Assignment One - COMP 3710
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Virus

The first model I decided to explore was the “Virus” model found under Biology. This model represented how a virus can spread throughout humanity with many scalable factore. The most interesting part of the model to me was that no matter how hard you would make it for humanity to survive, there was a balance that would form between infected and cured. Within the Things to Try section, modelling the ebola virus was very eye opening and surprising considering how dangerous the virus is represented in the world today to spread but realistically, is not a large widespread threat. This model showcased how complex even simple things can be such as a virus.

Fire

The second model that I reviewed was the “Fire” model under Environmental Science which represented the spread of fire through a varying density forest. The slider given was a tree density slider which had a crazy effect on the fire pattern. At about 50% density it n=could never burn to the other side of the screen but at anything above 75% it was almost a guarantee. In the Things to Try section, the fire has a 50/50 chance to burn all the way across the screen at a 59% density which was very interesting to me; why would the burn not be a 50/50 burn at 50% density? This curiosity led me to read a research paper about the Effects of Wind and Tree Density fire patterns (https://www.tandfonline.com/doi/full/10.1080/21580103.2016.1262793) which shows that true critical point for burning is a 45% density when factoring in the wind. Overall this model was generally accurate without counting wind speeds and led me to learn a bit more about a natural disaster that happens more and more frequent in today's climate.

Traffic Basic

The final model that I worked with and did the Extending the Model section was the “Traffic Basic” model. This model outlines how a traffic jam can simply start from just deceleration and acceleration patterns and not any single traffic accident/event. As someone that drives every single day, and has had countless traffic jams, this model immediately grasped my interest. After lots of playing around with the model I found that at medium settings (cars, deceleration, and acceleration all at midway within their sliders) the red car would never exceed a speed of 0.5 and their would constantly be a stop. However, when the time for deceleration was decreased, and only when it was decreased, was when the red car could achieve its max speed and consistently keep it without stopping. This shows that there is a direct correlation between the amount of time stopped and how intense the traffic jam becomes.

The first section of Extending the Model was to try adding different rules or a sense of randomness to the stopping and speeding up capabilities of the drivers, since each driver is not identical in the real world (and even the same driver will have varying acceleration/deceleration rates). After adding in a random float value to the deceleration and acceleration value, it shows that in a real world situation, it is impossible to avoid a traffic jam every time. There is no real solution to get rid of these seed based traffic jams since a single random slow down can have such a ripple effect, especially when the drivers vary. Obviously to minimize the chance of traffic jams happening the best bet would be to decrease the time in which it takes people to decelerate, but adding in alternative routes to decrease the amount of people or increase acceleration rates when drivers present is low would also help. It would also be very difficult to to encode the different driving habits and response times from driver to driver, although it would be possible with strict rules around randomization.In the model submitted, I created a two lane traffic problem, assuming two lane traffic meant including oncoming traffic (eg. northbound and southbound traffic).