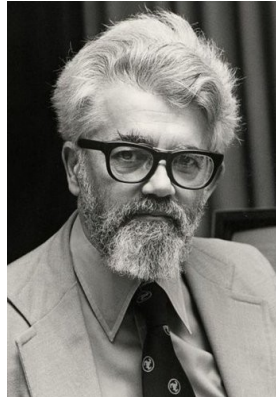


John McCarthy



John McCarthy was a turing award winning computer scientist who I have choosen to write this biography on. I chose McCarthy because of his important contributions to computer science, in particular his co-founding of the fields of Artificial Intelligence (AI) and timesharing systems.

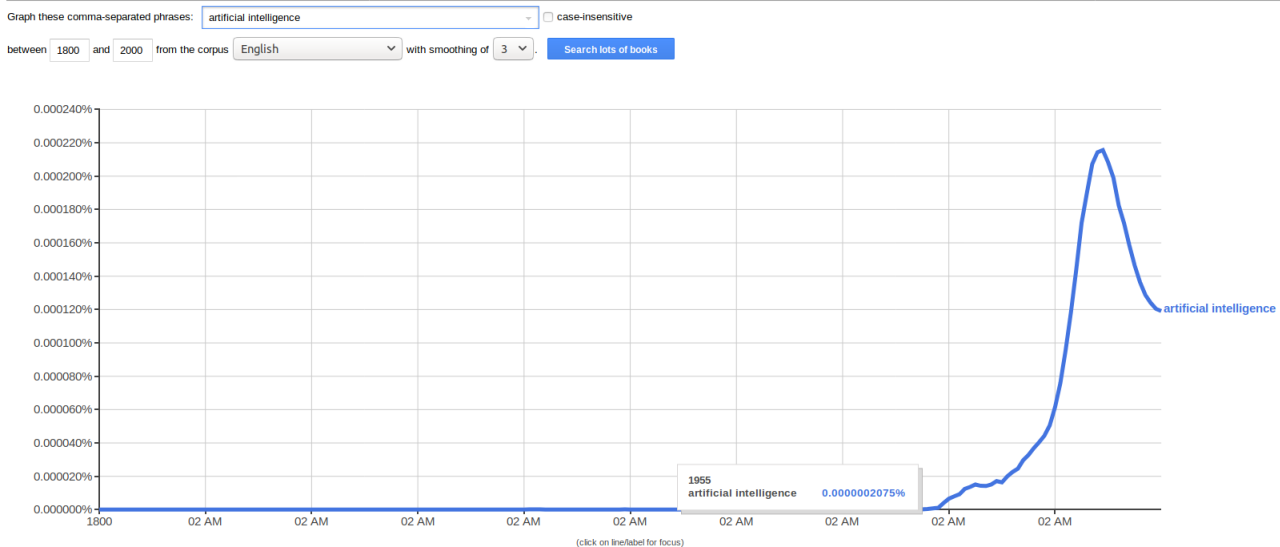
McCarthy was born in Boston, Massachusetts on September 4, 1927 to an Irish immigrant father and a Lithuanian immigrant mother. From a young age he excelled in school graduating from Belmont High School two years early. During his high school years McCarthy showed particular interest in mathematics. He studied college textbooks and as a result when he attended Caltech in 1944 he was able to skip the first two years of mathematics. He graduated with a B.S. in maths in 1948. After this McCarthy enrolled in Princeton where he obtained his Ph.D. in Mathematics in 1951. His dissertation was titled “Projection Operators and Partial Differential Equations”.

While at Princeton McCarthy was fascinated with the idea of mechanizing intelligence. John von Neumann, of Princeton encouraged McCarthy to write up his ideas. In 1953 McCarthy got a position as an acting assistant professor of mathematics at Stanford University. Although McCarthy continued to think about machine intelligence he claims he didn’t write anything about it during those early years at Stanford.

In 1955 McCarthy took another position as a assistant professor in Dartmouth College, New Hampshire. Around that time IBM decided to make an IBM 704 computer available for research and educational purposes at MIT and other New England colleges. That summer McCarthy held a workshop called “Summer Research Project on Artificial Intelligence”. This was the first use of the term artificial intelligence.

The proposal stated that the

study is to proceed on the basis of the conjecture 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... For the present purpose the artificial intelligence problem is taken to be that of making a machine behave in ways that would be called intelligent if a human were so behaving.



Although others had written about mechanizing intelligence previously, the Darmouth workshop is considered to be the beginning of serious work in the field – a field to which McCarthy devoted his scientific career.

In 1957 at MIT, McCarthy proposed the idea of timesharing – allowing a single computer to be simultaneously shared among several users. This idea later evolved into servers and cloud computing. McCarthy’s colleague Lester Earnest has said *"The Internet would not have happened nearly as soon as it did except for the fact that John initiated the development of time-sharing systems. We keep inventing new names for time-sharing. It came to be called servers.... Now we call it cloud computing. That is still just time-sharing. John started it."*

In 1958 McCarthy became an assistant professor of communication science at MIT. He believed that the knowledge needed by AI programs should be represented in declarative sentences (principally in a logic language) rather than being encoded within the programs that use that knowledge. As he put it, *"Sentences can be true in much wider contexts than specific programs can be useful."* He said, *"For AI, logic is inevitable in the same sense that for physical systems calculus is inevitable."* In Autumn of 1958 McCarthy saw the need for a new programming language which could support recursion and dynamic storage. He began his work on a language called LISP (LISt Processor).

In 1959, McCarthy invented a technique called “Garbage Collection” in which random access memory is freed up by removing code that subsequent computations won’t need. This idea was used in LISP and is still used in many languages today (most notably Java).

McCarthy’s 1960 paper “Recursive Functions of Symbolic Expresssions and Their Computation by Machine, Part I” established the theoretical foundations of LISP as a universal computational formalism. (See sources section for the paper). LISP soon became the language of choice for AI research. Programs written in LISP have flown NASA spacecraft and are key parts of several practical AI systems.

From 1959 to 1962 a group of MIT students, supervised by McCarthy, developed a chess-playing program. In 1962 McCarthy returned to Stanford University as a full professor in the Computer

Science Division of the Mathematics department. Here, McCarthy continued to work on his chess program. In 1966, McCarthy used the computer program to challenge counterparts in the Soviet Union. McCarthy's team lost two games and drew two games.

In 1965 McCarthy developed the first display-based timesharing system "THOR".

As McCarthy's various AI-related projects grew he formed the Stanford Artificial Intelligence Laboratory (SAIL). The foundations for graphical user interfaces and printers, computer typesetting and publishing, speech recognition, computer vision and robotics, computer music, and other technologies that are now part of our everyday lives all got their start at SAIL.

Most of McCarthy's research done throughout the rest of his career at Stanford was focused on the problem of implementing commonsense reasoning.

Along with his work in computer science, McCarthy was deeply interested in connections between AI, philosophy, and cognitive science. He believed that we would have to know much more about how human intelligence works before being able to duplicate it in machines, writing that *"[unfortunately we] understand human mental processes only slightly better than a fish understands swimming."*

About consciousness, McCarthy was of the opinion that *"thinking about consciousness with a view to designing it provides a new approach to some of the problems of consciousness studied by philosophers."* In particular, *"From the AI point of view, consciousness must be regarded as a collection of interacting processes rather than the unitary object of much philosophical speculation."* But he also argued that *"robots should not be programmed to have emotions or to behave so as to emotion ascribed to them"*.

He and Ralph Gorin set up the first timeshared computer system for all Stanford students to use in the mid-1980s, it was called LOTS, for Low Overhead Time-Sharing System.

McCarthy's many awards included the Association for Computing Machinery's Turing Award (1971), the first International Joint Conference on Artificial Intelligence Award for Research Excellence (1985), the Kyoto Prize (1988), the National Medal of Science (1990), the Benjamin Franklin Medal in Computer and Cognitive Sciences (2003), and memberships in the American Academy of Arts and Sciences (1974), the National Academy of Engineering (1987), and the National Academy of Sciences (1989). He was a founding fellow and past president of the Association for the Advancement of Artificial Intelligence. He was named the Charles M. Pigott Professor of Engineering by Stanford in 1987.

John McCarthy died on October 24, 2011, from complications of heart disease at his home in Stanford, California. His contributions to Computer Science, particularly artificial intelligence, are still felt today.

Sources

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