

# Interim Report

## G53IDS

Project Title: Applying Evolutionary Algorithms to Pokémon Team Building  
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8<sup>th</sup> December 2017

## 1 Introduction

- Talk about aims and objectives
- Overall goal with the project
- Major steps to be taken
- Some of this can be adapted from the project proposal

## 2 Motivation

- Talk about other AI game playing and how they approach it
- Mention how these approaches assume things like pregame decisions
- Detail the problem
- Again some can be adapted from the project proposal

## 3 Related Work

- Discuss the Hearthstone deck building GA
- Investigate more works to talk about here (gaming and more general)

Team building is a form of optimisation problem as you are trying to bring the optimal team to the match so you have the best chance of winning. A variety of work has been conducted looking at optimisation via AI techniques, in particular I looked into techniques that tackled having a large, vast search space and where the correctness of a solution was hard to judge. Both of these issues were things that I saw as issues that I would have to tackle to solve the team building problem.

García-Sánchez et al. approached a very similar problem using a genetic algorithm, the problem in question was deck building[1]. The example they used was a popular collectable card game, Hearthstone, and they tried to create a viable deck through the genetic algorithm. This was of particular interest as several parts of their study directly relate to what I am trying to achieve, as well as several short comings that I would have to take into account.

A evolutionary algorithm was used as ‘they commonly produce very effective combinations of elements’, which a deck can be described as a combination of cards. This also allowed for competitive decks to be built from scratch with no expert knowledge.

## 4 Description of the Work

- Detail the output specifically
- Discuss building this solution from scratch (besides using relevant APIs outside of the main project), why this is beneficial
- Talk about both the EA and MA and how they will be linked

## **5 Methodology**

### **5.1 Object Orientated Design and Python**

- Easy adaptation
- Conversation from GA to MA
- Commonly used, lots of APIs

### **5.2 Evolutionary Algorithms**

- Choice of GA and MA
- Why this over other AI techniques like ANN and Local Search

### **5.3 Software Engineering Tools**

- Git
- Latex
- Atom
- Unit Tests
- How these tools work together and help with project management and speed up work

## **6 Design**

- Genetic Algorithm
- High level Representation Explanation

## **7 Implementation**

- Language and Platform choices
- Separation of settings
- Low level Representation Explanation
- Validation methods (if made by then)
- Use of the benchmark example

## **8 Progress**

### **8.1 Project Management**

- Discuss bringing Interim Report work forward
- Adding in of a benchmark function to test the GA Structure
- Review of individual tasks and how long they took
- Revised work plan, including changes to current progress and any prospective changes

### **8.2 Contributions and Reflections**

- Difficulties due to unpredicted work loads in other areas
- How moving forward aspects and adding additional tasks helped and hindered
- Current achievements in the project
- Personal Reflections

## 9 Appendix

### References

- [1] Pablo García-Sánchez, Alberto Tonda, Giovanni Squillero, Antonio Mora, and Juan J Merelo. Evolutionary deckbuilding in hearthstone. In *Computational Intelligence and Games (CIG), 2016 IEEE Conference on*, pages 1–8. IEEE, 2016.
- [2] Griffin McElroy. Becoming the very best: The pokemon world championships. <https://www.polygon.com/2013/7/20/4539528/becoming-the-very-best-the-pokemon-world-championships>, July 2013.