Project Proposal

Reinforcement Learning in Mario Kart Wii

## Background

* What is already out there
  + Tango AI YouTube video/s
    - Used self-made checkpoint system
  + Jack Boynton Presentation
    - Found optimal trajectories/path around the track
    - More suited to more realistic racing games/sims
  + Games Conference RL?
    - READ
* How is mine different
  + None show a human playing against the AI, I will do this at different stages and see the progress
  + Looking like I may use gecko codes and get data from screendump, others did not do this – will hopefully allow ai to train more quickly

## Project Aims/Objectives

* Aims
  + Train an AI model to play mariokart wii using reinforcement learning
  + Play against this ai at different levels in its development
  + To show the major breakthroughs and demonstrate the learning process
* Objectives
  + Training the AI
    - Use CNNs to transform framedumps from the game into inputs to a neural network
    - Train this neural network using a reward function that has many parameters that will change over time. Im not expecting the learning to be very efficient straight away, but I will tune this reward function and its weights throughout the learning process as it encounters different difficulties
  + Play against the AI
    - I will save the state of the neural network at different stages of the learning process and be able to reiterate its inputs into the emulator
      * May have to be non-simultaneous, but simultaneous would be a lot better
    - Dolphin savestates may not be able to be used, controller inputs are looking most likely
  + Show major breakthroughs
    - Again storing controller input, I want to set flags that save the neural network when it completes first turn, lap, 3lap, beats easy cpu, beats staff ghost, beats exert staff ghost

## Plans to Achieve Objectives

06/11/23 – COMPLETE PRORMPOSAL!!!

1. Research
2. Problem Formulation
3. Formalisation
4. Emulator Interaction/Configuration
5. Programming
6. Learning Process
7. Data Analysis