OCR Computer Science Project

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Candidate Number: -

Project Name: Project Sludge

Analysis

The Problem

Through my reading of phycology books over many years, my curiosity of how the brain and the neurons that make it up link together to form complex networks to respond to stimuli has increased over that time. Recently i was looking for a solution on the market so i can visualize a real time simulation of how neurons form complex networks to respond to said stimuli, but nothing satisfied me, which led to the realization that there's a gap in the market.

Many biology students, psychology students, AI developers and even self-learners struggle to visualize how neurons and neuron networks work. They read books, see static images and look at non-interactable videos of poorly rendered graphics which means they struggle to see how the knowledge they have applies to real life biology and learning. As much of the actual learning comes from actual practice, which there's a lack of, this causes a more difficult time in understanding the fundamentals in the previously mentioned fields and lots of unnecessary headaches.

Here’s where my solution comes in. An interactable grid of cells, where these cells have a group of rules to imitate the functions of neurons. These neurons can form complex networks which can be trained to take in a stimulus/input given by the user, i.e. a group of visual data, and respond to such stimuli through the fundamental training principles of reward and punishment, where after sufficient training, it can provide a suitable output to all future inputs. This will allow the user to go through all the generations and understand how the group of neurons formed a suitable network, hence providing a valuable tool for learning.

This solution is suitable to a computational approach due to its need to handle large data sets efficiently, providing seamless visualization and a sandbox for the user. Furthermore, it need for the analysis of such data which is essential for any learner and even further replication of the data, which comes in handy in the scientific fields of biology and phycology where experiments have to replicable. Computers also allows to test the practicality of the neural networks constructed over generations through sandboxes where the responses to stimuli can be tested, i.e. testing how a neural network can respond to visual stimuli to drive a virtual car. It will critically use the ideas of cellular automata to replicate how neural networks using “alife” as it is the closest we can get without using petri dishes of neurons which not everyone has access to.

Stakeholders

My main demographic is students of phycology, for this I have gathered three students studying phycology at different levels: Ana in year 12 at Hallcross, Marta mmmmmm

My target demographic is students of phycology, for this i have gathered two students studying phycology, Marta in year 13, and Ana Astoria in year 12. My aim is to be able to simply their journey into their education and provide a simple tool for learning.

They will use it to further expand their knowledge in the field of phycology and gain practical skills in it too. They will use it to test out theories, analyze data gathered from the sandbox and replicate it down the line for scientific review.

Other stakeholders include, students of computer science who want to explore neural networks and the technology of cellular automata, taking inspiration from it. Others may also include anyone with an interest in the field who wants to start their journey in the field of phycology.