Editorial

V Rajaraman, Editor

This issue of *Resonance* honours John McCarthy, a pioneer in computer science, who is well known for coining the term Artificial Intelligence (AI). McCarthy's was a restless mind. As soon as he attended a symposium on Cerebral Mechanisms in Behaviour in 1948, he asked a question "Can we make computers think like people?" This was his lifelong passion and his research was on how computer programs can be endowed with commonsense reasoning. Apart from his interest in AI, McCarthy also predicted in 1961 that someday computing would become a utility, much like a power utility, and in 1970 that computers would be used to buy and sell goods. Technology has advanced enough to fulfill both these predictions. He had an immense faith in the inevitable advances in computer hardware and software technologies. In 1968, he attended a conference on Machine Intelligence at the University of Edinburgh organized by Donald Michie, another pioneer in AI. At a cocktail party during the conference he challenged Donald Levy, who was the Scottish chess champion and also a programmer in Michie's laboratory, to play a game of chess with him. McCarthy lost but told Levy that in 10 years a computer program would beat him. Levy disagreed and bet £250 that it would not happen. Soon others joined in the bet and the kitty became £1250. In 1978, Levy played with the then best chess-playing computer program and won his bet.

It was not until 1989 that a good enough chess-playing program was written which beat Levy. It took another 8 years for the IBM Deep Blue to beat Kasparov, the then world champion. McCarthy's criticism of the early chess-playing programs was that they were too rule based and did not mimic well enough the strategies humans use to play the game. Today all chess grandmasters hone their skills by playing against computer programs!

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Chess-playing programs were the earliest attempts to demonstrate the ‘intelligence’ of computer programs. Games such as chess have well-defined set of rules and strategies and it was inevitable that someday a computer program would beat the best human player. A more difficult problem is that of computer programs understanding natural language. This is explained in detail by Raman Chandrasekharan in his article in this issue. Amazing advances in natural language understanding by computer programs and methods of searching huge databases have resulted in a computer (IBM Watson) beating the human champion in a popular TV quiz game called Jeopardy! which uses natural language clues. It is a difficult game even for humans. How IBM Watson beat the champion is explained by Raman Chandrasekharan in his article.

Before one could attempt to solve AI problems using computers a suitable programming language was required. This was realized by McCarthy in 1958 and he designed a language called LISP (LISt Processing) which was the language used by AI programmers for 50 years. The special features of LISP and the reasons for its longevity are explained by Harish Karnick in his article.

Cloud Computing is today’s buzzword. McCarthy predicted its emergence in 1961. In my article, I have given an elementary introduction to cloud computing. I have also written a short biography of McCarthy highlighting his contributions. The Classics article is the Turing Award Lecture by McCarthy in which he criticizes the lack of generality in solving problems in AI.

Apart from these articles on McCarthy there is an article on ‘Drug Metabolism’ by Taxak and Bharatam which explains the fascinating link between chemistry and biology.