COMP3200 Interim Report

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0.1 Project Concept

0.1.1 Description

Develop an algorithm for multiple agent object detection and privacy focussed self improvement

- Multiple agents with different camera perspectives around an environment should be able to determine the positions of given objects
- The agents should decide if af object is actually there, or if the sighting was a false positive
- For the scope of this project, I will be only detecting non-moving objects
- Agents should never share camera feeds between themselves
- For this project, the agents will have to detect simple objects in a simplified environment, with the assumption being that one could extend the methods with more time to a real world use case

Perform object detection and learning in a completely distributed manner

- The agents should perform all communications without a central server
- After a time period, all the agents on the network should have the same model of the objects in the environment
- The agents should share a common neural network for object detection, and each agent should contribute to that model with their own data

0.1.2 Reason For Changing Focus

- I have found the theoretical aspect (developing the algorithm) the most interesting part of my research
- I would prefer not to dwell on specifics like making a photorealistic fire or trying to find a real word dataset
- Spending more time on the algorithm design will allow me to create a more robust algorithm

0.2 Plan - NOT IN INTERIM REPORT

1. Train a standard neural net of mnist discrimination
2. Using swarm learning, partition mnist to different agents and train discrimination
3. Compare performance of first two methods and optimise algorithm
4. Train a standard neural network for object detection

5. Partition the dataset and use swarm learning to lean the same task, compare, and optimise
6. Build/Modify the simulation such that multiple agents can grab screenshots from within it
7. Add an object detection heatmap as an output to the simulation for each camera
8. Train (using swarm learning) a neural net to detect objects in the simulation. This should be trained from the heatmap, and should not involve agents detecting objects as a group, but instead individual object detection
9. Figure out how to allow performance to improve over time without looking at the heatmap (in the real world there is no heatmap)

0.3 Progress

0.3.1 Algorithm Design

Here i will talk about how I plan to implement the whole system

0.3.2 Distributed Learning

Here i will talk about how the implementation of distributed learning is going - probably on a dataset like mnist