DRAFT



Computer Games Development SE607

Technical Design Document

Year IV

[Leo Chen]

[C00250593]

[XX/XX/2023]

[Declaration form to be attached]

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# Acknowledgements

I would like to thank the following people who assisted in completing this project including;

X of Y who kindly agreed to …

I would also like to thank Y for use of ….

Use this template when writing your research report. As a rule of thumb, the report should be of the order of 10 pages (about 250 words/page).

# Project Abstract

The Real Time Strategy Game Genre has provided a concrete and effective method to allow researchers to introduce and study complex algorithms that adapt its evolving landscape. The popular RTS game StarCraft (SC) and its sequel StarCraft II (SC2) has been utilised as a basis for developing Machine Learning algorithms to further the research on Artificial Intelligence. Previous researchers have constructed a framework to build from that allows others to create and expand their own algorithms as they see fit with great success.

This project focuses on creating an entirely new, smaller scale RTS game that uses a machine learning algorithm as a core concept for an opponent. The idea is to create a basic environment that allows the algorithm to achieve simple goals that cumulate to the advancement to a much larger and complex goal through the mechanics of the game. In the end the machine learning algorithm would be able to play against a human component.

Developed using the Unity engine as an easy to use application to apply the project to.

# Project Introduction and/or Research Question

With the advancement of artificial intelligence, most efforts have been placed on training neural networks to recognise images, understanding and reinterpreting data to provide an output.

The purpose of this project was to create a simple but expandable neural network from an entirely new game from the ground up. This will allow me to experiment with the environment the algorithm is present in and create new challenges for it to overcome.

# 

# Literature Review

## Artificial Intelligence and Learning Algorithms

The implementation of learning algorithms for expanding the research of artificial intelligence has woven its way into video games. With the cooperation between Blizzard entertainment and Deepmind, they have developed the SC2LE (StarCraft 2 Learning Environment), a program that introduces a Reinforced Learning Algorithm into the complex and chaotic game. Though initially created in controlled “mini-game” environments, it has allowed other researchers to expand the scope of the algorithm to encompass the entire game. Different researchers have created AI Agents to compete against StarCraft 2’s built in cheat level built in AIs with great success.

Though most have mainly focused on SC2LE, a different project was developed to create a smaller scale RTS that featured a machine learning algorithm. Micro RTS, developed by Santiago Ontañón, is a small implementation of a real time strategy game which is used to observe and perform AI research. The implementation of such is X

## A new game environment

Replace this text with an appropriate Literature Review.

The literature review places your research in context. You aren’t the first person to investigate or research a particular topic. Present a short literature review with the following goals:

* Give the reader a good overview of the key concepts;
* Describe the most relevant work (in your own words) that other people have done in this area;
* Use proper academic writing with references.
* Show how the existing work influenced your project.

# Evaluation and Discussion

Replace this text with Results and Discussion.

Describe the results using diagrams such as graphs etc. as appropriate, and discuss what the results mean.

Example: Results indicate that once the threshold gets over a certain point it significantly reduces player performance and player experience

# End of Project Deadline Evaluation

Over the course of 7 months, the project has not achieved its goals. The scope of the project was too vague in the beginning to create a concrete foundation for a suitable test bed for the Machine Learning environment. It wasn’t until near the end where a more cohesive idea was formed

**Project Milestones**

Replace this text with Project Milestones.

Key project milestone dates and measurement on schedule, was project schedule adhered to, effectively planned for delivery on-time or ahead of schedule if appropriate.

**Major Technical Achievements**

What are your major technical achievements?

**Project Review**

What went right? What went wrong? What (if anything) is still outstanding/missing (i.e., still left to do)? If starting again, how would you approach this project differently? What advice would you have for someone attempting a similar project in the future? Were your technology choices the right or wrong ones? If you chose the wrong technology, provide justifications for why you think this. What were the implications of your technology choices?

# Conclusions

summarise your work and findings.

**Future Work**

Indicate what might be some next steps to try (if a student next year was going to undertake a project in this area what might be an interesting thing for him/her to examine?).

# References

# Appendices

Replace this text with Appendices.

This might include ethics application and other relevant material e.g. copy of any questionnaires used.