Homework 1 Report

Name: Tran Thi Thoa
ID: s1242006
October 8th, 2019

John McCarthy (September 4th, 1927 – October 24th, 2011) was an American computer scientist and one of the founders of the discipline of the Artificial Intelligence after playing a seminal role in defining the field devoted to the development of intelligent machines. [1]. The major contributions for which he is known is coining the term Artificial Intelligence to describe computer programs which seemingly exhibit intelligence, that is, computers perform tasks which when performed by humans require them to be intelligent. Besides his technical contributions he was a great teacher and was instrumental in creating two famous schools in Artificial Intelligence in MIT and Stanford[2].

1 Timelife and education

John McCarthy was born in Boston, Massachusetts, on September 4, 1927, to an Irish immigrant father and a Lithuanian Jewish immigrant mother, John Patrick and Ida (Glatt) McCarthy [4]. During the Depression the family moved many times, eventually arriving in Los Angeles, where his father was an organiser for a clothing workers' union and his mother was active in the women's suffrage movement [1], both of them were active members of the Communist Party of USA [3].
John McCarthy was a child prodigy and even though he joined school late due to a childhood illness, he was exceptionally intelligent, and graduated from Belmont High School two years early[5]. McCarthy showed an early aptitude for mathematics; during his teens he taught himself college mathematics by studying the textbooks used at the nearby California Institute of Technology (Caltech). As a result, he was able to skip the first two years of mathematics at Caltech[3]. In his statement of intent he wrote one sentence, "I intend to be a Professor of Mathematics". He was admitted in 1943 and graduated in 1947 and continued his post- graduate studies in mathematics there [2]. In 1949 he moved to Princeton University to pursue doctoral studies in mathematics. His thesis was related to the solution of partial differential equations. McCarthy initially completed graduate studies at Caltech before moving to Princeton University. He received a Ph.D. in mathematics from the institution in 1951 as a student of Solomon Lefschetz. During the summer of 1952 McCarthy worked at The Bell Telephone Laboratories, He had also published one of the first papers on how computers can be taught to play chess. McCarthy was not satisfied with this effort and wanted a better focus on the topic of building machines which could reason intelligently. He coined the term Artificial Intelligence and wrote a proposal on August 31, 1955, along with Marvin Minsky, Nathaniel Rochester, and Claude Shannon, to the Rockefeller Foundation titled, 'A proposal for the Dartmouth summer research project on Artificial Intelligence' [6]. The topics to be

discussed included automatic computers, how a computer can be programmed to use a language, neural nets, computational complexity, self improvement, and randomness and creativity.
After short-term appointments at Princeton and Stanford University, McCarthy became an assistant professor at Dartmouth in 1955 [3] and then, moved to MIT as a research fellow in the autumn of 1956. He spent the period 1956 to 1962 at MIT which was one of the most productive periods in his career. In 1962, Stanford University invited him to return to the Math- ematics Department, McCarthy became a full professor at Stanford, where he remained until his retirement in 2000. By the end of his early days at MIT he was already affectionately referred to as "Uncle John" by his students [7]. John McCarthy was awarded the Turing Prize in 1971 by the Association for Computing Machinery, USA for his pioneering work on Artificial Intelligence. Besides this, he obtained the Kyoto Prize in 1988, the National Medal of Science (USA) in 1990, and the Benjamin Franklin Medal given by the Franklin Institute in 2003. He was inducted into the AI Hall of Fame in 2011, and named as one of Stanford's Engineering Heroes [2], he also a memeber of the American of Arts and Sciences (1984), the National Academy of Engineering(1987) anf the National Academy of Sciences(1988). John McCarthy officially retired from Stanford University on January 1, 2001;however, continued to be an active researcher

2 Contribution to computer science

John McCarthy is one of the "founding fathers" of artificial intelligence, together with Alan Turing, Marvin Minsky, Allen Newell, and Herbert A. Simon [3]. John paved the way for the some of the worlds transformative technologies: programming languages, the Internet, the web, and robots. He conceived and developed time-sharing, instumental of three of the very earliest time sharing systems(Compatible Time-Sharing System, BBN Time-Sharing System, and Darthmouth Time Sharing System), and coined the term "Artificial Intelligence" in 1955 and organised the famous Darthmouth conferrence in Summer 1956, which started Artificial Intelligence as a field[8], invented the first programming language for symbolic computation LISP in the late 1950s; based on the Lambda calculus, LISP soon became the programming language of choice for AI applications after its publication in 1960. His key contributions were in human-level AI and commonsense reasoning[6]. In 1958, McCarthy served on an ACM Ad hoc Committee on Languages that became part of the committee that designed ALGOL 60. In August 1959 he proposed the use of recursion and conditional expressions, which became part of ALGOL [3]. The "garbage collection" methods to solve some problems with LIPS were also invented by him around 1959. He helped to motivate the creation of Project MAC at MIT when he worked there, and at Stanford University, he helped establish the Stanford AI Laboratory, for many years a friendly rival to Project MAC. A world famous school in AI started at Stanford with activities in robotics, speech processing, and knowledge representation. Over thirty students obtained PhDs working

with McCarthy; many among them went on to win the Turing Award. Much of McCarthy's research in commonsense reasoning was done at Stanford[2].
In 1961, he was perhaps the first to suggest publicly the idea of utility computing, in a speech given to celebrate MIT's centennial: that computer time-sharing technology might result in a future in which computing power and even specific applications could be sold through the utility business model (like water or electricity) [9].
In 1966, McCarthy and his team at Stanford wrote a computer program used to play a series of chess games with counterparts in the Soviet Union; McCarthy's team lost two games and drew two games[3].
The circumscription method of non-monotonic reasoning was developed from 1978 to 1986 by him and in 1982, he had the idea of the space fountain, a type of tower extending into space and kept vertical by the outward force of a stream of pellets propelled from Earth along a sort of conveyor belt which returns the pellets to Earth [3].
McCarthy was generous in sharing his ideas and articulating them effectively. He had a personal website, where in later years he published many interesting articles. One of them 'What is Artificial Intelligence' is in a question answer mode posing a number of questions which persons new to AI ask and McCarthy's answers[2].
As shown by his numerous awards, John was, indeed, a scientific giant. He was driven by an insatiable desire to model human reasoning using computers. His devotion to computer science together with his expansive intellectual capabilities have ensured his place in history as the father of Artificial Intelligence.

References

[1] https://www.independent.co.uk/news/obituaries/john-mccarthy-computer-scientist-known-as-the-father-of-ai-6255307.html

[2] V Rajaraman, March 2014, *John McCarthy – Father of Artificial Intelligence*
https://www.ias.ac.in/article/fulltext/reso/019/03/0198-0207

[3] John McCarthy (Computer Scientist) –Wikipedia.

[4] Shasha, Dennis; Lazere, Cathy (1998). *Out of Their Minds: The Lives and Discoveries of 15 Great Computer Scientists*
https://books.google.com/books?id=-0tDZX3z-8UC&pg=PA23.

[5] Woo, Elaine (October 28, 2011)
http://www.latimes.com/news/obituaries/la-me-john-mccarthy-20111027,0,7137805.story

[6] Professor John McCarthy
formal.stanford.edu/jmc/index.html

[7] Steven Levy, *Hackers, Heroes of the Computer Revolution*

[8] Roberts, Jacob (2016).
"Thinking Machines: The Search for Artificial Intelligence"

[9] Garfinkel, Simson (1999). Abelson, Hal (ed.).
Architects of the Information Society, Thirty-Five Years of the Laboratory for Computer Science at MIT