Artificial Intelligence Project 1

Planet Wars

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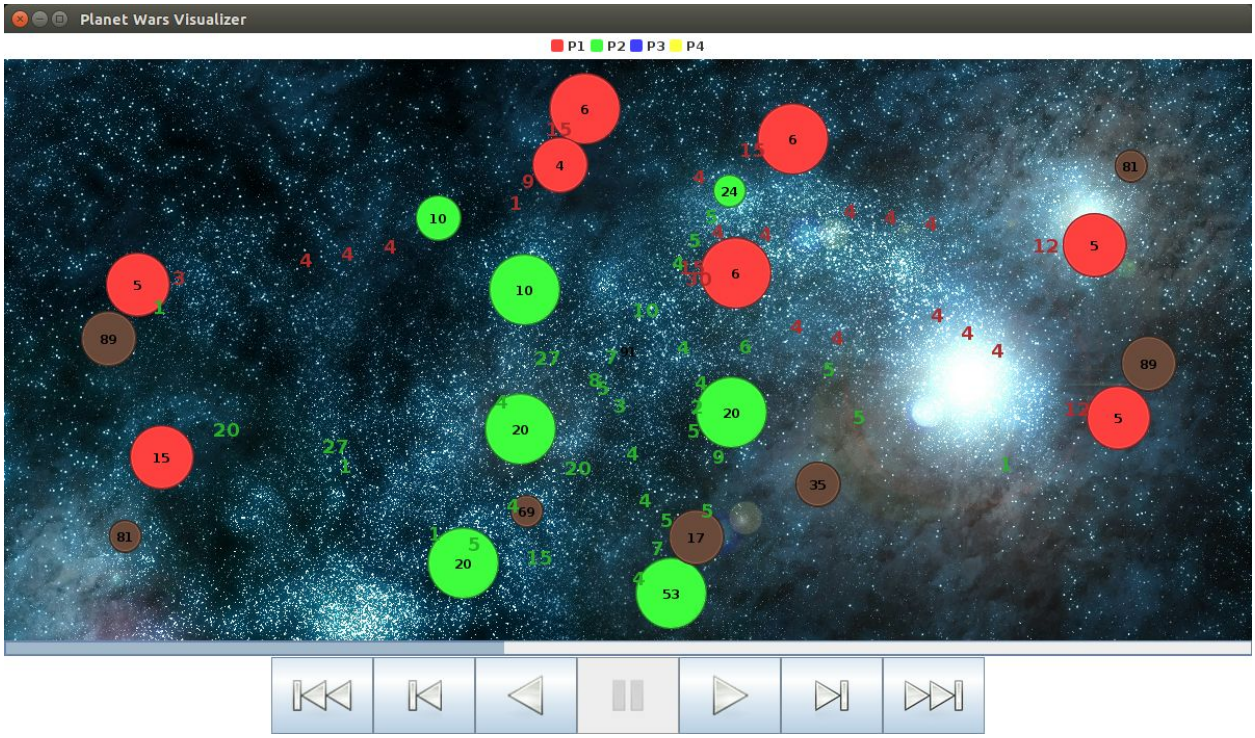

Introduction:

Planet Wars was originally a part of the Google AI Challenge in 2010. The main goal of this project is to design strategies for the game based on some heuristic such that it beats the opponent bot in some given number of turns. While generating all possible successor states and pruning them to choose the most advantageous move sounds a lucrative option, in practise it is not feasible to generate even 2-3 plies completely. However, any good strategy must consider next moves based upon three aspects: i) future scenario of loss or gain (predictions based on attacking fleets in air), ii) how soon

the attack shall yield result (for instance, preferring closer planets to attack), the winning/losing position we hold in the game (switching offensive/defensive strategies).

Algorithm:

Aspects of our strategy:

1. Predictions
2. Offence
3. Defence

Defence:

We are defending our planets and the neutral planets that we would have captured. For doing this we are finding the predictions of our planets and the neutral planets. Predictions basically take into account what happens by the next 20 turns, i.e. how many ships from which planet reach which planet. Based on this we store the planet owner and the number of ships (after the number of prediction turns).

So now we know which all planets are threatened. Now we find the closest planet which can be used to save these threatened planets and we send the number of ships required to save that planet.

Offence:

We are attacking neutral and enemy planets with different strategies.

For attacking neutral planets, we find out one of our planets which has the highest number of ships (and is not threatened). Now we find the neutral planet with highest score (based on growth rate and distance) and issue an order from the source to the destination planet with all the spare ships we have on that planet. We also take care that there is no enemy planet nearby that neutral planet which is capable of defending it against our attack.

The number of spare ships on any planet is the number of ships left after we ensure that that planet is safe even after all the enemy fleets in air destined to that planet reach that planet according to our current predictions. For attacking enemy planets, we find out our

planets that can possibly attack an enemy planet based on distance and spare ships on that planet. Now for an enemy planet we issue order from the attacker planets to the enemy planet with the spare ships on those planets.

Cases where are bot is winning:

1. In cases where the opponent is attacking only neutral planets or only our planets, regardless of number of ships, we are winning. For example, our matches against 'Skynet' and 'Others' respectively.
2. In cases where the opponent bot is sending too many or too few resources to capture planets, we usually win as we have used prediction to calculate spare ships which our planets can afford to send at the current move. For example, our matches against 'winxii' and 'Houdini_III' respectively.

Cases where our bot is losing:

1. In games where the opponent starts capturing neutral planets very aggressively, our bot usually loses. We are playing it safe in the beginning. For example, in our matches against 'IBMWatson', 'kuch_machau'.
2. In cases where the opponent bot begins by capturing enemy planets (i.e. our planets), our bot loses pretty badly because initial predictions do not anticipate enemy attacking as in the initial state enemy is usually far from our planets. For example, our matches against 'VeRaAk'.

Citations:

1. https://github.com/Franck-Dernoncourt/planet-wars/blob/master/MyBot.py
2. https://github.com/mrcarlosrendon/Planet-Wars
3. http://iq-games.blogspot.in/2011/02/planet-wars-my-first-ai-contest-part-2.html