

Report for Second Practice Test for Game Theory Course

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Abstract—In this report I go over well known agents and adapting them to the given problem, then I propose my own agent and provide simulation of different possible tournaments

1. Introduction

We are given a spin off of the old fashioned trust game. We have two agent each have an initial same number of snowballs. In each of the 60 rounds of the game, the agent is faced with a choice, either throwing some of his snowballs in a hot field, in which its snowballs disappear or throw them to its opponent, in which they get added to its opponent snowballs. The goal of this game is to minimize the snowballs you have left in the end of the game. Taking into consideration that in each minute snowballs with each agent increase by one in each round. and agents are limited by the minimum of snowballs they have left and $\frac{15 * e^x}{15 + e^x}$ where x is the minutes passed since its last shot.

2. Observations and assumptions

The first question that could come to your mind is when to shot and when not to. To get rid of the maximum number of snowballs possible over the 60 minutes given. Lets take a look at the given equation and its graph. $\frac{15 * e^x}{15 + e^x}$

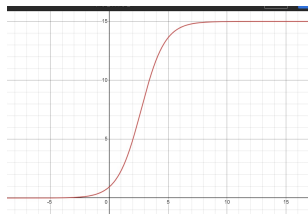


Figure 1.

Thus we can observe that if we played every 4 minutes we will achieve the maximum possible number of thrown snowballs which is 11 each time. For most of this report - until said otherwise- we will assume that all agents play with this observation.

Sadly, human kind is evil by nature, thus I have ignored the possibility of having an all cooperative agent either as of my own or my classmates’.

Another question that could come to our minds, is how many agents will be in the tournament? assuming 30 in from AI group and 15 from DS group, I would say approximately 45 agents playing against each other.

3. Strategies

Strategies that I first thought of were, CopyCat, AllAttack and Grudger.

- Copycat: will start with cooperation, and if its opponent cooperated - as in thrown its snowballs to hotfield- the CopyCat will do the same. But if the opponent attacked, Copycat will do the same.
- AllAttack: Will always attack no matter what its opponent do.
- Grudger: will begin with cooperation, but if its opponent attacks once, the Grudger will attack for the rest of the game.

3.1. Match results

for any two agents of same time playing against each other, the match will end up with a tie. for Copycat vs Copycat and Grudger vs Grudger the tie will be 1 and for allAttack vs Allattack the tie will be 160.

- CopyCat vs AllAttack : 160,149
- CopyCat vs Grudger : 1:1
- AllAttack vs Grudger : 149:160

3.2. Observations

We can see that AllAttack even tho it has the highest chance of winning a specific match, however its remaining snowballs is quite high if it plays against some offensive agents. which is something that is not optimal on the tournament. However, looking at copyCat and grudger they both has the ability to minimize their snowballs even in a lose, the difference is not significant when compared to their

performance with more cooperative agents. thus it seems logical to me to build the idea of my best agent on copycat or grudger.

4. My best agent

Now based on the last section observation. Grudger seems more logical solution than Copycat. Since I don't believe any of my colleges agents will switch to cooperation after being offensive. However, to optimize more Grudger, I thought of GrudgerPlus were it act exactly the same as the normal grudger except in the last round it always attacks. Thus winning CopyCat and normal grudger Lets assume that the grudger is playing against another grudger or a copycat. That will end in a tie. but GrudgerPlus acts exactly the same as the normal Grudger yet it always attacks in the last round regardlessly. thus winning copycat and grudger and minimized the loss from AllAttack.

5. Tournament Simulation

- A tournament that contains 3 GrudgerPlus, 22 AllAttack , 12 CopyCat and 8 Grudger : GrudgerPlus ranks first with copycat and grudger closely behind
- A tournament that contains 5 GrudgerPlus, 22Allattack, 10 CopyCat and 8 Grudger : GrudgerPlus ranks first with copycat and grudger closely behind
- A tournament that contains 10 GrudgerPlus, 30 AllAttack, 3 CopyCat, 2 Grudger : GrudgerPlus ranks first with copycat and grudger closely behind
- A tournament that contains 1 GrudgerPlus, 44 AllAttack : The only case I see were GrudgerPlus ranks last.

5.1. Corner Cases

: In those simulations I have only considered playing against agents who shot each 4 minutes , but what if we considered playing against agents that shot in lets say each 6 minutes, then GrudgerPlus playing every 4 minutes will lose with a larger. However, I am gambling on the fact that there will be more agents with somewhat cooperative style. So we all can get a better rank.