Autonomous Mobile Robots

Graduate Student Final Project Competition (for extra credit points)

(undergrads receive +2 points on Homework Average for attending entire competition)

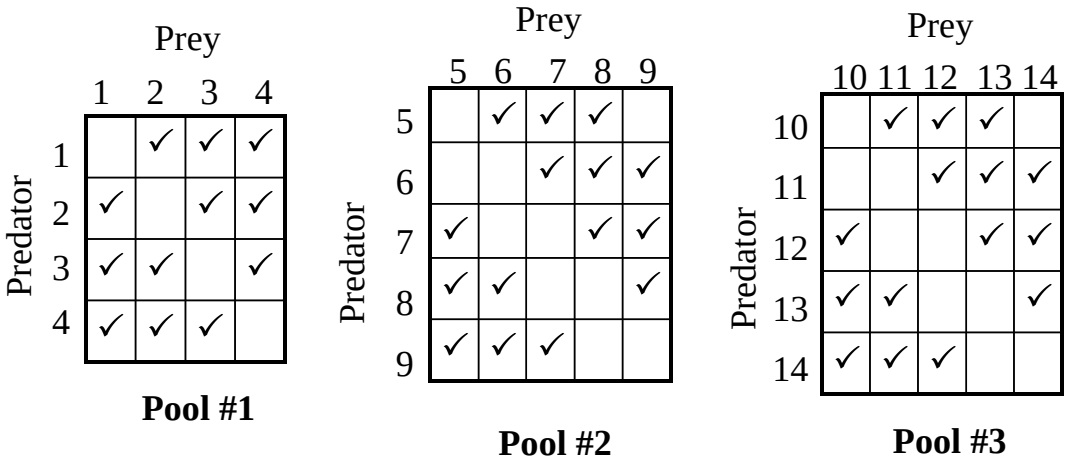
We'll meet in the Hydra Lab for this competition on Tues., Nov. 25 at 5:05PM!!!

Note: due to time constraints, we must start this competition promptly at 5:05PM. Thus, if you are late to class (in the Hydra Lab), then you risk forfeiting your place in the competition.

For the final project, we will have a head-to-head competition to determine the distribution of extra credit. Since we have 14 graduate students in the class, a complete scenario where everyone's predator plays everyone's prey would take 14 x 13 = 182 games. We could play some of these games in parallel, but it seems clear that one class period is not sufficient for a complete head-to-head playoff.

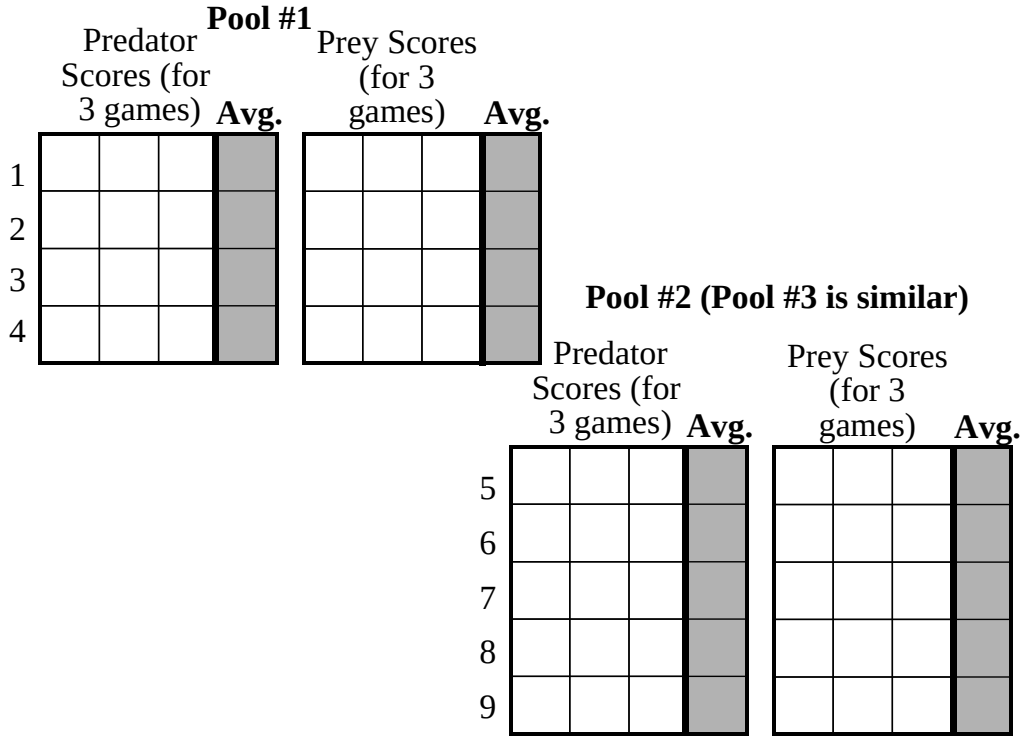
So, instead we're going to set up a "pool play", kind of like my nephew's little league baseball tournaments. Granted, the pool play approach injects some luck into the process, in that you may have a really strong pool (which is to your disadvantage), or a really weak pool (which is to your advantage). But, that's life.

Here's how it will work. I'll divide everyone into 3 separate pools of 4-5 players each. In each pool, everyone's predator/prey will play 3 of other prey/predators in their pool. (In the event that a student(s) doesn't show up – which is –10 points on their final project score – we will convert a 5-person pool to a 4-person pool.) All 3 pools will compete concurrently. This will be a total of 3 x 4 = 12 or 3 x 5 = 15 games per pool. Here's this setup of who plays whom:



In each of these games, we'll keep track of the time it takes for the predator to catch the prey. The score for both the predator and prey in a particular game will be this time. Since we have limited time, we'll put a time cap on each of these games – a maximum of 3.5 minutes per game, or 210

seconds per game. As a result of this pool competition, we will end up with 3 scores for each predator and 3 scores for each prey, in each pool. We'll average these scores for each player, resulting in the following:



Now, for each pool, we'll rank order the predators, and we'll rank order the prey, according to the average score. For the case of the predators, the scores will be ordered in ascending order, so that small times are better. For the case of the prey, the scores will be ordered in descending order, so that large times are better. The top performing predator and the top performing prey in each pool will now advance to the final playoff round. This results in 3 predators and 3 prey, which we'll call $P1_{pred}$, $P1_{prey}$, $P2_{pred}$, $P2_{prey}$, $P3_{pred}$, $P3_{prey}$,where $P1_{pred}$ is the winning predator from Pool 1, and so forth. In the playoff round, each predator/prey will play against the other prey/predators, for a total of 6 games. The playoff round looks like this:

Predator \ Prey	$P1_{prey}$	$P2_{prey}$	$P3_{prey}$
$P1_{pred}$		✓	✓
$P2_{pred}$	✓		✓
$P3_{pred}$	✓	✓	

Finally, we'll rank-order the predator and prey performances in this final playoff round, based on their time scores in this round, with predators in increasing order and prey in decreasing order.

Logistics of running games

Each pool will compete on a separate linux machine. We will have everyone's submitted code compiled and set up in an area accessible to all in advance of the class competition time. A neutral party will start up Player/Stage for each pool. Then, each player who is competing in a particular round will be responsible for entering the correct command line to execute their code, connecting to the correct robots (i.e., either predator or prey) for that competition. This will be the operation for both pool play and the final round play.

At the competition, a list giving the pool assignments and the order that the players will compete will be distributed. Each pool will also be given a score sheet to keep track of the scores. The pool as a whole is responsible for ensuring that the scores are recorded correctly. At the end of pool play, the instructor will gather all the scores and determine who the winner is of each pool, thus determining who advances to the final round.

Awarding extra credit points

Extra credit points will be added to your final project grade according to how your software performs in this competition. Your predator software and your prey software are evaluated separately. The points will be awarded as follows:

+8 points: Winning predator of playoff (final round)
+8 points: Winning prey of playoff (final round)
+6 points: Predator #2 of playoff (final round)
+6 points: Prey #2 of playoff (final round)
+4 points: Predator #3 of playoff (final round)
+4 points: Prey #3 of playoff (final round)

+2 points: Predator ranked #2 in pool play from 1st round (3 of these)
+2 points: Prey ranked #2 in pool play from 1st round (3 of these)

In the case of ties, we will add up the points available for each ranking and divide them equally among the tying players.

Since each of you has 2 programs competing, you can win points twice – once for your predator code, and once for your prey code. So, it is possible for you to earn 16 extra credit points. It is also possible for 8 different people to win extra credit points.

Good luck!!