Neuroscience-Inspired Artificial Intelligence

RAJA ADIL
UNIVERSITY COLLEGE LONDON
1) Artificial Intelligence (AI) - Refers to the simulation of human intelligence in machines that programmatically think similar to humans and essentially mimic their actions. When a machine exhibits characteristics that are associated with a human's thought process such as learning something new or solving tough problems, this can be classified as Artificial Intelligence.

2) Brain - The brain is the part of our body which allows us to make sense of things. Through our organs, our surroundings are delivered to us as input, the brain processes these surroundings, makes sense of it, and delivers output. The brain is able to control our actions and thoughts, capable of controlling our every movement.

3) Cognition - Refers to our mental processes in order to gain knowledge and comprehend things. This can include the process of thinking, learning, knowing, remembering, etc. The way we output these processes is through encompassing our language, imagination, perception, etc.

4) Neural Network - A series of algorithms used in order to recognize underlying relationships in a dataset through a process which mimics the way we as humans operate. Neural Networks are easily adaptable to new sets of data, meaning they can produce the best possible result without a need to redesign the algorithm.
The researchers are trying to better understand how biological brains could play a vital role in building intelligent machines. They explore historical interactions between the AI and neuroscience fields in order to emphasize current and future advances in AI that have been inspired by the study of neural computation in humans and other animals. They highlight shared themes that are or may be key for advancing future research in both Neuroscience and Artificial Intelligence.
Methods

Look for ways where AI can be helpful to neuroscience and the broader potential for synergistic interactions between these two fields.

Explored how the brain could implement an algorithmic techniques in order to allow networks to learn efficiently with big models of data. They key are attempting to find and allows layers of a networks and algorithms to be optimized toward an objective function that Neuroscience presents

Develop models with strong connections to theoretical neuroscience ideas about predictive coding capable of approximating and developing efficient algorithms through sets of data, influencing areas of neuroscience
Images

A simple neural network

input layer  hidden layer  output layer
Results and Errors

Some results have resulted in human-level performance on challenging reasoning tasks. Deep Learning and algorithmic models that have used large data, has been used to capture the processes by which children gain commonsense and in ways understanding of the world through interactive experiments that have collected data. These deep models have been developed that are able to construct rich object models from raw sensory inputs. learning procedures that adjust system parameters in order to minimize error.

Some of their pieces of data they experimented with resulted in prediction errors of how humans think, learn, and process information. This is a key part of Artificial Intelligence that needs to be fixed by adding more data in networks to produce efficient, easily predictable, and accurate information that we as people would want to know of to push further for greater developments of technology.
Future Applications

Guidance toward architectural and algorithmic constraints that may lead to successful neural network applications for AI.

Using Deep Learning/Imaging techniques in order to detect and predict tumors.

To summarize detailed information such as treatment stages, disease conditions, etc. through machine learning methods features.

To review studies in diagnosis, differential diagnosis, and subtyping of Parkinson’s disease, to depict the workflow from magnetic resonance image to classification results, and to summarize an essential assessment of the recent research and to offer suggestions for future research.
Interesting Things

1) Human intelligence is characterized by a remarkable ability to maintain and manipulate information within an active store, known as working memory.

2) Artificial systems now match human performance in challenging object recognition tasks and outperform expert humans in dynamic, adversarial environments such as Atari video games, the ancient board game of Go, and imperfect information games such as heads-up poker.

3) Machines can autonomously generate synthetic natural images and simulations of human speech that are almost indistinguishable from their real-world counterparts, translate between multiple languages, and create “neural art” in the style of well-known painters.

4) In neuroscience, the advent of new tools for brain imaging and genetic bioengineering have begun to offer a detailed characterization of the computations occurring in neural circuits, promising a revolution in our understanding of mammalian brain function.
THANKS!

Do you have any questions/comments/concerns?

CREDITS: This presentation template was created by Slideshow, including icons by Flaticon, and infographics & images by Freepik