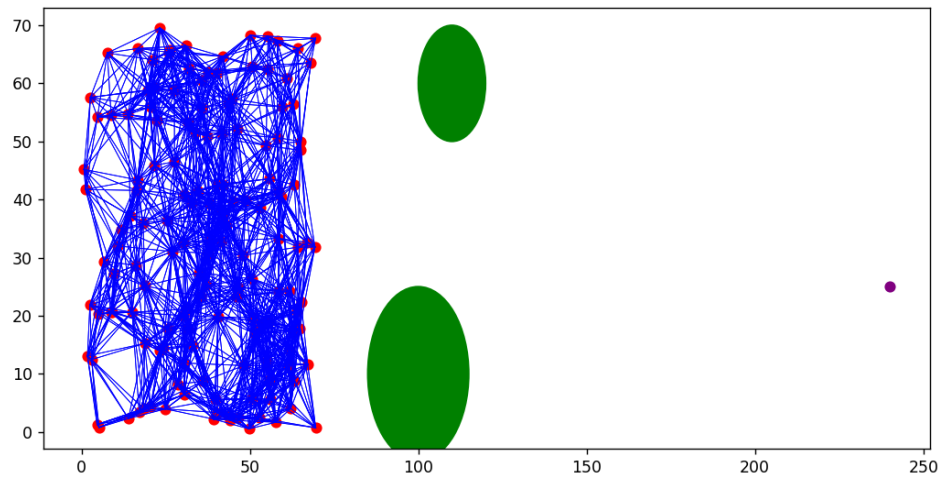


Cole Renfro

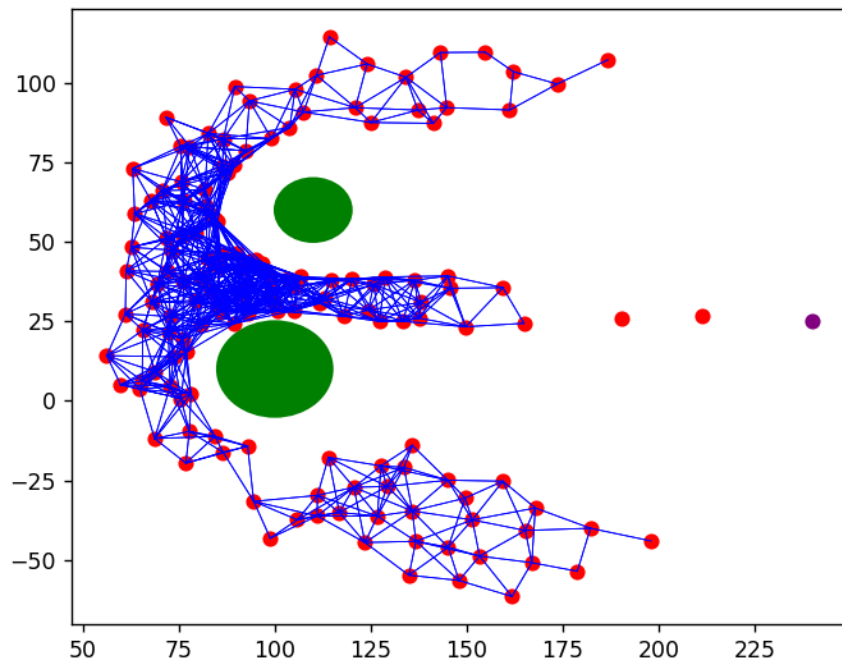
All you need to do is enter the command “python3 Part1.py or Part2.py” for each section of code.

The only libraries needed to run this are numpy and matplotlib.pyplot. Which can be installed with “pip3 install numpy or matplotlib.pyplot”

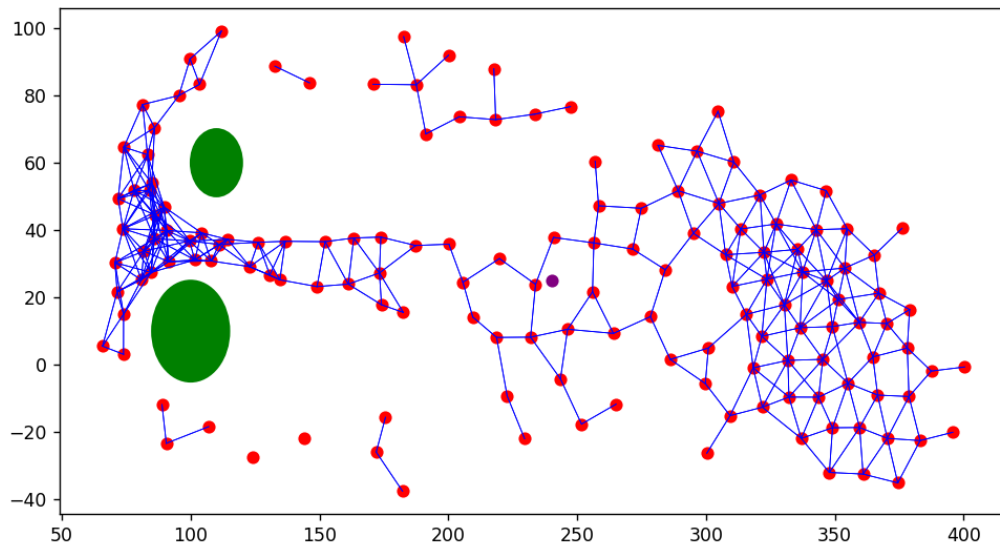
Part1 Results:



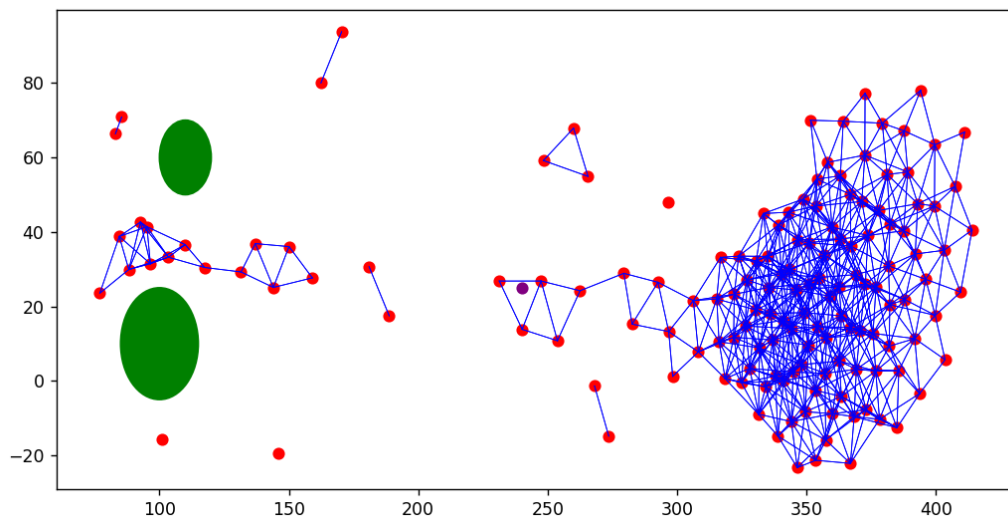
Flock starts off connected but not in a quasi-alpha lattice. Green circles are obstacles. Purple is the Gamma Agent.



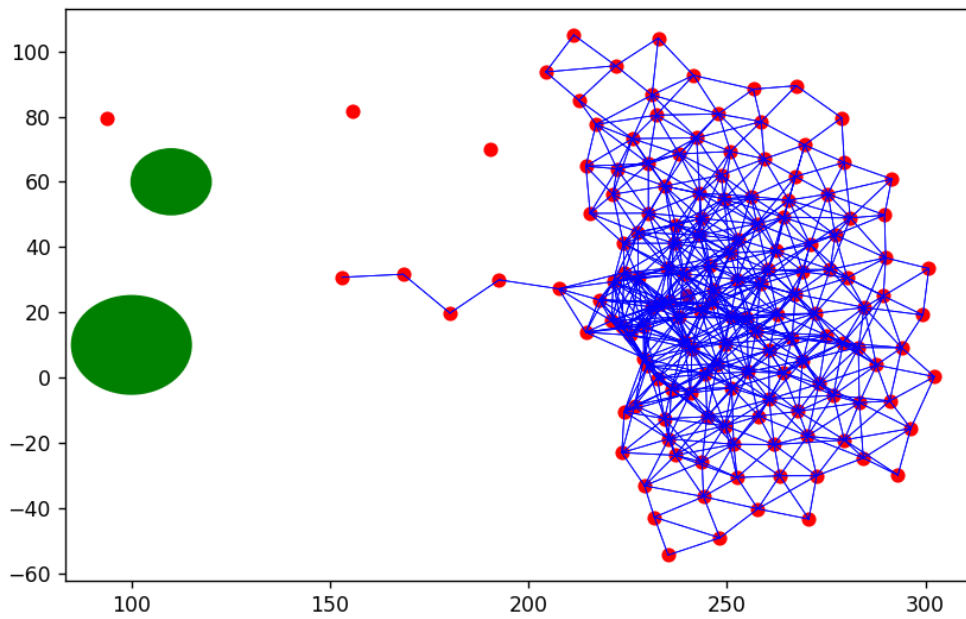
As Flock goes around obstacles they begin to break apart as many start to slow down when going between the obstacles.



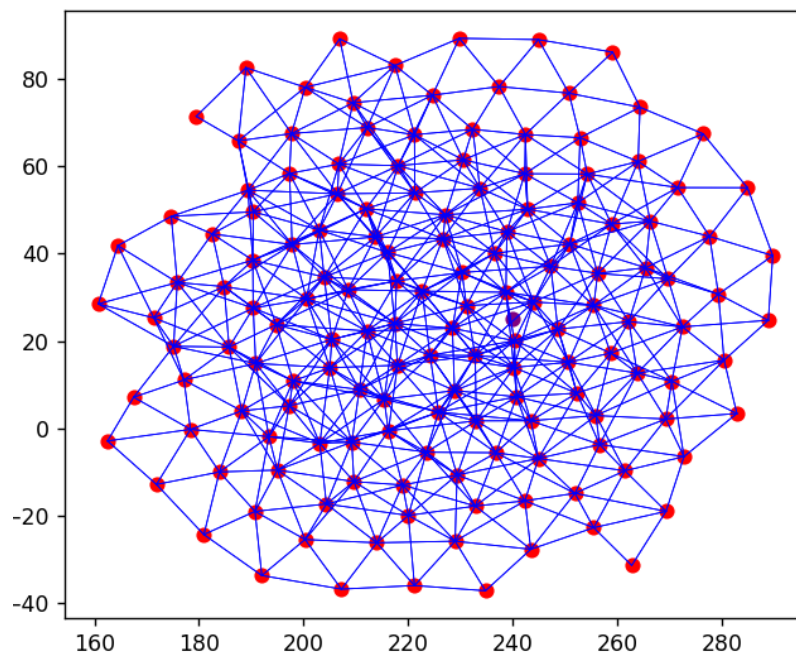
As the flock has mostly passed the obstacles, the flock begins to reform a quasi-alpha lattice a little passed the gamma agent.



The flock begins to go back to the gamma agent as the last stragglers return to the flock.

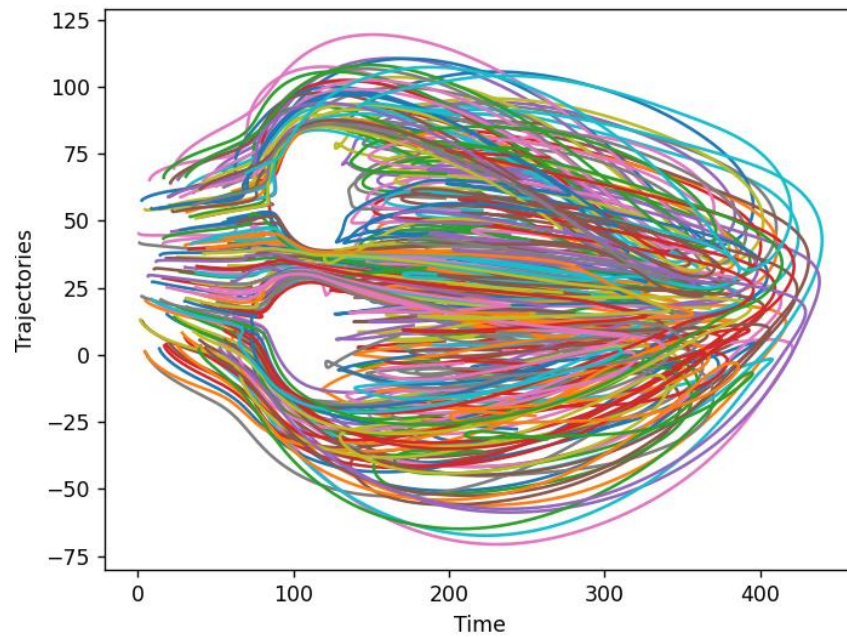


Almost all nodes are connected again and thus the flock forms a lattice at the gamma agent.

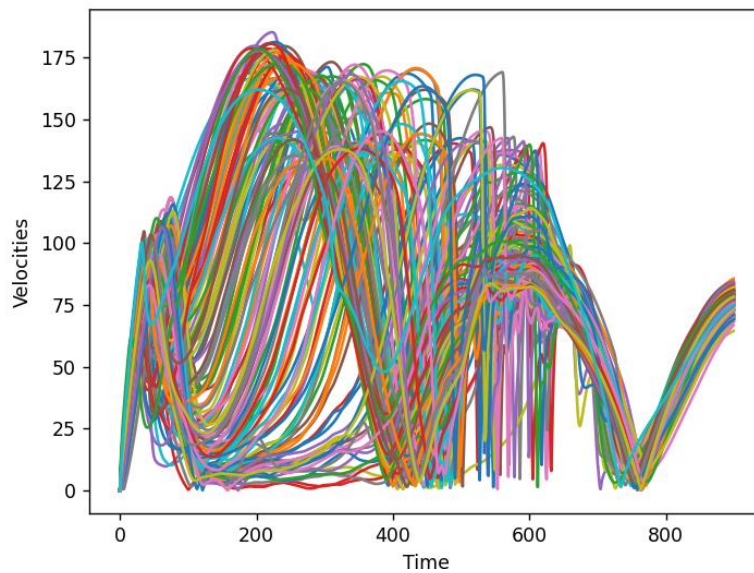


It is hard to see but the flock has formed a lattice over the gamma agent (Located slightly right of the middle)

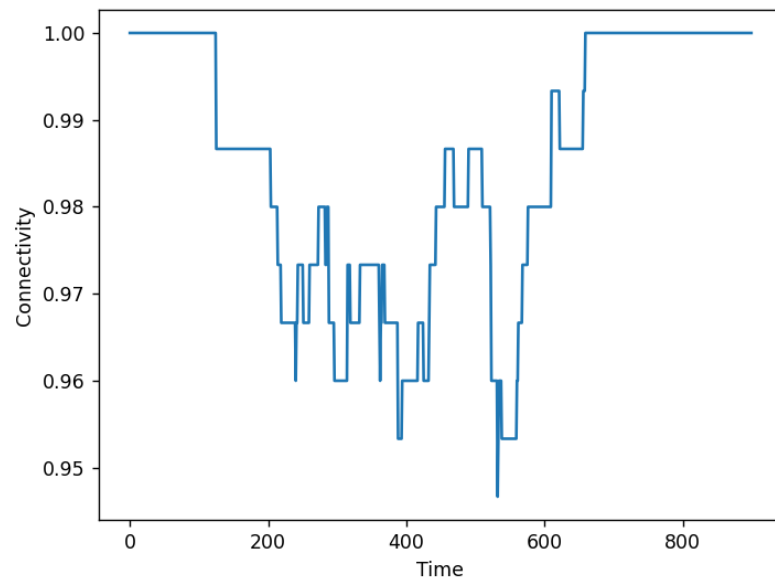
Part 1 Charts:



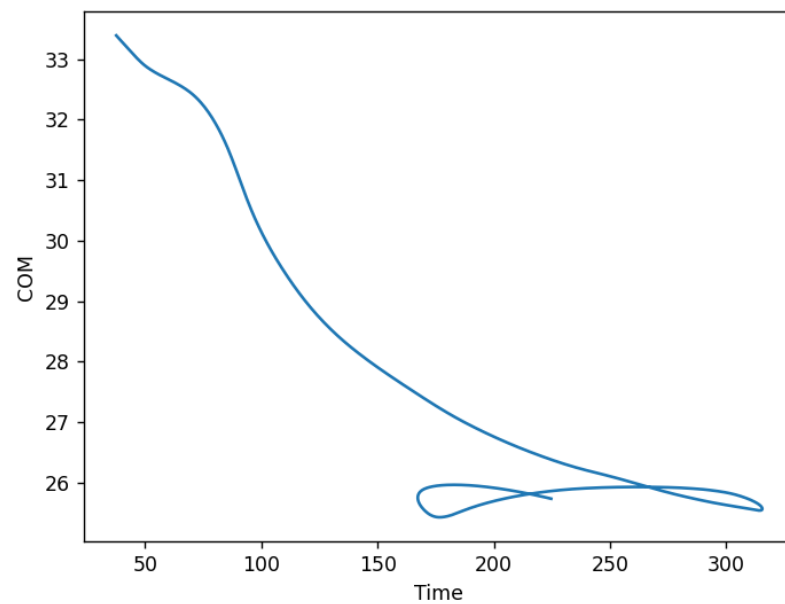
As seen in the trajectories the nodes rubber band passed the gamma agent after going around the obstacles



The velocities drastically change when going around the obstacles are bouncing back to the gamma agent.

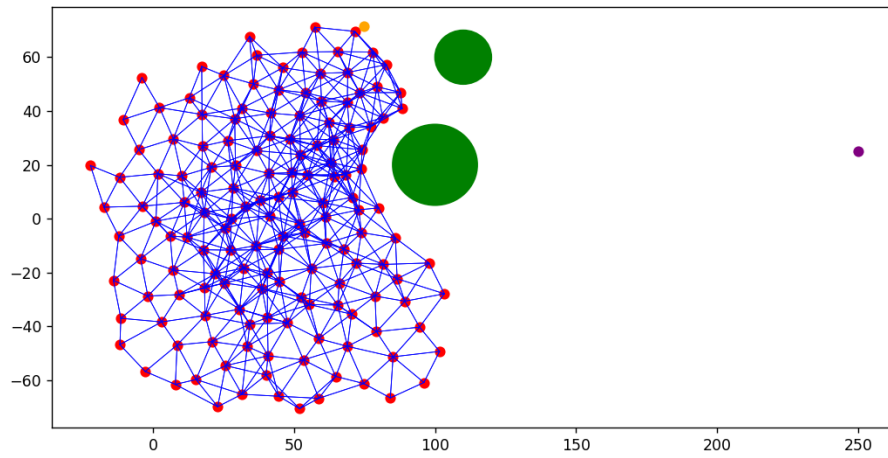


Connectivity stays relatively high throughout but naturally drops when navigating around obstacles

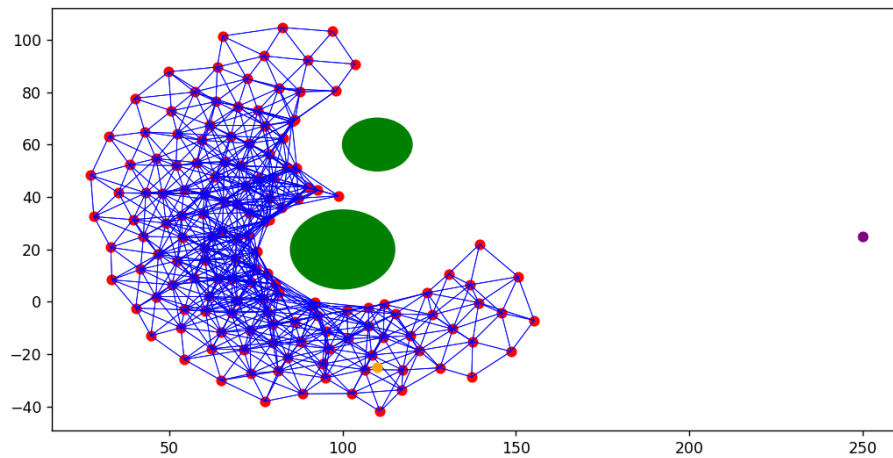


The COM starts at about (50,35) (near center of 70x70) and as most nodes go between obstacles or below them, the COM drastically goes down until reaching the gamma agent.

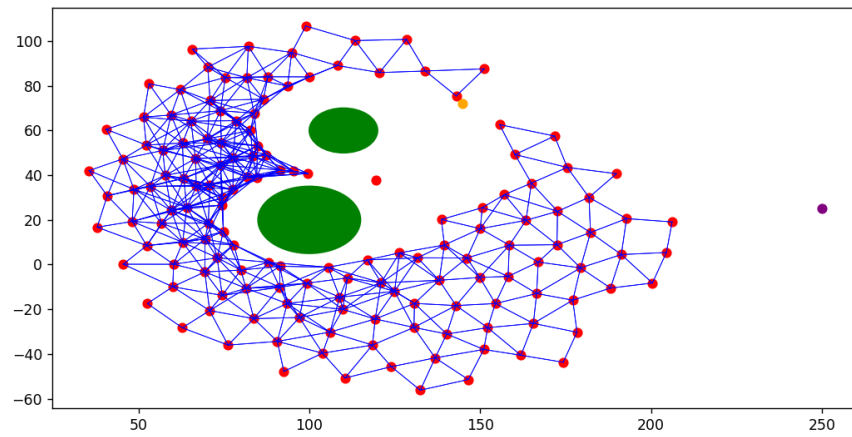
Part 2 Results:



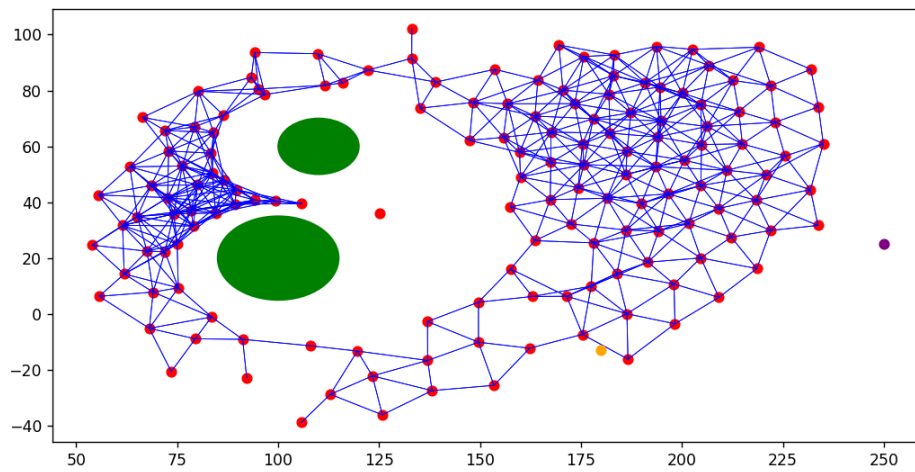
Flock starts in alpha lattice and follow the gamma agent. (Gamma agent is orange and purple circle represents the gamma agents end location)



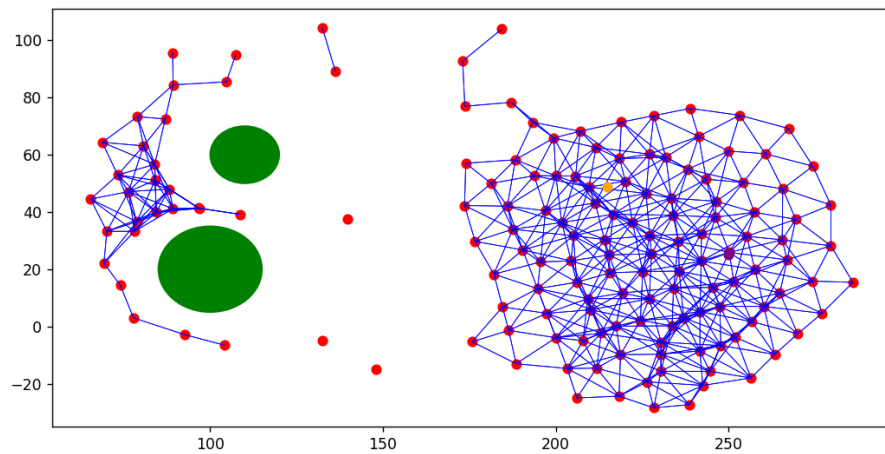
As gamma agent curves down the flock adjusts course and begins to primarily go underneath the obstacles.



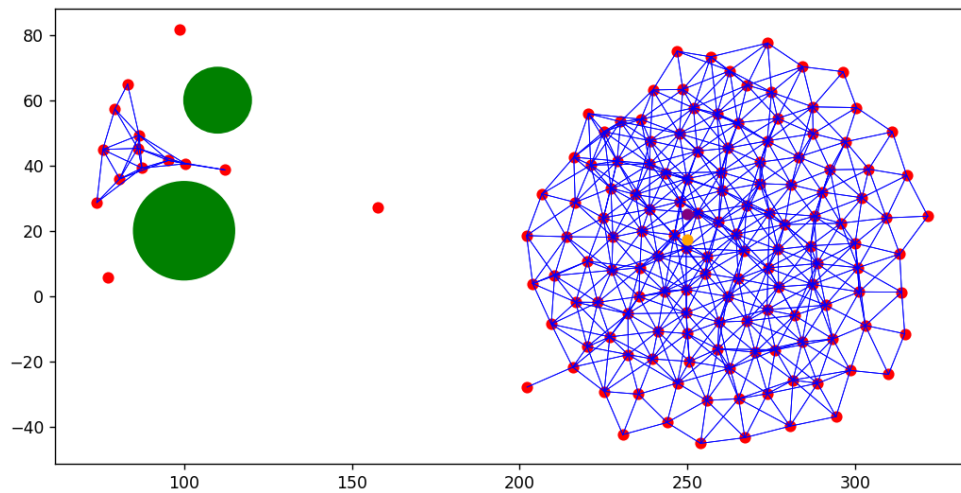
Most nodes are now going underneath the obstacles, but some go over and even less go between.



Most have passed the obstacles and are forming a quasi alpha lattice.

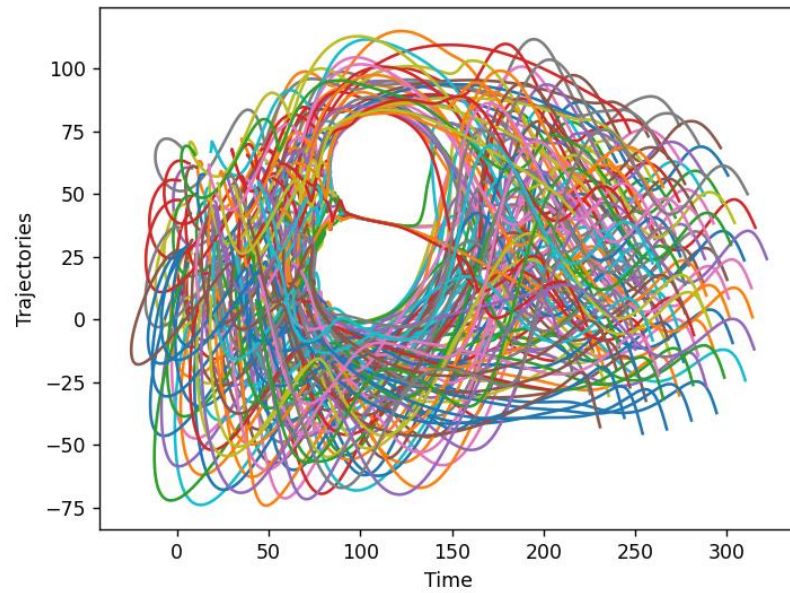


The flock has split in two and the main group reform a lattice around the gamma agent, while the stragglers attempt to move around the obstacles.

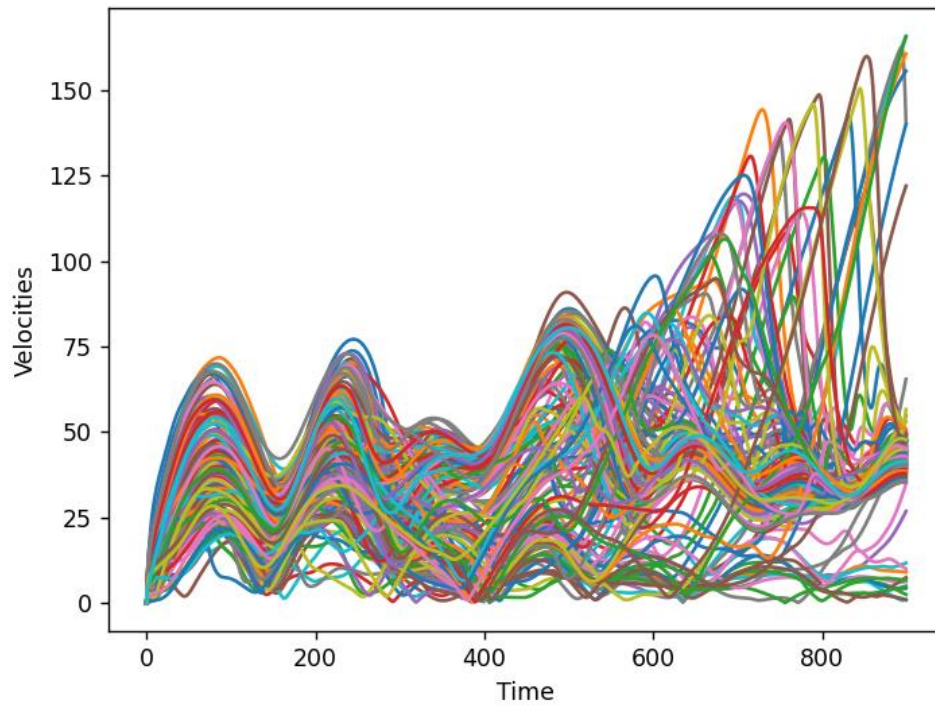


While there are still some stragglers the main flock has formed a lattice around the gamma agent.

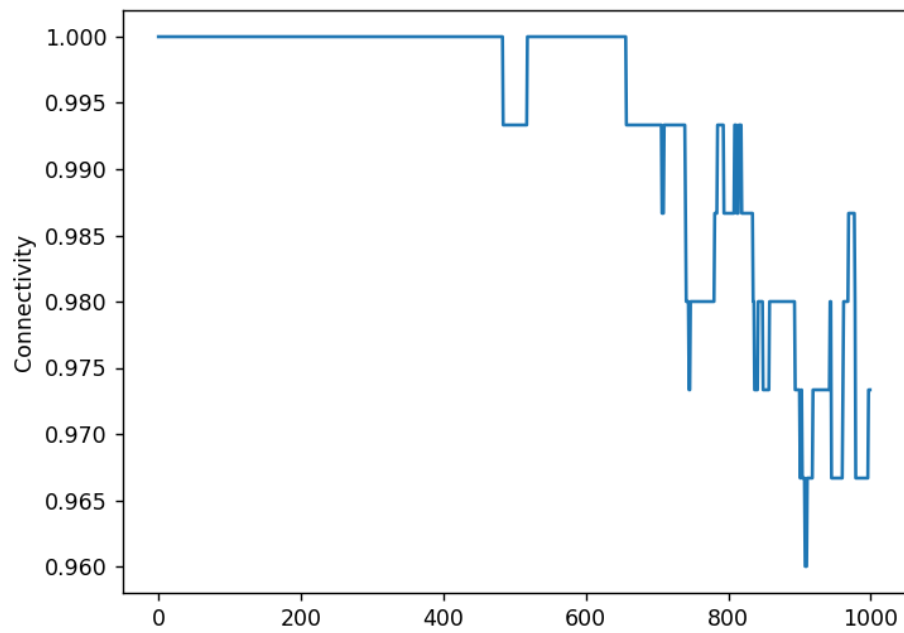
Part 2 Charts:



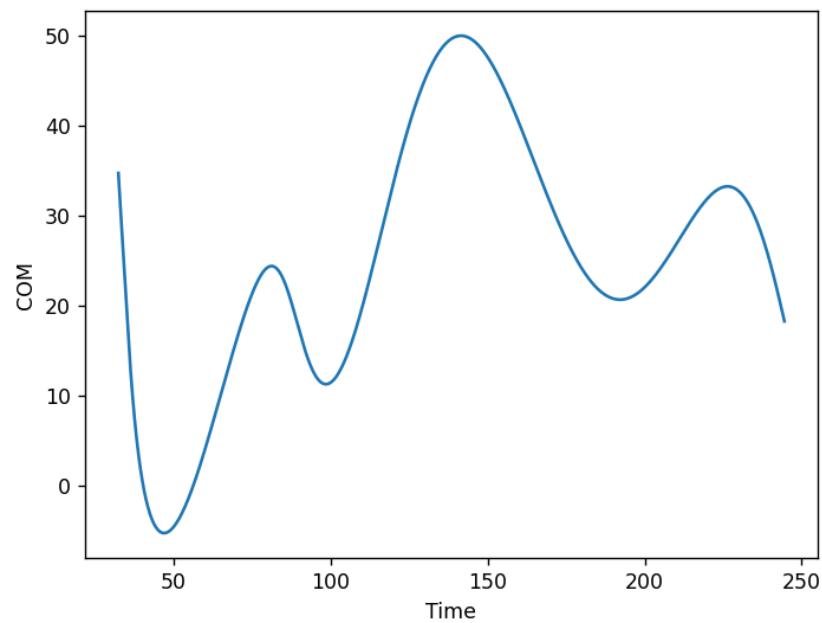
As shown the nodes attempt to follow the sine-wave trajectory, however this pattern is broken by the obstacles.



The velocities change drastically based on whether the node is going around the obstacle or following the gamma agents change in direction.



Connectivity starts high and reduces around the obstacles, but starts to returns to a high value after passing the obstacles.



COM follows a sine-wave trajectory until reaching the gamma agent at the end.