

Project Summary

What have I achieved

I have created several AI based upon Reinforcement Learning methodologies and techniques to perform different tasks using games and simulators to create new and interesting behaviours in unique and challenging environments.

- Built a self driving car that reacts to negative reinforcement to learn its driving pattern
- Built a Convolutional Neural Network for a bot to play Doom
- Built a Starcraft 2 Bot that utilises a Convolutional Neural Network to learn from image data that has been processed and simplified to determine when to attack the enemy and how.
- Built a Convolutional Neural Network that utilises the Behaviour Cloning training methodology to learn its behaviour.

What I've Learned

- Grown my knowledge of AI techniques
 - Investigated advanced methods of creating computer simulated behaviour and decision making
 - Limitations of Reinforcement learning
 - Learned the process of creating AI using Reinforcement Learning
 - Learned about data collection and feature engineering
 - Learned the basics of statistical analysis
 - Learned about dataset design
 - Learned the basics of the different RL libraries
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- Learned new tools for solving problems in software development

Self-Reflection

Work in Reinforcement Learning has been difficult and has tested my ability to persevere when the world interferes and frustrations and pressure arise, to challenge myself to be a better leader and learner. To manage time and effort and remembering to work smarter and not harder.

What I'd like to investigate next

I'd like to complete what I'd set out in my scope outline, but also apply new methods to old problems and explore the application of these techniques in other domains not specifically related to games. Exploring Generative & Multi-Agent Networks to cooperate together and develop new strategies in a team-based environment whilst still maintaining autonomy instead of deferring strictly to humans, and the potential of AI working in tandem with humans would be ideal.

Resources I've used

I've utilised resources and tutorials from various sources including:

SC2 Tutorial - Sentdex:

<https://www.youtube.com/watch?v=v3LJ6VvpfGI&list=PLQVvva0QuDcT3tPehHdisGMc8TInNqdg>

Python Programming Tutorials: <https://pythonprogramming.net/>

Behaviour Cloning with Unity Simulator: <https://github.com/udacity/self-driving-car-sim>

I've created the models for the Doom and Self Driving Car using Behaviour Cloning

I've also created the codebase for:

- Starcraft 2 Bot & Modelling
- AI code for Self Driving Car using Negative Reinforcement

I've created the dataset for the Behaviour Cloning Self Driving Car