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Weekly Report 1: Final Project

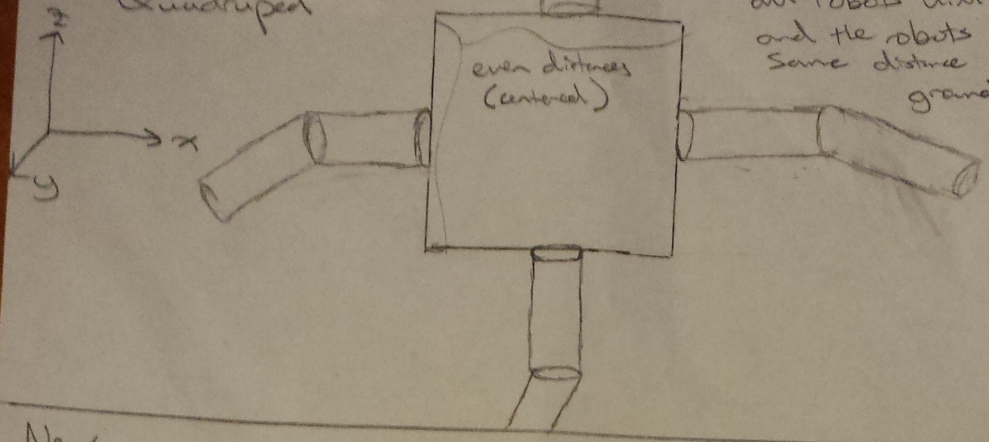
Which evolves to walk further: The quadruped we created, a quadruped with two legs on opposite sides, or a hexapod with three legs on opposite sides?

For my final project, I have chosen to test whether the quadrupedal robot we built, with one leg on each side of its body, will evolve to travel farther than a quadrupedal robot with two legs on each "side" of its body, and no legs on the "front" or "back" of its body. I will also build a hexapedal robot with three legs on each "side", and compare its fitness with the 2 quadrupeds. To do this, I would like to have three working versions of my scripts, with the two quadrupeds and the hexapod all having their own bullet and python code. This way, when they are all built, I will be able to run their evolutionary algorithms separately. The robots will each be given the same amount of evolutionary effort.

For the progress, I will take screenshots of my robots being built, and eventually their evolution when they are all in working condition. By the weekly update 2, I would like to have the second quadruped robot built with its own separate code. This will be achieved by changing the positions of all eight of the leg objects and joints, but not by altering the ANN at all. Next, I will add an object, add a joint, a motor, a touch sensor and finally a neuron to the ANN. Eventually, the robot will have 6 working legs. By the second update, I would like to have the hexapedal robot built with its own separate code.

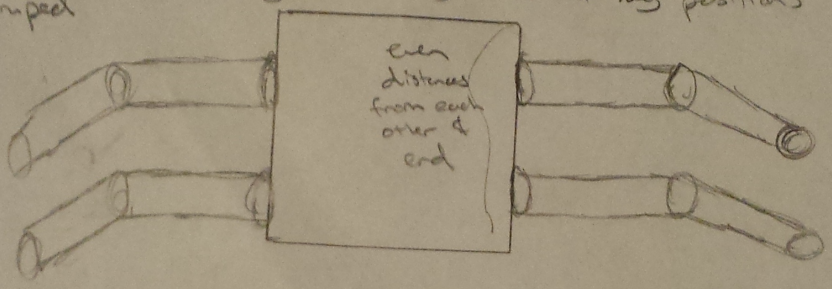
In my project, I am only interested in how the morphology effects the distance traveled into the screen of each of my robots. Thus, my simple hill-climber algorithm will stay the same for each of the robots. Further, the general structure of the neural networks will stay the same between the robots. Our quadrupedal robot has 4 touch sensors and 8 motors, and thus a 4*8 neural network to give a synaptic connection between each sensor and motor. The second quadruped will have the same ANN. The hexapedal robot will have a 6*12 network, as it has will have two more touch sensors and 4 more motors. I will try to only change the morphology and corresponding number of synapses for each robot. I will evolve their neural networks with the same amount of generations

Existing Quadruped



* Note all leg objects for all robots will be the same and the robots will be the same distance off the ground as each other

New Quadruped - same general body, different leg positions



Hexapod - will have a slightly longer body