

# **History Of AI**

## **The birth of artificial intelligence 1952–1956**

In the 1940s and 50s, a handful of scientists from a variety of fields (mathematics, psychology, engineering, economics and political science) began to discuss the possibility of creating an artificial brain. The field of artificial intelligence research was founded as an academic discipline in 1956.

## **Cybernetics and early neural networks**

The earliest research into thinking machines was inspired by a confluence of ideas that became prevalent in the late 1930s, 1940s, and early 1950s. Recent research in neurology had shown that the brain was an electrical network of neurons that fired in all-or-nothing pulses. Norbert Wiener's cybernetics described control and stability in electrical networks. Claude Shannon's information theory described digital signals (i.e., all-or-nothing signals). Alan Turing's theory of computation showed that any form of computation could be described digitally. The close relationship between these ideas suggested that it might be possible to construct an electronic brain.<sup>[25]</sup>

Examples of work in this vein includes robots such as W. Grey Walter's turtles and the Johns Hopkins Beast. These machines did not use computers, digital electronics or symbolic reasoning; they were controlled entirely by analog circuitry.<sup>[26]</sup>

Walter Pitts and Warren McCulloch analyzed networks of idealized artificial neurons and showed how they might perform simple logical functions. They were the first to describe what later researchers would call a neural network.<sup>[27]</sup> One of the students inspired by Pitts and McCulloch was a young Marvin Minsky, then a 24-year-old graduate student. In 1951 (with Dean Edmonds) he built the first neural net machine, the SNARC.<sup>[28]</sup> Minsky was to become one of the most important leaders and innovators in AI for the next 50 years.

## **Game AI**

In 1951, using the Ferranti Mark 1 machine of the University of Manchester, Christopher Strachey wrote a checkers program and Dietrich Prinz wrote one for chess.<sup>[31]</sup> Arthur Samuel's checkers program, developed in the middle 50s and early 60s, eventually achieved sufficient skill to challenge a respectable amateur.<sup>[32]</sup>

Game AI would continue to be used as a measure of progress in AI throughout its history.

## **Symbolic reasoning and the Logic Theorist**

When access to digital computers became possible in the middle fifties, a few scientists instinctively recognized that a machine that could manipulate numbers could also manipulate symbols and that the manipulation of symbols could well be the essence of human thought. This was a new approach to creating thinking machines.<sup>[33]</sup>

## **Dartmouth Conference 1956: the birth of AI**

The Dartmouth Conference of 1956<sup>[37]</sup> was organized by Marvin Minsky, John McCarthy and two senior scientists: Claude Shannon and Nathan Rochester of IBM. The proposal for the conference included this assertion: "every aspect of learning or any other feature of intelligence can be so precisely described that a machine can be made to simulate it".<sup>[38]</sup> The participants included Ray Solomonoff, Oliver Selfridge, Trenchard More, Arthur Samuel, Allen Newell and Herbert A. Simon, all of whom would create important programs during the first decades of AI research.<sup>[39]</sup> At the conference Newell and Simon debuted the "Logic Theorist" and McCarthy persuaded the attendees to accept "Artificial Intelligence" as the name of the field.<sup>[40]</sup> The 1956 Dartmouth conference was the moment that AI gained its name, its mission, its first success and its major players, and is widely considered the birth of AI.<sup>[41]</sup> The term "Artificial Intelligence" was chosen by McCarthy to avoid associations with cybernetics and connections with the influential cyberneticist Norbert Wiener.<sup>[4]</sup>

## **The golden years 1956–1974**

The years after the Dartmouth conference were an era of discovery, of sprinting across new ground. The programs that were developed during this time were, to most people, simply "astonishing":<sup>[43]</sup> computers were solving algebra word problems, proving theorems in geometry and learning to speak English. Few at the time would have believed that such "intelligent" behavior by machines was possible at all.<sup>[44]</sup> Researchers expressed an intense optimism in private and in print, predicting that a fully intelligent machine would be built in less than 20 years.<sup>[45]</sup> Government agencies like DARPA poured money into the new field.<sup>[46]</sup>

## **The first AI winter 1974–1980**

In the 1970s, AI was subject to critiques and financial setbacks. AI researchers had failed to appreciate the difficulty of the problems they faced. Their tremendous optimism had raised expectations impossibly high, and when the promised results failed to materialize, funding for AI disappeared.<sup>[73]</sup> At the same time, the field of connectionism (or neural nets) was shut down almost completely for 10 years by Marvin Minsky's devastating criticism of perceptrons.<sup>[74]</sup> Despite the difficulties with public perception of AI in the late 70s, new ideas were explored in logic programming, commonsense reasoning and many other areas.<sup>[75]</sup>

## **Boom 1980–1987**

In the 1980s a form of AI program called "expert systems" was adopted by corporations around the world and knowledge became the focus of mainstream AI research. In those same years, the Japanese government aggressively funded AI with its fifth generation computer project. Another encouraging event in the early 1980s was the revival of connectionism in the work of John Hopfield and David Rumelhart. Once again, AI had achieved success.<sup>[109]</sup>

## **Bust: the second AI winter 1987–1993**

The business community's fascination with AI rose and fell in the 1980s in the classic pattern of an economic bubble. The collapse was in the *perception* of AI by government agencies and investors – the field continued to make advances despite the criticism. Rodney Brooks and Hans Moravec, researchers from the related field of robotics, argued for an entirely new approach to artificial intelligence.

## **Deep learning, big data and artificial general intelligence: 2011–present**

In the first decades of the 21st century, access to large amounts of data (known as "big data"), cheaper and faster computers and advanced machine learning techniques were successfully applied to many problems throughout the economy. In fact, McKinsey Global Institute estimated in their famous paper "Big data: The next frontier for innovation, competition, and productivity" that "by 2009, nearly all sectors in the US economy had at least an average of 200 terabytes of stored data".

By 2016, the market for AI-related products, hardware, and software reached more than 8 billion dollars, and the New York Times reported that interest in AI had reached a "frenzy".<sup>[171]</sup> The applications of big data began to reach into other fields

as well, such as training models in ecology<sup>[172]</sup> and for various applications in economics.<sup>[173]</sup> Advances in deep learning (particularly deep convolutional neural networks and recurrent neural networks) drove progress and research in image and video processing, text analysis, and even speech recognition.<sup>[174]</sup>