OCR Computer Science Project

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Analysis

The Problem

As of the writing of this, I’ve had my interest peaked by phycology for a while now. More specifically, how little organisms known as neurons bunch up together to form a network to produce a response to a stimulus. There has been an attempt to recreate these Neural Networks which comes in the form of a major boom in our culture. AI, or more realistically, machine learning algorithms that generate texts to prompts. These machine learning algorithms have been everywhere from fitness apps to newsletters. Now this is great, however these machines learning neural networks are rigid, uniform and have stopped to recreate what it was aiming to recreate.

Looking through the market, I was left dissatisfied by the notion of such self-imposed limitations. The tools offered to computer scientists and phycology students to learn about and teach ‘abiotic’ neural networks were almost non-existent. Phycology students have no tools to visualise real time growing networks that produce a response to stimuli and computer science students have no alternative to the rigid self-programmed neural networks that offer an illusion of learning.

This led me to the obvious realisation of the gap in the market. Here’s where my solution comes in. A two-dimensional grid of cells with two working layers that act as individual layers of cellular automata (a technology that we will go through later). The first layer acting as the transmitter; it will be the neurons connecting together, a railroad per says. The second layer will conduct the signals along the edges set in the first layer, the train carrying the load. Both layers will have their own set of rules that will determine how the networks are formed and the signal transmitted. The grid will be displayed within a graphical interface and should be interactable with a set of tools. This grid of neurons can be trained with the principles of reward and punishment to produce a desirable response to a set of stimuli in REAL time.

This solution will need efficient management of data and multiprocessing capabilities, such as of a GPU. It will also have to provide an optional lightweight GIU and visualisation of the network. All amenable to a computational approach.

Stakeholders

My main target demographic is computer scientists and students of phycology. For this I have gathered two phycology students, one computer scientist and one phycology students with involvement in computer science.

The phycology students would greatly benefit from a more in depth and real time visualization of how neurons work together, grow and form networks. They will be mostly interacting with the visualiser and the tools that come with it.

On the other hand, computer scientists can benefit from the tools that can produce organic neural networks to aid in their own algorithms, solve solutions and gain a greater understanding of the field of artificial intelligence as well. They will be mostly interacting with the API but will occasionally venture with the visualiser to check on the ‘health’ of the network.

Other stakeholders may include anyone interested in learning about neurons and users that want to produce visualisations of neurons.

My stakeholders include Marta (year 13 Phycology and Computer Science student), Ana Astoria (year12 phycology student), Syima (Year 13 phycology student) and Ashton Pitcher (Year 12 Computer Science Student).

Interviewing Stakeholders

As this project’s aim is to better people and involves a GUI; an interview with the previously mentioned stakeholders seems appropriate. These series of questions will try to return useful feedback in terms of what features are needed or beneficial and try to find out how all of this is suitable to each type of person. These questions (and its respective clients) will be referred back to all throughout the development process.

Questions include but are not limited to:

1. Tell me about yourself
2. Where do you get your understanding of neurons/ neural networks?
3. Do you use any websites, videos or any computer resources to expand and enhance your understanding of neurons?
4. What are the drawbacks and benefits of such methods of learning?
5. How would an interactable model for learning about neurons change the efficiency of your retrieval?
6. For an interactable mode/ sandbox for neurons, what key features are needed?
7. What other features would be nice quality of life additions?
8. What are your thoughts on a sandbox interactable model that grows to produce a response to stimulus?
9. Any other comments or questions?

Interviewing Asthon

1. Asthon: My name is Ashton Pitcher; I am a student at Doncaster UTC. I do Computer Science, Business, Math and Further Math. I do taekwondo and play drums. I am extremely interested in neural networks, which is why I took this Interview.

Me: What do you know about neural networks?

Asthon: I don’t know much; I have a lukewarm understanding of neural networks. I once witnessed brain scans in person which intrigued me to pursuit more knowledge on neural networks.

1. Asthon: I get my understanding from sources such as Wikipedia and word of mouth, but apart from that, I lack any major knowledge in neural networks and the field of Physics.
2. & 4 Me: The question doesn’t apply to you, but if you were to start learning about it, what resources would you use? What are some benefits and drawbacks of such methods?

Asthon: I would invest in university courses. However, they are expensive to join, and it would take a rather large chunk of time out of my busy day. The benefits of a university course is that its very in depth and provides a formal qualification.

I could also speak to a family friend who is a neuroscientist. They have a lot of field experience that they can share, therefore they are extremely qualified. However, they might have trouble explaining and simplifying the information down to make it easy to understand.

1. Ashton: A sandbox isn’t complicated for a person like me to understand which will let me understand networks through exploration in my own way and understand how the neural networks interact.
2. Ashton: The most important feature would be simple interactive UI, this is to make it accessible to all age groups and all ranges of intelligence.

Me: Anything important to navigate the UI?

Ashton: Colour coded interactions that have keys that explain it. I want to interact with the neural network via cutting and adding neurons.

1. Ashton: A qualify of life feature that I would find very helpful is being resourceful light; taking less that a whole gigabyte of ram and not cause any memory leaks. Easy tools for manipulation of neurons.
2. Ashton: Will it be accessible?

Me: Accessible in terms of what?

Ashton: What other platforms is this available on?

Me: The plan is to make it accessible on the computer first and then if it works out make it accessible on mobile devices for greater accessibility of knowledge. Any other questions?

Ashton: No, thank you.

Interviewing Ana Astoria:

1. Ana: I’m Ana and I am a student at Hall cross, I go to 6th form, and I do sociology, phycology and law. I plan on going London to get a law degree and become a Barrister. I really like music and I’m pretty much into a bit of everything, but my favourite band is Radiohead.
2. Ana: Well, I learn about neurons in bio-phycology and when I revise a topic, I usually go on the resources given by my teachers on google classrooms.
3. Ana: I usually just search up videos about the particular topic I want to revise on YouTube and Safari, I usually use Quizlet.
4. Ana: I’d say that some benefits is that its really accessible and easy to find resources, and there’s a wide variety of content. I’d say that a drawback would be that it is a lot easier to get distracted when revising.
5. Ana: For learning it wouldn’t help memorise any new information, it is a lot easier for me to just revise by watching videos and answering exam questions however yes, with retrieval it would have a positive improvement and it would improve my understanding of neurons.
6. Ana: Maybe give a clue to the user when they are unsure or give a definition of terms when you hover on it to guide you.
7. Ana: Keep it easy to use, accessible, to make it free if possible, and maybe make it an app as well that is available on both laptops and phones.

Interviewing Marta:

1. I’m 18 years old, I was originally born in Lithuania, but I moved to the UK when I was 14. I do Maths, Phycology and Computer Science for A levels. My hobby is music and I enjoy skincare too.
2. Mostly from Phycology lessons and Research on the internet.
3. Mostly Google and YouTube.

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