**Artificial intelligence (AI)**, the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the [intellectual](https://www.merriam-webster.com/dictionary/intellectual) processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience. Since the development of the digital computer in the 1940s, it has been demonstrated that computers can be programmed to carry out very complex tasks—as, for example, discovering proofs for mathematical theorems or playing chess—with great proficiency. Still, despite continuing advances in computer processing speed and memory capacity, there are as yet no programs that can match human flexibility over wider domains or in tasks requiring much everyday knowledge. On the other hand, some programs have attained the performance levels of human experts and professionals in performing certain specific tasks, so that artificial intelligence in this limited sense is found in applications as [diverse](https://www.merriam-webster.com/dictionary/diverse) as medical [diagnosis](https://www.merriam-webster.com/dictionary/diagnosis), computer search engines, and voice or handwriting recognition.

All but the simplest [human behaviour](https://www.britannica.com/topic/human-behavior) is ascribed to intelligence, while even the most complicated [insect](https://www.britannica.com/animal/insect) behaviour is never taken as an indication of intelligence. What is the difference? Consider the behaviour of the digger [wasp](https://www.britannica.com/animal/wasp), *Sphex ichneumoneus*. When the female wasp returns to her burrow with food, she first deposits it on the [threshold](https://www.merriam-webster.com/dictionary/threshold), checks for intruders inside her burrow, and only then, if the coast is clear, carries her food inside. The real nature of the wasp’s [instinctual behaviour](https://www.britannica.com/animal/insect/Role-of-hormones#ref41274) is revealed if the food is moved a few inches away from the entrance to her burrow while she is inside: on emerging, she will repeat the whole procedure as often as the food is displaced. Intelligence—conspicuously absent in the case of *Sphex*—must include the ability to adapt to new circumstances.

[Psychologists](https://www.britannica.com/science/psychology) generally do not characterize [human intelligence](https://www.britannica.com/science/human-intelligence-psychology) by just one trait but by the combination of many diverse abilities. Research in AI has focused chiefly on the following components of intelligence: learning, reasoning, [problem solving](https://www.britannica.com/science/problem-solving), [perception](https://www.britannica.com/topic/perception), and using language.

Problem solving, particularly in artificial intelligence, may be characterized as a systematic search through a range of possible actions in order to reach some predefined goal or solution. Problem-solving methods divide into special purpose and general purpose. A special-purpose method is tailor-made for a particular problem and often exploits very specific features of the situation in which the problem is embedded. In contrast, a general-purpose method is applicable to a wide variety of problems. One general-purpose technique used in AI is means-end analysis—a step-by-step, or [incremental](https://www.merriam-webster.com/dictionary/incremental), reduction of the difference between the current state and the final goal. The program selects actions from a list of means—in the case of a simple [robot](https://www.britannica.com/technology/robot-technology) this might consist of PICKUP, PUTDOWN, MOVEFORWARD, MOVEBACK, MOVELEFT, and MOVERIGHT—until the goal is reached.

The earliest successful AI program was written in 1951 by Christopher Strachey, later director of the Programming Research Group at the [University of Oxford](https://www.britannica.com/topic/University-of-Oxford). Strachey’s [checkers](https://www.britannica.com/topic/checkers) (draughts) program ran on the [Ferranti Mark I](https://www.britannica.com/technology/computer/ENIAC#ref216048) computer at the [University of Manchester](https://www.britannica.com/topic/University-of-Manchester), England. By the summer of 1952 this program could play a complete game of checkers at a reasonable speed.

Information about the earliest successful demonstration of [machine learning](https://www.britannica.com/technology/machine-learning) was published in 1952. Shopper, written by Anthony Oettinger at the [University of Cambridge](https://www.britannica.com/topic/University-of-Cambridge), ran on the [EDSAC](https://www.britannica.com/technology/computer/ENIAC#ref216048) computer. Shopper’s simulated world was a mall of eight shops. When instructed to purchase an item, Shopper would search for it, visiting shops at random until the item was found. While searching, Shopper would memorize a few of the items stocked in each shop visited (just as a human shopper might).