**282893 Acquired Intelligence and Adaptive Behaviour Coursework**

Abstract

While testing a CNN, I needed to decide whether to test on the same labelled data that it had been trained on. There is a logical argument to be made that it would be fair – that it mathematically shouldn’t make a significant difference, or that it would be unfair since it has already directly learned the result already. The goal of this report is to evaluate whether testing a CNN on the same data it was trained on gives it a disproportionate advantage, more than that of just increasing quantity of training data.

Introduction

Each agent controls a ‘robot’, consisting of two connected wheels that they can accelerate independently at will. Each agent will be in an environment, with a traversable floor and collidable obstacles. Each agent has 16 equally-spaced distance sensors, to cover each direction.

There will be two groups of identical agents; the control group, who will be trained on obstacles with randomised positions and sizes, and the experimental group who will be trained on the same data every time. The goal of all agents is to travel as far to the right as possible in a given timeframe. The timeframe I have chosen is 20 seconds, as this is long enough to travel a comparable distance while still being short enough to train to a high degree in a reasonable timeframe. The fitness function will be correlated to the robot’s X-coordinate.

My hypothesis is that agents trained and tested on the same data will outperform others when tested with the same data, and that agents trained on randomised data will outperform the others when tested on randomised data. That is to say, that adaptability can be learned just from variable training data, and that an increase in adaptability leads to a decrease in maximum potential score.