MV4025 Lab 4 Defense Planning

So far in this lab sequence, the positions of the defensive entities have been random (specifically, independently drawn from a uniform distribution over a disk). Obviously, this is not an effective way to position defenders. The task for this week is to do better.

We will assume that the goal of the defense is to deny the attackers access to a 75m radius disk centered at the defender's center of mass. The defenders do not necessarily have to be located in this disk.

0. Study the provided starter code. The only important code there at the moment is the code to compute the average number of defenders who can shoot each position in an annulus around the defensive position. If you cannot think of anything better, you can use the average number of defenders who can target points in a 75-300m annulus as a measure of effectiveness.

1. Decide on your approach. What measure of effectiveness (precisely defined numeric performance measure) will you choose? Which possible positions will you consider (i.e. what filtering will you do)? How will you pick one viable position over another (i.e. what planning factors are relevant)? What algorithm will you use to organize your effort to pick better positions? (Hill-climbing? Selecting the best location from a grid of options?)

2. Visualize the performance of your algorithm and characterize it numerically according to one or more measures of effectiveness. Show before and after pictures of the defensive force positions. Convince me that your algorithm does in fact result in improvements to your measure of effectiveness.

3. Document thoroughly. Make sure I understand what you did, the rationale behind it, and how to test your project. The goal is the most realistic defense layout possible given the many constraints on your efforts (development time, computation time, etc.).