

Group 5 Final Report

Harjot Gill, Yang Li, Tim Miller

September 25, 2013

1 Introduction

2 Initial Insights and Observations

3 Strategies and Concepts

3.1 Single Player

3.1.1 Surviving Mode

One thing we noticed is that for harsh environment($p = 0.1\%$), the organism will easily extinct if moving around too much, especially at the beginning of game. However, if we are able to let the food to grow for a while, the board will become abundant, which then allows the organism to make some move and maximize total power. Basically, we attempt to help our organism *Survive* the beginning couple hundred rounds(Stage One) and switch to energy miximizing mode(Stage Two). Note that the surviving mode is just one layer put at the beginning of the game. At some point(details in Implementation), when organism enters stage two, *any* algorithm for maximizing energy could be invoked. The two stages are totally decoupled.

Move or stay. During this surviving mode, apparently, reproduce is not a good action. The energy splitting makes the organism weak and cost of stayput will doubled. The question remained to be whether the organism should just stay, waiting for food to appear in the neighbor cells or move around to explore food. We answer this question by introducing a probabilistic analysis over the benefit of moving or stay. More specifically, we will calculate the probability of finding food when you move and compare it with the probability of finding food if those energy are used to stayput and wait, so as to determine the best action in each round.

Eat or wait. The idea above is focusing on finding one food. But once a food is found in neighbor cell, shall the organism just go ahead and eat it or wait for as long as it can. Our answer is the later, based the following three reasons.

1. This is single player mode, no one will appear and rob the food away.
2. The goal of this stage is to survive the beginning harsh environment, waiting is more suitable to this.
3. The expectation of food on that cell grows exponential to the time you wait(more details in Implementation).

- 3.2 Multiple Player
- 4 Implementation
- 5 Analysis and Results
- 6 Contributions
- 7 Future Direction and Limitations
- 8 Acknowledgments
- 9 Conclusion