Ray Solomonoff, 83; Made Machines Think

By JOHN MARKOFF

As a child Ray Solomonoff developed what would become a lifelong passion for mathematical theorems, and as a teenager he became captivated with the idea of creating machines that could learn and ultimately think.

In 1952 he met Marvin Minsky, a cognitive scientist who was also exploring the idea of machine learning, and John McCarthy, a young mathematician. And within four years, they and seven other scientists, as part of the original Dartmouth Summer Research Project, had founded a new field and given it a name: artificial intelligence.
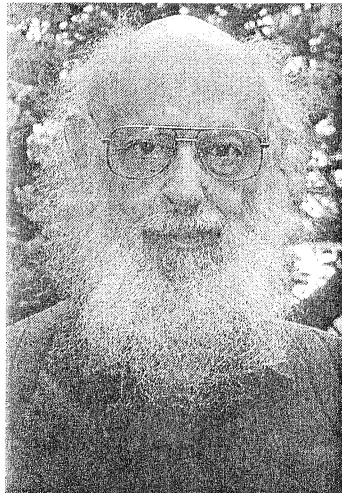
The conference proved to be a watershed both for the field of artificial intelligence (Dr. McCarthy, a Dartmouth College mathematician at the time, coined the term) and for modern computing. It laid out a proposal for a program of study, stating, "The study is to proceed on the basis of the conjecture 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."

The next summer Allen Newell, J.C. Shaw and Herbert Simon, researchers at the Carnegie Institute of Technology (now Carnegie Mellon University), devised a program to discover proofs of logical theorems. Simulated by hand in 1955, the program, called "Logic Theorist," was demonstrated at the Dartmouth conference and is considered to be the first effort to create an artificial intelligence program.

Mr. Solomonoff, who died on Dec. 7 in Boston at the age of 83 but whose death was not widely reported, plunged further into the field in 1960, when he developed the idea of algorithmic probability.

The notion emerged from his effort to grapple with a problem of induction: Given a long sequence of symbols describing real-world events, how can you extrapolate the sequence? The idea gave rise to a new approach to probability theory.

Mr. Solomonoff went on to pioneer the application of probability theory to solving artificial intelligence problems. But in the 1960s and 1970s he was ahead of his time, and the approach initially had little impact on the field. More recently, probability theory has caught on among artificial intelligence researchers and is now the dominant approach.

"Ray did early work on the theoretical foundations of learning systems, focused on understanding how to generate and assign probabilities to sequences of symbols, which could be mapped to the challenge of predicting what comes next, given what you've seen so far," said Eric Horvitz, a Microsoft computer scientist and a former president of the Association for the Advancement of Artificial Intelligence.

"Beyond his core technical work," Mr. Horvitz, added, Mr. Solomonoff was a "passionate proponent of the probabilistic approach to A.I., on the promise of building intelligent computing systems that could learn and rea-

Ray Solomonoff

A pioneer in using probability theory to solve artificial intelligence problems.

son under uncertainty."

His work in the early 1960s predated the work of the Russian mathematician Andrei Kolmogorov, who also did pioneering research in information theory and later acknowledged Mr. Solomonoff's earlier contributions.

Mr. Solomonoff later turned his attention to the consequences of artificial intelligence. In 1985 he wrote a paper that speculated on the cost and the time it would take to develop a machine with many times the intelligence of a group of humans. He called this the "infinity point."

The idea predated the prediction of the computer scientist Vernor Vinge, who in 1993 speculated on a similar evolution in machine intelligence, which he called "the singularity."

Born in Cleveland on July 25, 1926, Mr. Solomonoff was the son of immigrants from Russia, Julius and Sarah Solomonoff. He studied physics at the University of Chicago and graduated with a master's degree in 1951.

Fiercely independent, he would remain self-employed for much of his life, taking a variety of visiting scholar positions. In 2001 he was a visiting professor at the Dalle Molle Institute for Artificial Intelligence in Lugano, Switzerland; more recently he was a visiting professor at the Computer Learning Research Center at Royal Holloway, University of London.

He is survived by his wife, Grace, who said the cause of death was a ruptured brain aneurysm. He lived in Cambridge, Mass., and also had a home in New Ipswich, N.H., which he built himself, heating it with two rows of light bulbs in the ceiling, a feat made possible by thick insulation and inserts to cover the windows.

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