What is Artificial Intelligence? How Does AI Work? (AI Types, History, and Future)

By Avni Singh 06-Jun-2022

If right now, you were to look around for the forms of artificial intelligence, you'd be surprised to notice how deeply AI has penetrated every facet of our life. You can command Alexa or Siri right now to play your favourite song. You can ask the AI systems in your phone to set the alarm for you, remind you to run errands, and perform countless other tasks.

As normalized as AI is in our lives right now, it was just a science fiction fantasy up until a couple of decades ago. So what changed in the last decades that brought AI to common people's lives, straight from sci-fi books and movies?

This article will take you on the journey of understanding what is artificial intelligence, its history, beginnings, types, and future. Let's get started.

What is Artificial Intelligence

The 'intelligence' in Artificial Intelligence refers to machines' ability to make an informed decision or actions based on the given information. Humans are called intelligent beings because we can make independent decisions by factoring in information from our environment.

Our minds have a unique ability to learn, process billions of bits of information every second, solve problems, use logical reasoning, etc. In AI, this intelligence is simulated by machines. They are fed information and then programmed to exhibit human intelligence. When a machine can take actions on its own and simultaneously rationalize them, it will be deemed intelligent.

In short, artificial intelligence is when computer systems can perform tasks that require human intelligence, like solving complex problems, making decisions, etc.

Domains of AI

Artificial intelligence has the following domains:

1. Machine Learning
2. Deep Learning
3. Robotics
4. Expert systems
5. Fuzzy logic
6. Natural Language Processing

Let's delve into the history of AI and how it developed into its present form.

History of Artificial Intelligence

If we go back to the times of the Romans and the Greeks, their mythology has countless mentions of mechanical men, the modern-day equivalent of a robot. One such popular name is Talos. In Greek mythology, Talos was a giant bronze automaton that was made to protect the city Greek city of Europa from the attacks of pirates and invaders.

Fast forward to the last century, our movies and books have been dotted with these machines, who think independently. Needless to say, humans have long had the idea of human-like objects with a mind of their own.

Beginnings and Developments in Artificial Intelligence

For ages, philosophers have thought of the human brain's thinking process as a 'symbolic system.' Whether they are on an intergalactic mission or fighting aliens, Robotic companions to humans have been at the heart of sci-fi pop culture.

From TARS from Interstellar, Arthur from Passengers, to Wall-E and cult movies like The Matrix, machines that think and talk and perform actions for humans have been embedded in the popular imagination for a long time.

The First Developments

But when did developments actually begin in the realm of Artificial Intelligence? It wasn't until 1956 that the field of Artificial Intelligence was officially founded.

A British math whiz called Alan Turing, also deemed as the father of theoretical computer science, made a suggestion that became the foundation of AI. The suggestion was simple – Just like the human brain, why can't machines use information and reason to solve problems and make choices and decisions based on a given set of information?

In the 1950s, Turing wrote a paper titled 'Computing Machinery and Intelligence.' This paper talked about building intelligent machines capable of making decisions and performing actions and how their intelligence can be tested.

However, the ideas of this paper didn't come to immediate fruition. This was because, for any machine to become intelligent, it must be able to store commands. This was a significant deterrent in the development of AI post Turing's paper, as the computers in the 1950s were not modern enough to store commands; they could only execute the commands given to them.

The Father of Artificial Intelligence

Fast forward to a couple of years later, and the term 'Artificial Intelligence' was officially coined at a conference at Dartmouth College by a computer scientist called John McCarthy.

He later came to be known as the father of Artificial Intelligence. McCarthy, along with Marvin Minsky, Nathaniel Rochester, and Claude Shannon submitted a proposal at the Dartmouth conference, which proposed a 2-month long, ten men study at Dartmouth College.

The basis of the study was "...the conjecture that that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it."

McCarthy proposed that the study to understand AI will work on discovering how to "make machines use languages, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves."

AI Winters and Further Developments

There was optimism in the community of cognitive scientists for the future of artificial intelligence. However, it wasn't a smooth sailing afterward. There were long periods of inactivity called AI winters, once from 1974 to 1980 and then again from 1987 to 1993.

Post the last AI Winter that ended in 1993, development in AI gained speed. In 1970, Japan's Waseda University built the WABOT-1, the world's first, one of its kind anthropomorphic robot with proper systems for limb control, vision, and conversation. In 1997, IBM's Deep Blue, a chess-playing computer program, defeated Garry Kasparov, the Russian grandmaster.

In 2000, the beginning of the 21st century, the ASIMO robot by Honda, a humanoid robot, starts delivering customer's trays at restaurants. In the same year, a robot called Kismet is developed by Cynthia Breazeal. This robot can recognize human emotions and also simulate them.

In 2014, Google's driverless car passed the self-driving test. In 2016, Hanson Robotics developed Sophia, a social humanoid robot, who became the first robot to get a country's citizenship. Today, artificially intelligent robots are used in every facet of our lives- speech recognition software, smart homes, self-driving cars, and many more things

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Types of Artificial Intelligence

There are four types of artificial intelligence, based on the functionality of AI systems:

- **Reactive Machines-** Reactive machines have limited capability. These machines cannot learn from the previous tasks that they performed. When functioning, reactive machines only take into account the data that they have at the moment. Reactive AI machines can't function based on memory; they don't learn from their previous actions. This limits their usage. IBM's Deep Blue AI machine, which defeated Garry Kasparov in chess in 1997, falls under the Reactive AI machine. They just respond to a stimulus.

- **Limited Memory**- Limited Memory machines are just an upgraded version of reactive machines. These machines can take into consideration the past data while making new decisions. In other words, limited memory machines can 'learn' from past data. Limited memory AI is used in nearly all forms of AI that we use today, ranging from chatbots to self-driving cars.

- **Theory of Mind-** This type of AI is still a theoretical concept as of now. The focus of the Theory of Mind AI will be on comprehending the human thoughts, belief systems, needs,

thinking processes, etc. This AI will help machines have a deeper understanding of how humans behave, act, and emote.

- **Self-aware-** This type of artificial intelligence is not remotely close to existence. In this, the artificially intelligent beings will have a consciousness of their own. Just like humans, they will have their set of beliefs, ideas, ideologies, and emotions. This type of AI is also considered a massive threat to the human race.

Stages of Artificial Intelligence

- **Artificial Narrow Intelligence (ANI)**- This is also known as weak AI, and most AI systems built till date fall under this category. The machines that follow a narrowly defined set of tasks fall under the Artificial Narrow Intelligence stage of AI. At the ANI stage, the machines are devoid of any ability to think and make independent and informed decisions. The functions performed by such machines are predefined—for example, self-driving cars, Siri, Alexa, etc.

- **Artificial General Intelligence (AGI)**- This is also known as Strong AI, and currently, no robots or machines exist that have Artificial General Intelligence. In this stage, machines will have the ability to process information and make informed decisions just like humans. Since these machines will have an autonomous thought process like humans, they are also considered as a threat to the human race by many prominent scientists, include late astrophysicist Stephen Hawkins.

- **Artificial Superintelligence (ASI)**- This is considered the highest stage of machine awareness. Although hypothetical as of now, Artificial Superintelligence (ASI) is the stage when the machines' abilities to think, process, and reason will surpass human beings' intelligence. If you've seen any popular rendition of machines taking over the planet and enslaving or eliminating humanity, it is done by ASI. The popular science fiction movie trilogy, The Matrix, is centered on this concept.

Usage of Artificial Intelligence

Artificial intelligence has widespread usage in every possible field out there. It has revolutionized banking, safety, medicine, and engineering, to name a few. Here are some of the common domains to which AI has contributed to:

- **Medicine-** Today, AI in the field of medicine has made diagnosis and treatment easier and more precise. This helps in saving more lives. AI is used in medicine to monitor patients, choose the right treatment, analyze results, gather data, compile reports to conclude treatment methods, etc.

- **Banking-** Since banking is also online now, there's been a steady rise in fraud payments, money laundering, etc. AI helps banks in risk assessment, prevent money laundering, KYC checks, prevent any payment frauds.

- **Cybersecurity-** Since digitization, from big and small corporations to governments, everyone has their sensitive data stored in a digital format. Although this has massive benefits, it also makes sensitive data prone to cyber-attacks and theft. AI systems can detect even the slightest of anomalies and prevent attackers from stealing or corrupting sensitive data.

- **Virtual assistants-** These are the most common ones found in the homes of ordinary people. Virtual assistants like Siri and Alexa use voice recognition software. You can command them to 'play a song' or 'set up a reminder,' and they will follow it.

Future of Artificial Intelligence

In 2018, well-known venture capitalist Dr. Kai-Fu Lee prophesized about AI, that it "is going to change the world more than anything in the history of mankind. More than electricity." And it turns out, it was indeed true.

If we look around ourselves right now, all the emerging technologies, from the Internet of Things (IoT), big data to machine learning and robotics, everything is driven by artificial intelligence. In the future, we can see the following developments in the realm of AI-

Google and Tesla's self-driving cars will soon be a common sight on our roads. Common places like restaurants will have robots that will be fully capable of performing basic functions like bringing you your order, picking up trays, etc.

Robots will be able to perform functions like preparing reports, controlling appliances and gadgets at our homes and offices, etc.
Jobs that pose a risk to human life, like defusing bombs, will be done by robots. If we think about AI's impact on our future, there's no limit to our imagination.

Artificial Intelligence Certifications

Considering the massive potential of artificial intelligence, it's a great idea to have a certification in this field. We at Koenig Solutions offer online Artificial Intelligence course with full understanding.

We offer some of the best programs and courses in Artificial Intelligence, some of which are:

- Artificial Intelligence Certification Boot Camp
- Machine Learning (Data Science) with Python
- Microsoft Azure AI Fundamentals AI-900
- Advance Python for Machine Learning
- Julia Programming Certification

Conclusion

The idea of machines having a mind of their own has been around for centuries. Today, we are seeing unprecedented strides in the field of Artificial Intelligence.