Aaron Saporito 🇺🇸 | Russell Kosovsky 🇺🇸 | Matthew Lee 🇰🇷 | Jay Nash 🇵🇹 | Derin Gezgin 🇹🇷

COM316: Artificial Intelligence | Answers to Standard Questions #10

Meeting Date & Time: 11/20/24, 8:30-9:30 PM

What other types of problems can we solve using this method? In other words, the problem probably deals with a particular situation. Can we categorize what general category of problems this method can solve?

Neural networks are highly adaptable solutions that allow us to solve many types of problems. For example, we can use them to predict answers, such as whether an object is an obstacle or not. Additionally, they can be used in image classification and language processing.

Neural networks can be used in classification problems like image classification, facial recognition, sound classification, etc. Similarly, it can be used to control autonomous agents as their decision mechanism can be a neural network.

In theory, neural networks can also be trained to be used in forecasting. For example, we can train a neural network with weather data (wind speed, humidity of the air, time of the year, etc.) to predict the weather in the future.

Assuming that this solution does not give us a fully autonomous artificial mind, what is holding us back?

The neural network still requires training before being able to classify. Because of this, it requires human input to learn a concept. Ideally, a fully autonomous agent can learn concepts without human input. For this to be automated, there should be a system to label new information correctly. But this would require a new classifier for that specific classification.

At the same time neural networks are very dependent on labeled data on its learning sessions. In other words, they are not able to perform unsupervised learning on complex tasks.

At the same time, neural networks can master very specific tasks and topic and they lack the ability of generalization. For example a neural network that is trained to ride a car might be struggling a lot to try riding a remote-controlled car as the inputs would be very different. However, a

human can quickly see the big similarities between these two tasks and master the second task.

Neural networks cannot use common sense and reasoning. For example, if we show an image of a cat sitting on a dog to a neural network intended to classify cats and dogs, it might get confused and classify this as cat or dog depending on its training. It would never be able to classify it as "a cat sitting on a dog."

Can we restate this problem and/or add more tools to gain more ground in our search for the artificial mind? What small change will force us to develop a solution that is one step closer to a fully autonomous artificial mind?

Currently, we are limited by the size of our neural network. We can learn more complex features by expanding into a multilayer neural network with hidden layers. This increases our likeness to a real mind, as there are many unique interconnections between neurons. We can further this idea by incorporating backpropagation to learn across multiple layers, similar to habit forming in a human mind. To reach an even more human brain-like state, we can incorporate NEAT, allowing new neurons to either be added or deleted as the neural network evolves.

At the same time, neural networks are not very good at recognizing patterns like Recurrent Neural Networks or Long-Short Term Memory Networks. A basic neural network (which we work on in this assignment) will only take the input and give an output based on its weights and biases. It will never keep track of its previous examples during the learning session.

Lastly, we can add attention to our neural network, allowing us to focus on specific input parts. When our input is very simple, this will not make a difference, but when we have an extremely large input, being able to focus on certain parts of it and knowing where to focus would be crucial as it will increase the accuracy and make a better model overall.