**Exploration of the use and application of a learning Artificial Intelligence agent in video games.**

Is it possible to use genetic algorithms within a learning AI system to create a dynamically increasing gameplay challenge within a video game?

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# Overview

The idea behind my Final Year Project is to explore the potential uses and applications for an Artificial Intelligence system, which utilises learning through a genetic algorithm, in gaming that progressively learns and adapts to overcome certain situations that the AI agent encounters. I would go about implementing this by initially creating a system such as snake where the first generation of snake would not know how to effectively search out food and how to avoid the fail states of the game but as the snake went through multiple generations it would adapt and improve its method of playing the game. My intention is to save the state of the snake AI at a fixed number of generations and then compare that against the average of human play testers, to see how the performance of the snake is and at what point the snake AI becomes better than a human, if it does at all.

# Project rationale

good technical challenge to learn ai and it has a lot of uses in games

# Technical Overview

## Areas of investigation

Different learning types

## Background research

Genetic algorithms

## Literature review of sources

5-6 sources

In place here.

Infinite Mario Bros AI using Genetic Algorithm: <https://ieeexplore.ieee.org/abstract/document/6089330>

An adaptive methodology for synthesising mobile phone games using genetic algorithms:

<https://ieeexplore.ieee.org/abstract/document/1554774>

An empirical study on collective intelligence algorithms for video game problem solving:

<https://repositorio.uam.es/handle/10486/674486>

M. Mitchell, An Introduction to Genetic Algorithms, Cambridge, MA:MIT Press, pp. 1-10, 1996:

<https://books.google.co.uk/books?hl=en&lr=&id=0eznlz0TF-IC&oi=fnd&pg=PP9&dq=+An+Introduction+to+Genetic+Algorithms&ots=shpJ92ZaRd&sig=oVDGt5-JYpFHOLbxXY29nzjsaik&redir_esc=y#v=onepage&q=An%20Introduction%20to%20Genetic%20Algorithms&f=false>

Reference

## Methodology

Waterfall vs agile

Combination

Etc.

## Research ethics

Ethics data etc.

# Project plan

Steps/stages

Gantt chart

Realistic.

# Deliverables

Evaluation of the performance of the AI

Generation selection.

# References

1. Working Title: Title of your project.

2. Simple Outline Description/Research Question: Give a short overview (1-2 paragraphs) of the area your project will focus on and the problem that your project will attempt to solve.

3. Rationale for project choice: Explain why you have chosen this particular project. This could be based on a number of factors including: appropriateness to employment aspirations, modules studied, area of interest/development etc.

4. Areas for investigation: Discuss the topics you will need to find out about in order to do your project – there should be several. They will need to be carefully selected to make sure they are appropriate and sufficient for your project. If you have too few topics this may constrain your project, but at the same time if there are too many you may end up being unable to meet any of them satisfactorily. The actual number will depend on the type of project you are doing.

5. Background research: Describe the background research that you have undertaken so far in order to find and define your project idea. This could include a review of similar products or areas of investigation, available resources (it is not a good idea to attempt a project for which you are unable to identify any resources to help you), potential future market/demand etc.

6. Literature review: At this stage we are not expecting a full literature review but you should give details of 2 books, 2 academic journal articles or conference papers and 3 websites that will be useful to your project. You should cite them correctly in your text (Harvard style) and give the full reference details in a reference section at the end of your project specification (see section 11 for further details). All of them should be up-to-date (i.e. less than 6 years old, unless you can clearly explain why it is important to include an older reference) and there should be clear justification for including each reference.

7. Methodology: Discuss the main tasks that you expect to do in your project. For instance, you might decide that you need to collect some data in order to understand users’ views. In this case think of the type of data you will collect i.e. quantitative or qualitative and how you will be collecting them e.g. questionnaire, interviews. Also, you might want to briefly discuss your initial thoughts in respect of what development methodology you might use, e.g. re waterfall versus iterative development. Your methodology need not be fully formed at this stage but you should provide evidence that you have clearly thought about this area and have proposed some appropriate and sensible approaches and considered the benefits and potential drawbacks.

8. Research ethics: Discuss what ethical aspects you will need to address in your project and how you will address them. You should also identify the level of ethical release/clearance that you think you will need to apply for.

9. Project Plan: Provide a project plan which highlights the main phases of your project process and define deadline / completion dates for each phase. It should be detailed enough to be of some help to you, but not so detailed that it becomes difficult to follow. Your plan should also include details of time you will be spending on other modules, including any hand-ins, you can get this information about the modules running from the intranet (https://unity3.tees.ac.uk/schools/015/Pages/Students/Assessment.aspx#icasubmissions –> Assessment Calendars –> Final Year). You may also be able to see details of the assessments for some modules and if this is available you should incorporate this into your plan as well. Don’t forget to factor in your “me” time and any work, family or sports commitments you might have.

10. Project Deliverable(s): Provide a brief description of what you will create for your project’s ‘product’. It could be an IT product such as a web site or application, a design document or report for a business client (or potential interested group), or a poster to present a new model or research outcomes.

11. References: Give full reference details for all works cited, using Pears, R. and Shields, G. (2016). Cite them right: the essential referencing guide. 10th edn. Basingstoke: Palgrave Macmillan. Copies of this text are available in the Library and online via: <https://www.citethemrightonline.com/>