

Chapter 3. Gathering

The Quest for Artificial Intelligence, Nilsson, N. J., 2009.

Lecture Notes on Artificial Intelligence, Spring 2012

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Overview of Chapter 3

- The emergence of artificial intelligence as a full-fledged field of research coincided with three important meetings.
 - In 1955, a “**Session on Learning Machines**” was held in Los Angeles.
 - In 1956, a “**Summer Research Project on Artificial Intelligence**” was convened at Dartmouth College.
 - In 1958, a symposium on the “**Mechanization of Thought Processes**” was sponsored by the National Physical Laboratory in the United Kingdom.

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3.1 Session on Learning Machines

Session on Learning Machines (1/2)

- In 1955, it was held in conjunction with the 1955 Western Joint Computer Conference in Los Angeles.
- Four important papers were presented.
 - **W. Clark and B. Farley** of MIT's Lincoln Lab.
 - Some pattern-recognition experiments on networks of neuron-like elements
 - These networks came to be called *neural networks*.
 - “crude but useful generalization properties are possessed even by randomly connected nets of the type described.”
 - **G. P. Dinneen** of MIT's Lincoln Lab.
 - Computational techniques for processing images
 - Dinneen pioneered the use of filtering methods to remove random bits of noise, thicken lines, and find edges for processing images.

Session on Learning Machines (2/2)

- **O. Selfridge** of MIT's Lincoln Lab.
 - Selfridge described techniques for highlighting “features” in images and then classifying them based on the features.
 - The methods pioneered by Dinneen and Selfridge are fundamental to most of the later work in enabling machines to “see”.
- **A. Newell** of Rand Corporation in Santa Monica
 - Programming a computer to play chess
 - “The aim is to program a current computer to learn to play good chess. This is the means to understanding more about the kinds of computers, mechanisms, and programs that are necessary to handle ultracomplex problems.”
 - Newell committed himself to understanding human learning and thinking by the demonstration of the feasibility of computer simulation of complex processes.

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3.2 The Dartmouth Summer Project

The Dartmouth Summer Project

- At IBM that summer, McCarthy and Rochester persuaded Claude Shannon and Marvin Minsky then a Harvard junior fellow in mathematics and neurology, to join them in proposing a workshop to be held at Dartmouth during the following summer.



Figure 3.2: John McCarthy (left) and Marvin Minsky (right).

Summer Research Project on Artificial Intelligence (1/3)

- McCarthy took the lead “**Summer Research Project on Artificial Intelligence**” and submitted to the Rockefeller Foundation in August 1955.
 - 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 described that a machine can be made to simulate it.
- This workshop took place during six weeks of the summer of 1956 at Dartmouth college supported by Rockefeller Foundation.
 - The approaches and motivations of the people at the workshop differed.
 - (ex.) networks of neuron-like elements, symbol-processing approach, and application of information theory concepts to computing machines and brain models, etc.

Summer Research Project on Artificial Intelligence (2/3)

- The important contributions of the 1956 meeting
 - Most of the people who signed on to do work in this new field used the name “**artificial intelligence**” and that is what the field is called today.
 - **Minsky** continued work on a draft that was later to be published as a foundational paper, “Steps Toward Artificial Intelligence”.
 - **Newell and Simon** presented the “Logic Theorist (LT)” for proving theorems in symbolic logic.
 - LT was concrete evidence that processing “symbol structures” and the use of what Newell and Simon called “heuristics” were fundamental to intelligent problem solving.

Summer Research Project on Artificial Intelligence (3/3)

- In July 2006, another conference was held at Dartmouth celebrating the fiftieth anniversary of the original conference.
 - Several of the founders and other prominent AI researchers (Minsky, McCarthy, Newell, and Simon came to be regarded as the “fathers” of AI) attended and surveyed what had been achieved since 1956.

Figure 3.3: Some of AI's founders at the July 2006 Dartmouth fiftieth anniversary meeting. From the left are T. More, J. McCarthy, M. Minsky, O. Selfridge, and R. Solomonoff.



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3.3 Mechanization of Thought Processes

Mechanization of Thought Processes (1/2)

- In November 1958, a symposium on the “**Mechanization of Thought Processes**” was held at the National Physical Laboratory in England.
 - A symposium was held to bring together scientists studying artificial thinking, character and pattern recognition, learning, mechanical language translation, biology, automatic programming, industrial planning and clerical mechanization.
 - Among the people who presented papers include Minsky, McCarthy, Ashby, Selfridge, McCulloch, Backus (one of the developers of FORTRAN), and Hopper (a pioneer in automatic programming).

Mechanization of Thought Processes (2/2)

- The important papers of the symposium
 - **Minsky** published papers, “Some Methods of Artificial Intelligence and Heuristic Programming” and “Steps Toward Artificial Intelligence”, for new recruits to the field.
 - **McCarthy** proposed an artificial language for AI, “advice taker”, might be represented as expressions in a mathematical language called “first-order logic”.
 - **Selfridge** presented a paper on a new model for pattern recognition, “Pandemonium” which can take the form of a neural network, a hierarchically organized set of symbol processors.