 5 | 3 | 0 | 11.753096 | 18.71197611 | 0 |
| 6 | 2 | 0 | 5.694598 | 22.164845 | 0 |
| 7 | 1 | 0 | 6.148592 | 24.43516222 | 0 |
| 8 | 0 | 0 | 3.675096 | 21.53493667 | 0 |
| 9 | 0 | 0 | 2.138828 | 17.35761444 | 3.02999648 |
| 10 | 1 | 0 | 0 | 7.093772778 | 10.78277752 |
| 11 | 2 | 0 | 0.065337 | 6.464911667 | 8.26058038 |
| 12 | 3 | 1 | 4.965006 | -3.532019444 | 0 |

3.



4. So the temperature is as we expect it to behave, a sinusoid with some randomness introduced to it. The precipitation is the same (the green line). The grain growth increases, but then the deer population increases. Sometimes, the deer population gets killed off by aliens. Height adjusted is the representation of the grain height converted to

cm. You can see the alien population never really grows beyond three, as the deer population has to still exist in order for it to grow. But if the height of the grain is dropping, then the number of graindeer is also dropping, leading to the rapid extinction of the aliens.