**Establishing the model**

**The virtual space**

Initially we establish a square plane of variable dimension, initially we will set this dimension to extend to 50 in all positive and negative x and y dimensions.

Now we establish a function that will generate ‘food’ sources randomly spaced within our plane. The number of food sources we will allow to vary and controlling this number will become crucial in our later experiments.

**The Organism**

Now we will establish a single unit, this will act as our species of the experiment and for now we will define it with 4 parameters, its x & y coordinates in our 2 dimensional world, the number of food sources it has consumed on a certain day, and the amount of energy it has remaining.

All specimens will start the simulation in the centre of the defined world and then retain their exact coordinates from that point on. The movement of each specimen will be completely random and defined by a random walk Monte Carlo method. Each specimen will start each day with a food value of 0 and then increase by consuming a food source. All specimens will begin with a set energy value, and by moving one X & Y coordinate, will lose one point of energy. When their energy level reaches 0 they can no longer move. The initial energy level of each specimen can be seen as the number of moves we allow our species to have in a specific day. We set the initial energy level to 100.

**Duplication parameters**

If our specimen manages to find 1 food within the day, it will be able to survive onto the next day. If it does not find any food, it will die and be removed from the simulation for the next day

Organism Attributes

Speed

Sight Range

Applying Constraints

If we now run our simulation we can see that the species inside our world When our population reaches above a certain point, the population will grow exponentially with nothing to constrain it. To account for this, we will add a constraint related to the speed variable. We will impose a relationship of as this closely resembles the relationship between velocity and kinetic energy

Now we have established

We have now successfully developed a basic machine learning model

The model takes

Speed

Size (eating, hiding, energy)

Sight range

Eating on dead nuggets. Going off, intelligence

Conclusion

While the application of this project is only arbitrary.