Evolution Design

* Each step of evolution will involve a ‘generation’ of creatures
* Each creature will be an object, which holds a neural net (i.e a set of weight values by which to multiply the inputs to get the outputs), a current amount of energy, a current size, and a current movement speed
* Each generation of creatures will compete to survive for the most time.
* Each creature starts with 1000 energy, and loses 1 energy per tick of the logic thread.
* If a creature drops below 100 energy, they die.
* Creatures can regain energy by moving into food pellets (they gain 50 energy), or by moving into other creatures (They gain a quarter of the creature’s total energy)
* The creature’s size is directly proportional to the creature’s energy, and creatures can only eat creatures that are smaller than them. A creature dies once it is eaten.
* A creature’s movement speed is directly proportional to its size.
* Once all creatures are dead, or 3000 ticks have elapsed, whichever comes first, the competition is stopped, and the creatures are sorted from longest to shortest survival time.
* The top 45% of creatures are the selected, and new ones are generated, making slight mutations to the weights in the neural net.
* Generation n will consist of the top 45% from generation n-1, the children of those top 45%, and the last 10% is completely random creatures, in order to maintain diversity.

Neural Net Design

H3

H2

H1

H0

I3 – creature’s size

O1 – movement

O0 – bearing

I5 – creature’s current movement speed

Inputs

I0 – bearing

I2 – size of object

I1 – distance to object

I4 – creature’s current energy level

Outputs

Hidden Layer 1