



# **MACHINE LEARNING & ARTIFICIAL INTELLIGENCE**

**HISTORY OF ARTIFICIAL INTELLIGENCE**

# AI – HISTORY AND PAPERS



## HOW IT ALL STARTED

Crucial Research Papers that led to development of field of **Artificial Intelligence** and **Machine Learning**

# AI – HISTORY



## 1940-50

Scientists from variety of fields (mathematics, psychology, engineering, economics) began to discuss possibility of creating artificial brain. The field of artificial intelligence research was founded as an academic discipline in 1956 and it is widely acknowledged as birth of artificial intelligence field



# AI – HISTORY



The term Artificial Intelligence (AI) was coined by John McCarthy, an American computer scientist, in 1956 at The Dartmouth Conference. He defined it as:

*“Artificial Intelligence is concerned with the design of intelligence in an artificial device”*

*“It is the science and engineering of making intelligent machines, especially intelligent computer programs”*

# AI – HISTORY AND PAPERS



**1960**

- Steps towards Artificial Intelligence by Marvin Minsky, Proceedings of the IRE
- Minsky (PhD Maths, Princeton) is the guy behind highly influential MIT AI Lab
- This paper outlined the division of AI into different subfields, many of which are still around, practically laying out the modern field of AI in its current guise

# AI – HISTORY AND PAPERS



**1968**

- ▶ Programs with Common Sense by John McCarthy, in Semantic Information Processing
  - ▶ McCarthy Minsky (PhD Maths, Princeton) is the guy behind Language LISP and is also the founder of Stanford AI Lab
- ▶ This paper first raised the question of a program being able to be told about stuff that you would want it to learn

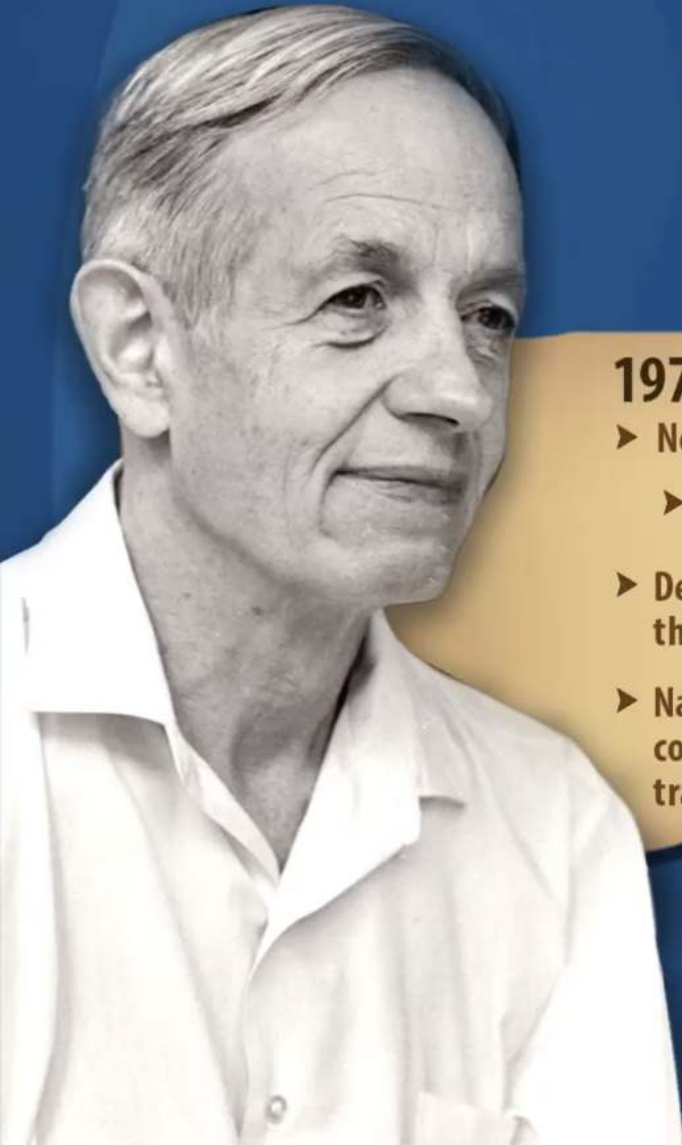


# AI – HISTORY AND PAPERS

**1977**

- **Maximum likelihood from Incomplete Data using the EM Algorithm by Dempster, Laird, and Rubin**
  - Harvard statisticians, Dempster, Laird, and Rubin were the first to use statistics to propose new approach to building algorithms
- This paper can be considered as first one to emphasize using probabilistic and statistical techniques in order to achieve generalization while building ML based solutions.

# AI – HISTORY AND PAPERS



**1977**

- Non-cooperative games, PhD thesis, John Nash, Princeton
  - John Nash – whose work led to establishment of Nash Equilibrium
- Decades later, paper's idea led to new approaches towards deep learning that were proven extremely useful in progressing machine learning
- Nash's work was later got extended to establish Game Theory which is the corner stone today for developing algorithms that help in developing trading products



# AI – HISTORY AND PAPERS

**1983**

- ▶ **Why should Machines Learn by Herbert Simon**
  - ▶ **Herbert Simon (PhD Economics, CMU, Noble Laureate) and other AI experts such as Allan Newell and Hans Berliner were closely linked with development of IBM – Deep Blue Machine that beat chess player Kasparov**
- ▶ **This paper can be considered as giving first scientific definition of machine learning**



# TIMELINE OF AI MILESTONES

1956

The first Dartmouth College summer AI conference is organized by John McCarthy, Marvin Minsky, Nathan Rochester of IBM and Claude Shannon

Joseph Weizenbaum (MIT) builds ELIZA, an interactive program that carries on a dialogue in English language on any topic

1965

1978

Herbert A. Simon wins the Nobel Prize in Economics for his theory of bounded rationality, one of the cornerstones of AI known as "satisficing"

Vernor Vinge publishes The Coming Technological Singularity, predicting that, within the next 30 years, humankind would have the ability to create "superhuman intelligence"

1993

1997

The Deep Blue chess machine (IBM) defeats the (then) world chess champion, Garry Kasparov

Google builds self-driving car

2009

2011

IBM's Watson computer defeated television game show Jeopardy! champions Rutter and Jennings

Google DeepMind's AlphaGo defeats 3x European Go champion Fan Hui by 5 games to 0

2016

2017

Google's AlphaGo Zero - an improved version of AlphaGo - learns by playing only against itself and beat its predecessor 89:11 after only 40 days



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