

## Artificial Intelligence

### What is Artificial Intelligence?

Artificial intelligence (AI) is when a computer is able to make decisions based upon stimuli, much as a human would. Artificial intelligence is an area of computer science that emphasizes the creation of intelligent machines that work and react like humans.

Some of the activities computers with artificial intelligence are designed for include:

- Speech recognition
- Learning
- Planning
- Problem solving

True artificial intelligence can also be learnt from actions taken and modifying behaviour based on them. This can give the illusion that a computer can think, but in fact it is still responding to programmed elements.

**Knowledge engineering** is a core part of AI research. Machines can often act and react like humans only if they have abundant information relating to the world. Artificial intelligence must have access to objects, categories, properties and relations between all of them to implement knowledge engineering. Initiating common sense, reasoning and problem-solving power in machines is a difficult and tedious task.

**Machine learning** is also a core part of AI. Learning without any kind of supervision requires an ability to identify patterns in streams of inputs.

**Machine perception** deals with the capability to use sensory inputs to deduce the different aspects of the world, while computer vision is the power to analyze visual inputs with a few sub-problems such as facial, object and gesture recognition.

### Examples of AI

**Automation:** What makes a system or process function automatically. For example, robotic process automation (RPA) can be programmed to perform high-volume, repeatable tasks that humans normally performed. RPA is different from IT automation in that it can adapt to changing circumstances.

**Machine learning:** The science of getting a computer to act without programming. Deep learning is a subset of machine learning that, in very simple terms, can be thought of as the automation of predictive analytics.

**Machine vision:** The science of allowing computers to see. This technology captures and analyzes visual information using a camera, analog-to-digital conversion and digital signal processing. It is often compared to human eyesight, but machine vision isn't bound by biology and can be programmed to see through walls, for example. It is used in a range of applications from signature identification to medical image analysis.

**Natural language processing (NLP):** The processing of human -- and not computer -- language by a computer program. One of the older and best known examples of NLP is spam detection, which looks at the subject line and the text of an email and decides if it's junk. Current approaches to NLP are based on machine learning. NLP tasks include text translation, sentiment analysis and speech recognition.

**Robotics:** A field of engineering focused on the design and manufacturing of robots. Robots are often used to perform tasks that are difficult for humans to perform or perform consistently. They are used in assembly lines for car production or by NASA to move large objects in space. Researchers are also using machine learning to build robots that can interact in social settings.

**Self-driving cars:** These use a combination of computer vision, image recognition and deep learning to build automated skill at piloting a vehicle while staying in a given lane and avoiding unexpected obstructions, such as pedestrians.

## **AI Applications**

**AI in healthcare:** The biggest bets are on improving patient outcomes and reducing costs. Companies are applying machine learning to make better and faster diagnoses than humans. One of the best-known healthcare technologies is IBM Watson. It understands natural language and is capable of responding to questions asked of it. The system mines patient data and other available data sources to form a hypothesis. Other AI applications include chatbots, a computer program used online to answer questions and assist customers, to help schedule follow-up appointments or aid patients through the billing process, and virtual health assistants that provide basic medical feedback.

**AI in business:** Robotic process automation is being applied to highly repetitive tasks normally performed by humans. Machine learning algorithms are being integrated into analytics to uncover information on how to better serve customers. Chatbots have been incorporated into websites to provide immediate service to customers.

**AI in education:** AI can automate grading, giving educators more time. AI can assess students and adapt to their needs, helping them work at their own pace. AI tutors can provide additional support to students, ensuring they stay on track.

**AI in law:** The discovery process, sifting through of documents, in law is often overwhelming for humans. Automating this process is a more efficient use of time. Startups are also building question-and-answer computer assistants that can sift programmed-to-answer questions.

**AI in manufacturing:** This is an area that has been at the forefront of incorporating robots into the workflow. Industrial robots used to perform single tasks and were separated from human workers, but as the technology advanced that changed.

### **Impact of AI on our lives**

- Those with disabilities can use voice-activated systems, such as Siri or Google Now, to search the web, message family and friends and more.
- The development of self-driving cars may mean that those with disabilities will also be able to travel independently in a car. It may also make the task of driving a car safer, by removing the element of human error.
- The level of entertainment provided by games is much greater. This is because an enemy or opponent in a game can be made more challenging to beat.
- It can be used to create expert systems that allow easy diagnosis or problem solving of issues that require expert knowledge.

### **Problems/issues with AI**

- In the case of self-driving cars, there is a debate about who should pay in the event of an accident on the road, where the self-driving car is at fault. Should the user have to pay? Should the company who made the car have to pay? This issue is as yet unresolved.
- Voice activated systems are improving, but they still suffer from lots of input errors. If artificial intelligence is dependent on a voice-activated system, it will be limited by the ability of this system.
- Artificial intelligence is only as good as its programming. If there are errors in the programs that allow the intelligence to be created, then it will not operate correctly.