



Artificial Intelligence

Or How Not to be Afraid of the HAL 9000

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What is Artificial Intelligence (AI) Anyway?

And ~~Why~~ Is It Scary?



- Definition of AI
- How Does AI Work?
- History of AI
- How Can AI Be Used?
- Why Are People Concerned?
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Definition of AI



- According to IBM, “Artificial intelligence, or AI, is technology that enables computers and machines to simulate human intelligence and problem-solving capabilities.”
- On its own or combined with other technologies (e.g., sensors, geolocation, robotics) AI can perform tasks that would otherwise require human intelligence or intervention. Digital assistants, GPS guidance, autonomous vehicles, and generative AI tools (like Open AI's Chat GPT) are just a few examples of AI in the daily news and our daily lives.
- As a field of computer science, artificial intelligence encompasses (and is often mentioned together with) **machine learning** and **deep learning**. These disciplines involve the development of AI algorithms, modeled after the decision-making processes of the human brain, that can ‘learn’ from available data and make increasingly more accurate classifications or predictions over time.



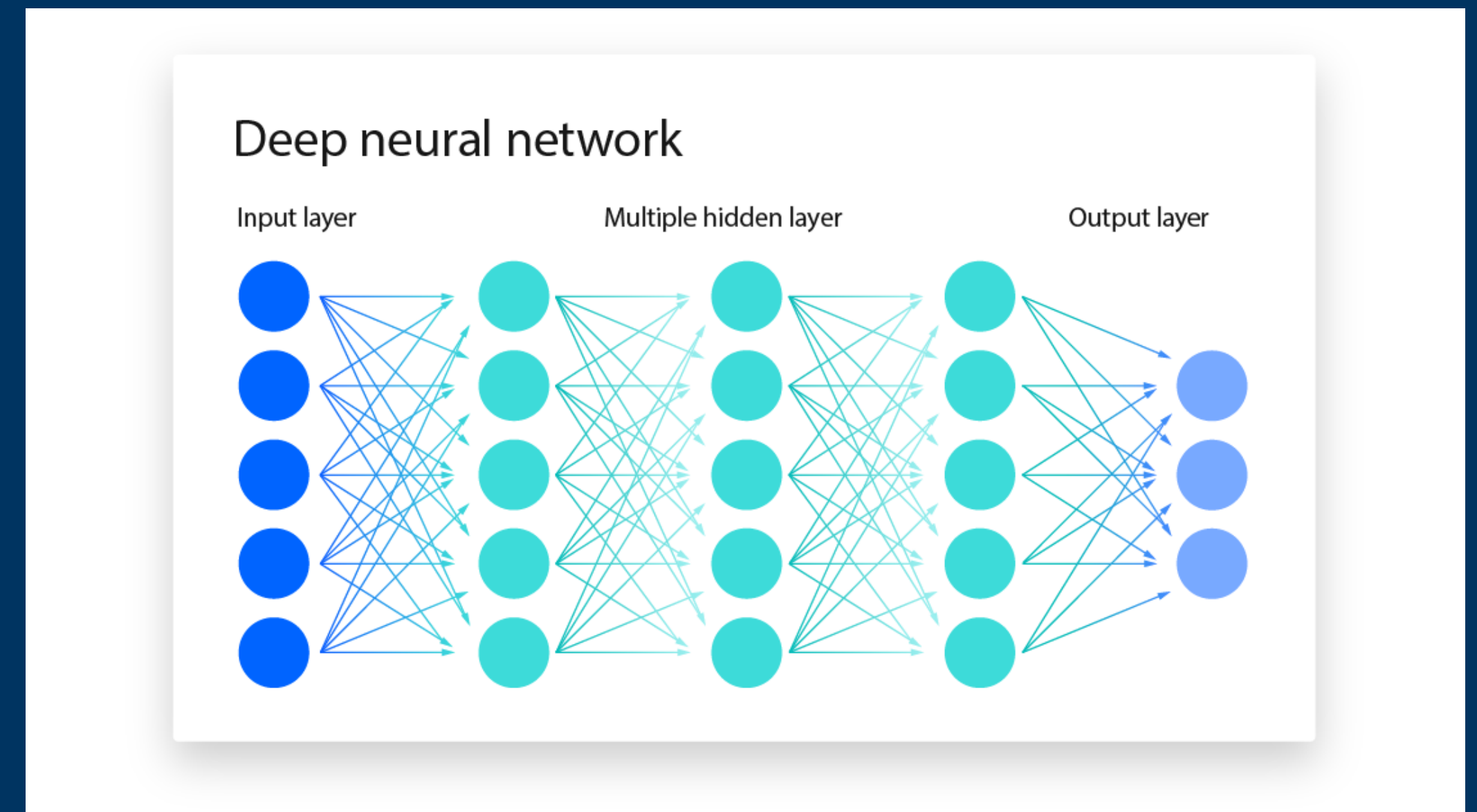
Definition of AI (con't)

- According to John McCarthy, AI “is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.”[1]
- According to Wikipedia, “Artificial intelligence (AI), in its broadest sense, is intelligence exhibited by machines, particularly computer systems. It is a field of research in computer science that develops and studies methods and software that enable machines to perceive their environment and use learning and intelligence to take actions that maximize their chances of achieving defined goals.”[2]

References: [1] Paper by John McCarthy, Nov 12, 2007, “What is Artificial Intelligence” - <http://www-formal.stanford.edu/jmc/>
[2] Wikipedia Article: “Artificial Intelligence” - https://en.wikipedia.org/wiki/Artificial_intelligence

How Does AI Work?

- Both machine learning and deep learning algorithms use **neural networks** to ‘learn’ from huge amounts of data. These neural networks are programmatic structures modeled after the decision-making processes of the human brain. They consist of layers of interconnected nodes that extract features from the data and make predictions about what the data represents.



History of AI



1950: Alan Turing publishes [Computing Machinery and Intelligence](#). In this paper, Turing asks the following question: "Can machines think?"

1956: John McCarthy coins the term "artificial intelligence" at the first-ever AI conference at Dartmouth College. Later that year, Allen Newell, J.C. Shaw, and Herbert Simon create the Logic Theorist, the first-ever running AI software program.

1967 - 1968: Frank Rosenblatt builds the Mark 1 Perceptron, the first computer based on a neural network that "learned" through trial and error. A year later, Marvin Minsky and Seymour Paper publish a book titled Perceptrons, which becomes both the landmark work on neural networks and, at least for a while, an argument against future neural network research projects.

1980s: Neural networks which use a backpropagation algorithm to train itself become widely used in AI applications.

1995: Stuart Russell and Peter Norvig publish Artificial Intelligence: A Modern Approach, which becomes one of the leading textbooks in the study of AI.

History of AI (con't)



1997: IBM's Deep Blue beats then world chess champion Garry Kasparov, in a chess match (and rematch). The HAL 9000 goes online.

2004: John McCarthy writes a paper, **What Is Artificial Intelligence?** and proposes an often-cited definition of AI.

2011: IBM Watson beats champions Ken Jennings and Brad Rutter at *Jeopardy!*

2015: Baidu's Minwa supercomputer uses a special kind of deep neural network called a convolutional neural network to identify and categorize images with a higher rate of accuracy than the average human.

2016: DeepMind's AlphaGo program, powered by a deep neural network, beats Lee Sodol, the world champion Go player, in a five-game match.

2023: A rise in large language models, or LLMs, such as ChatGPT, create an enormous change in performance of AI and its potential to drive enterprise value. With these new generative AI practices, deep-learning models can be pre-trained on vast amounts of raw, unlabeled data.

How Can AI Be Used?



- There are many uses for AI and chances are you are already using some form of AI perhaps without knowing it:
 - Digital Voice Assistants (Siri, Alexa, etc)
 - Internet Search Engines
 - Speech-to-Text
 - Customer Service virtual agents or Chatbots
 - Computer Vision
 - Weather Forecasting
 - Anomaly Detection (Cybersecurity and medical applications)

Reference: IBM Article: "What is Artificial Intelligence (AI)?" - <https://www.ibm.com/topics/artificial-intelligence>

Why Are People Concerned?

- AI in the movies and literature: The Terminator, HAL 9000, The WOPR (War Operation Plan Response)
- Deep fakes
- Copyright infringement
- Privacy and lack of transparency
- Data Center power consumption
- Algorithm bias and fairness
- Bad actors and weaponized AI
- Etc.



ChatGPT Demo

Apple Intelligence - What is it?

<https://www.apple.com/apple-intelligence/>

Questions/Discussion



Back-Ups

Generative AI



- Generative AI refers to deep-learning models that can take raw data—say, all of Wikipedia or the collected works of Rembrandt—and “learn” to generate statistically probable outputs when prompted. At a high level, generative models encode a simplified representation of their training data and draw from it to create a new work that’s similar, but not identical, to the original data.

Reference: IBM Article: “What is Artificial Intelligence (AI)?” - <https://www.ibm.com/topics/artificial-intelligence>