Opinion

iMedPub Journals
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International Journal of Innovative Research in Computer and Communication Engineering

2022
Vol.9 No.9:93

The Various Sub-fields of AI Research are Centered on Particular Goals

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Received date: October 28, 2022, Manuscript No. IJIRCCE-22-15420; **Editor assigned date:** November 02, 2022, PreQC No. IJIRCCE-22-15420 (PQ); **Reviewed date:** November 10, 2022, QC No. IJIRCCE-22-15420; **Revised date:** November 23, 2022, Manuscript No. IJIRCCE-22-15420 (R); **Published date:** November 30, 2022, DOI: 10.36648/ijircce.7.9.93.

Citation: Lee J (2022) The Various Sub-fields of AI Research are Centred on Particular Goals. Int J Inn Res Compu Commun Eng Vol.7 No.9:93.

Description

AI applications include advanced web search engines understanding human speech such as Siri and Alexa, self-driving cars automated decision-making and competing at the highest level in strategic game systems such as chess and Go. As machines become increasingly capable, tasks considered to require "intelligence" are often removed from the definition of AI, a phenomenon known as the AI effect. For instance, optical character recognition is frequently excluded from things considered to be AI having become a routine technology. Artificial intelligence was founded as an academic discipline in 1956, and in the years since has experienced several waves of optimism followed by disappointment and the loss of funding known as an AI winter followed by new approaches, success and renewed funding. AI research has tried and discarded many different approaches since its founding, including simulating the brain, modeling human problem solving, formal logic, large databases of knowledge and imitating animal behaviour. Highly mathematical-statistical machine learning has dominated the field, and this technique has proved highly successful, helping to solve many challenging problems throughout industry and academia.

Artificial Neural Networks

The various sub-fields of AI research are centred on particular goals and the use of particular tools. The traditional goals of AI research include reasoning, knowledge representation, planning, learning, natural language processing, perception, and the ability to move and manipulate objects general intelligence the ability to solve an arbitrary problem is among the field's long-term goals to solve these problems, AI researchers have adapted and integrated a wide range of problem-solving techniques including search and mathematical optimization, formal logic, artificial neural networks, and methods based on statistics, probability and economics. AI also draws upon computer science, psychology, linguistics, philosophy, and many other fields. The study of mechanical or "formal" reasoning began with philosophers and mathematicians in antiquity. The study of mathematical logic led directly to Alan Turing's theory of computation, which suggested that a machine, by shuffling symbols as simple as "0" and "1", could simulate any conceivable act of mathematical deduction.

Neurobiology Information

This insight that digital computers can simulate any process of formal reasoning is known as the Church-Turing thesis this, along with concurrent discoveries in neurobiology, information theory and cybernetics, led researchers to consider the possibility of building an electronic brain. The first work that is now generally recognized as AI was McCullough and Pitts' 1943 formal design for Turing-complete "artificial neurons". Two visions for how to achieve machine intelligence emerged. One vision, known as Symbolic AI or GOFAI, was to use computers to create a symbolic representation of the world and systems that could reason about the world. Proponents included Allen Newell, Herbert A. Simon, and Marvin Minsky. Closely associated with this approach was the "heuristic search" approach, which likened intelligence to a problem of exploring a space of possibilities for answers. The second vision, known as the connectionist approach, sought to achieve intelligence through learning. Researchers in the 1960s and the 1970s were convinced that symbolic approaches would eventually succeed in creating a machine with artificial general intelligence and considered this the goal of their field. Herbert Simon predicted, Machines will be capable, within twenty years, of doing any work a man can do. Marvin Minsky agreed, writing, within a generation. The problem of creating 'artificial intelligence' will substantially be solved". They had failed to recognize the difficulty of some of the remaining tasks. Progress slowed and in 1974, in response to the criticism of Sir James Light hill and ongoing pressure from the US Congress to fund more productive projects, both the U.S. and British governments cut off exploratory research in AI.

As the hype around AI has accelerated, vendors have been scrambling to promote how their products and services use AI. Often what they refer to as AI is simply one component of AI, such as machine learning. AI requires a foundation of specialized hardware and software for writing and training machine learning algorithms. No one programming language is synonymous with AI, but a few, including Python, R and Java, are popular. In general, AI systems work by ingesting large amounts of labelled training data, analysing the data for correlations and patterns, and using these patterns to make predictions about future states. In this way, a chatbot that is fed examples of text chats can learn to produce lifelike exchanges with people, or an image recognition tool can learn to identify and describe objects in images by reviewing millions of examples. This aspect of AI programming focuses on acquiring data and creating rules for how to turn the data into actionable information. The rules, which are called algorithms, provide computing devices with step-by-step instructions for how to complete a specific task Artificial neural networks and deep learning artificial intelligence technologies are quickly evolving, primarily because AI processes large amounts of data much faster and makes predictions more accurately than humanly possible. While the huge volume of data being created on a daily basis would bury a human researcher, AI applications that use machine learning can take that data and quickly turn it into actionable information. As of this writing, the primary disadvantage of using AI is that it is expensive to process the large amounts of data that AI programming requires. Weak AI, also known as narrow AI, is an AI system that is designed and trained to complete a specific task. Industrial robots and virtual personal assistants, such as Apple's Siri, use weak AI. Strong AI, also known as Artificial General Intelligence (AGI), describes programming that can replicate the cognitive abilities of the human brain. When presented with an unfamiliar task, a strong AI system can use fuzzy logic to apply knowledge from one domain to another and find a solution autonomously. In theory, a strong AI program should be able to pass both a Turing Test and the Chinese room test.