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Approximate Intelligence

Recently, I’ve been ruminating on ideas surrounding artificial intelligence. I have a close friend who is very enthusiastic about the current state of AI, but I’m not so sure about it. I do not think that our current model of artificial intelligence will produce anything truly intelligent. In the context of AI research, Legg and Hunter summarized a number of definitions of intelligence into the statement: “Intelligence measures an agent’s ability to achieve goals in a wide range of environments” (9). This definition is lacking. It describes an external conception of intelligence based only on what it achieves.

A paper published in American Psychologist says, “Individuals differ from one another in their ability to understand complex ideas, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning, to overcome obstacles by taking thought” (Neisser et al. 2). This is a much more comprehensive idea of what intelligence is which includes the ability to adapt, understand, and reason which many would say are an integral part of what we consider intelligence. These traits do not exist in the current state of the art of AI. Perhaps with powerful, enough software and hardware these qualities will emerge, but we do not understand the mind well enough to say this with certainty, and as the technology advances, the likelihood of this seems to be decreasing.

There has recently been an emergence of software that can create almost human-like art based on prompts fed to it by people, which has sparked debate online. One focus of this debate has been on the quality of the art produced and the ability of the AI to make specific requested changes. Most of these images generated by artificial intelligence have a quality of un-reality to them which demonstrates no understanding of what it is creating.

The idea of understanding is key. I recently had a discussion with a coworker that emphasized this. We had previously discussed if we think we are close to true artificial intelligence, and he disagrees with my assessment. To him, current models are not too different from the way that he thinks about intelligence, and at the time, I couldn’t understand the reason. However, a recent conversation we had was about what it means to understand something. He was saying that understanding is no different from pure knowledge and that if a person were to have enough knowledge about something implanted directly into their brain, then they would understand the thing. I argued that understanding also requires experience to draw from to create a deeper intuition.

The current models of artificial intelligence involve neural networks which attempt to simulate the way that biological neurons work together in an interconnected network. These networks consist of nodes connected by inputs and outputs. The outputs of each node are calculated from some function non-linear function of the inputs. Each node and connection also typically has a weight that adjusts the values. This lends itself more to a mathematical approximation of intelligence than an actual replication of intelligence. In calculus, there is a way of approximating the values of a function near a particular known value called a linear approximation. While a neural network is not a linear model, it is, in a sense, very similar to a linear approximation. They are quite good at finding solutions to problems that are like other problems that have solutions that are used to train the neural network.

A deep learning neural network will never be enough on its own to produce true artificial intelligence. There is work being done to simulate aspects of human neurology beyond the electrical signals of neurons, such as neurotransmitters like dopamine and serotonin. These chemicals have a huge impact on the way we as human beings think, feel, and behave, and without including them in the models, we could never get a fully accurate simulation of intelligence. Artificial intelligence has improved by leaps and bounds over the last ten years, but only time and further research will tell if this will be enough or if neural networks will be included in the artificial intelligence of the future at all.