

Vergil: Angry Birds AI Project Submission for the IT326 Course

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ABSTRACT

This paper describes Vergil, a bot made by modifying the existing Naïve Agent to solve the Angry Birds Game. I describe the research done, the method developed as well as how my bot does compared to the official Naïve Agent client.

1. Introduction

The bot is a part of the coursework for IT326 course at DA-IICT, taken by Prof. Sourish Dasgupta. It derives inspiration and starter material from the Angry Birds Ai Competition (<http://aibirds.org>). It is made for the Angry Birds game, specifically its google chrome extension. The overall structure is quite complex, but thankfully the starter kit handles everything else, letting me focus on developing the strategy only.

The bot is designed to calculate levels according to the strategies coded in it. You can think of it as a meta-heuristic agent, since the given level can be repeated, it runs the level again with a different strategy if the previous strategy did not perform up to expectation.

2. Approach

The approach of strategy 1 is to calculate the weights of each block based on the number of blocks it can hit, the type of bird on the sling, the type of the block itself, the orientation of the block, as well as the number of pigs near it. There are weights attached to every block, and each time the bot tries to play it finds the highest weighted block it can hit, and targets it.

The approach of strategy 2 is to calculate the number of blocks and pigs in proximity to itself, and assign a weight based on that.

These strategies are made based on the assumption that whenever any block is hit, it affects a fixed amount of space around it. Hence hitting that block would cause the most destruction possible, in turn giving us the maximum possible score.

The bot has some inherent limitations built into it as well. Given the type of strategies we have, the bot does not perform very well on levels with sparse designs. It is also currently incapable of incorporating the usage of map oddities like ramps and higher ground-like surfaces.

Level	Naïve Agent 2014	Strategy 1	Strategy 2	Max Self Score	3 Star Score	Maximum Possible Score
1	29760	29110	32210	32210	32000	36870
2	43250	34170	43910	43910	60000	63780
3	40180	26950	41970	41970	41000	50160
4	10590	Unrecorded	36610	36610	28000	42650
Total	123780	90230	154700	154700	161000	193460

3. Gameplay

The bot runs each level based on strategy 1 first. If it fails to achieve a 3 star score, it then moves on to strategy 2.

4. Discussion and future work

The bot currently does not implement a good level of AI. This is due to me being sick for most of the semester, and having limited coding skills.

Currently, the bot fares as shown in above table, compared to the maximum possible score, required score for 3 stars, as well as performance of the Naïve Agent base bot on first 10 levels. More levels could not be score-checked due to lack of time.

As is visible, the bot does beat the naïve agent 2014 implementation. It also has a lot of room for improvement, as is seen by the gap in my self-score vs. Maximum possible scores, as well as the 3 star scores.

As far as theory is concerned, there is an advanced algorithm I would like to implement that should most likely beat both strategies 1 and 2.

- Make a list of objects that can actually be hit by a bird. This depends on the

type of bird as well as the structures present in the game.

- For each of these objects, make a propagation tree that calculates which of the other blocks does the target affect, and in turn, which other blocks are affected. This enables us to get an idea of the actual destruction amount a shot can cause.
- Make a list of the top 5 shots, and fire them in order once. If the level is beaten with a 3 star score, move on to next level. Else, try a round robin order of the said 5 shots till either you hit 3 star score, or exhaust all alternatives.

5. References

Multiple papers from aibirds.org
(<https://aibirds.org/2013-Papers/>*)

Multiple articles on wired.com
(<http://www.wired.com/2011/05/is-the-launch-speed-in-angry-birds-constant/>,
<http://www.wired.com/2011/11/physics-of-the-yellow-angry-bird/> and more)

Angry Birds Next (www.angrybirdsnest.com)
for score values

Angry Birds Wikia
(www.angrybirds.wikia.com/wiki/)