INTRODUCTION TO **ARTIFICIAL INTELLIGENCE** FOR IT & NON-IT PROFESSIONALS

PRECURSOR AND BIRTH OF AI

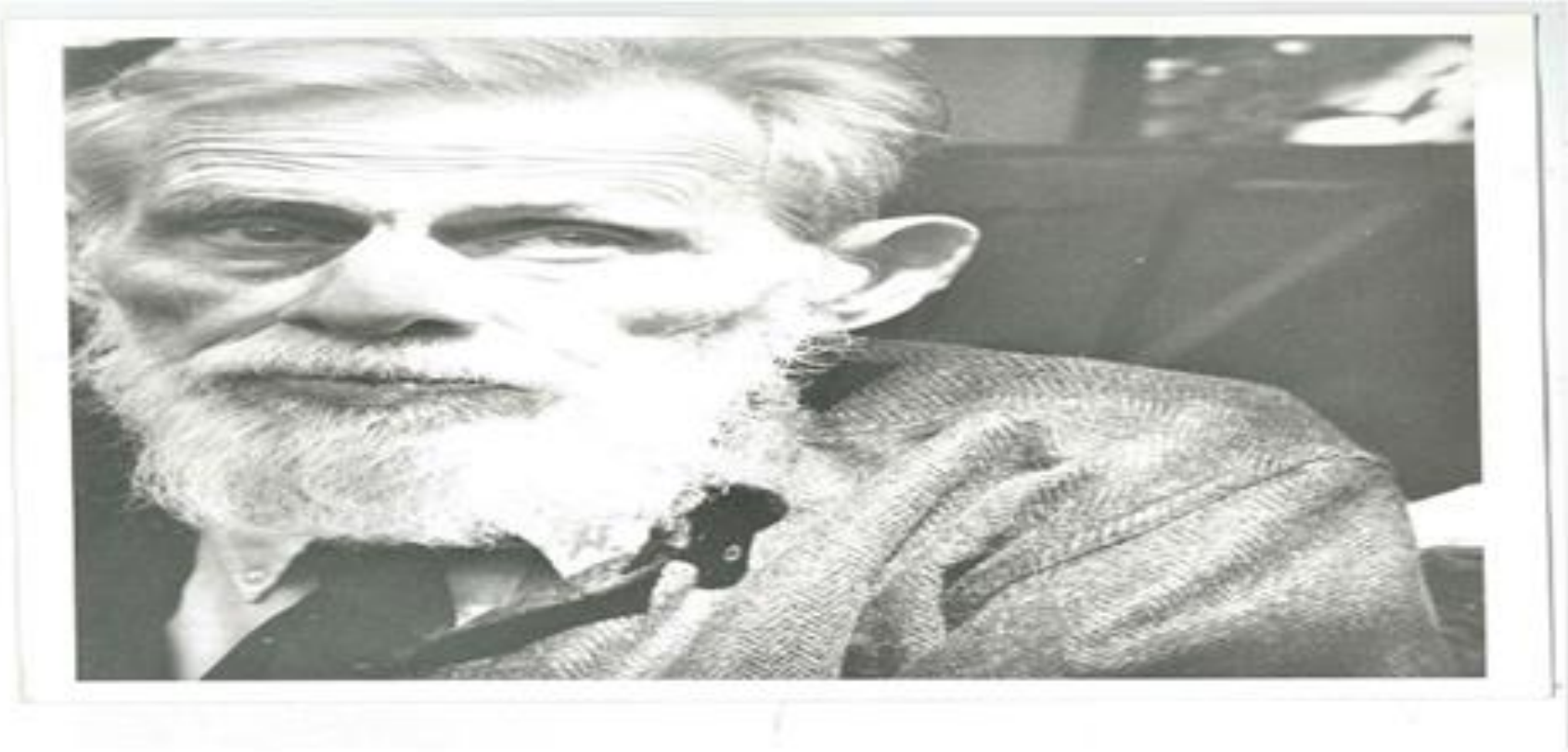
PRECURSORS OF AI

- Baghdad in 820 AD
- Al-Khwarizmi:

Muhammad Ibn Musa
Al-Khwarizmi
The Father of Algebra and Algorithms

PRECURSORS OF AI

- (1943–1955)
- 1943 Warren McCulloch & Walter Pitts



PRECURSORS OF AI

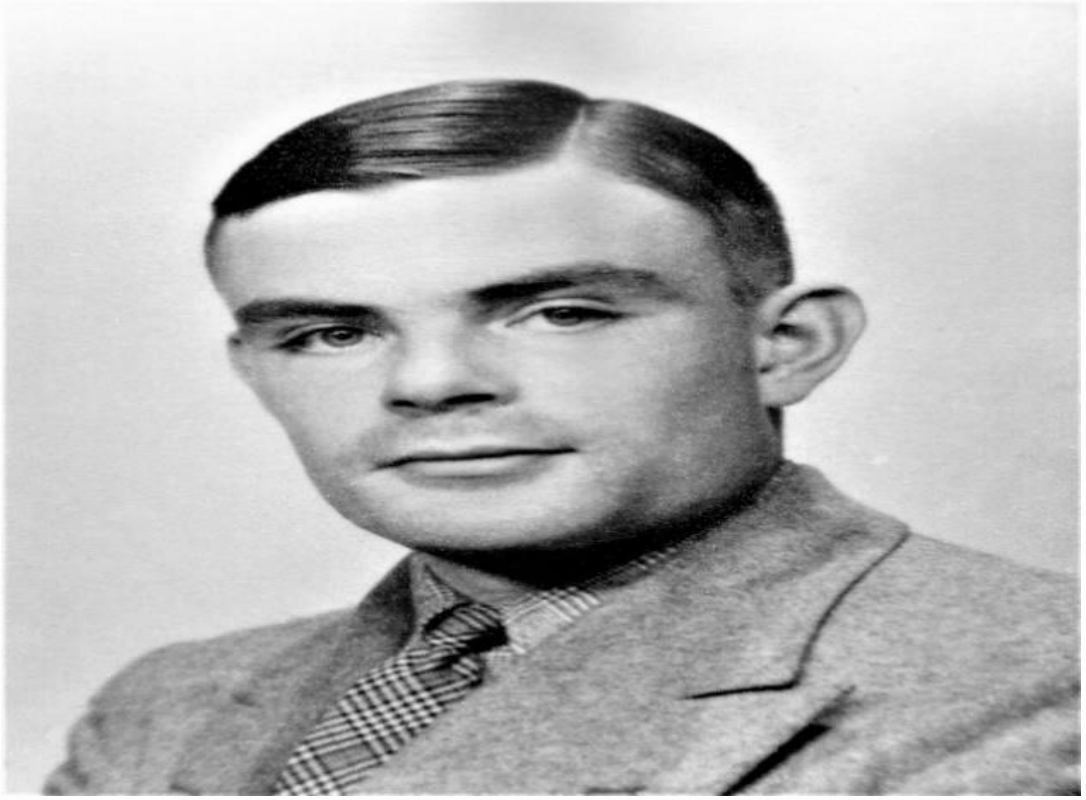
- Donald Hebb (1949)
- Hebbian learning

PRECURSORS OF AI

- 1950
- Harvard, Marvin Minsky and Dean Edmonds

PRECURSORS OF AI

- Alan Turing
- 1950



THE BIRTH OF ARTIFICIAL INTELLIGENCE (1956)

- The field of artificial intelligence research was born in 1956 at a conference that took place over the course of the summer at Dartmouth.
- Attendees filtered in and out over the weeks, but at the core were AI legends like Allen Newell, Herbert Simon, John McCarthy, Marvin Minsky, and Arthur Samuel

- Marvin Minsky, 1961
- Early successful AI programs:

  Samuel's Checkers Player

  first machine learning system

Arthur Samuel plays checkers with an IBM 704 computer in Poughkeepsie, New York

Herbert Gelernter (1959) constructed the Geometry Theorem Prover

At 1958 in MIT AI Lab McCarthy defined the high-level language Lisp

A dose of reality (1966 - 1973): •Early machine translation efforts to speed up the translation of Russian scientific papers in the wake of the Sputnik launch in 1957.

- Most of the early AI programs solved problems by trying out different combinations of steps until the solution was found.
- This strategy worked initially with limited objects and hence very few possible actions and very short solution sequences.

AI Winter

The mid 1970s saw a dip in interest in the field that came to be known as the first AI winter.

Knowledge-based systems (1969 - 1979):

Example: 1969: DENDRAL expert system by Edward Albert Feigenbaum

- Ex2: 1976: MYCIN by Shortliffle
  - Expert systems in medical diagnosis

- AI becomes an industry (1980 - present):
- The return of NNs (1986 - present)
- The emergence of intelligent agents (1995-present)
  - ❑ Internet tools, such as search engines, recommender systems, and Web site aggregators use AI technologies

AVAILABILITY OF VERY LARGE DATA SETS (2001-PRESENT)

- In the 60-year history of computer science, the emphasis has been on the algorithm as the main subject of study.
- But recent work in AI suggests that for many problems, it makes more sense to worry about the data
- Examples: trillions of words of English, billions of images from the Web, or billions of base pairs of genomic sequences

THE BIRTH OF ARTIFICIAL INTELLIGENCE

1943	McCulloch & Pitts: Boolean circuit model of brain
1950	Turing's "Computing Machinery and Intelligence"
1956	Dartmouth meeting: "Artificial Intelligence" adopted
1952—69	Look, Ma, no hands! – long list of Xs and a belief that “ a machine can never do X”
1950s	Early AI programs, including Samuel's checkers program, Newell & Simon's Logic Theorist, Gelernter's Geometry Engine
1965	Robinson's complete algorithm for logical reasoning
1966—73	AI discovers computational complexity Neural network research almost disappears
1969—79	Early development of knowledge-based systems
1980--	AI becomes an industry
1986--	Neural networks return to popularity
1987--	AI becomes a science
1995--	The emergence of intelligent agents

WHAT CAN AI DO TODAY?

- A concise answer is difficult because there are so many activities in so many subfields. Here we sample a few applications; These are just a few examples of artificial intelligence systems that exist today. Not magic or science fiction—but rather science, engineering, and mathematics.

1. **Robotic vehicles** A driverless robotic car named STANLEY sped.. cameras, radar, and laser range

2. **Speech recognition**

WHAT CAN AI DO TODAY?

3. Autonomous planning and scheduling

- MAPGEN, NASA's Mars Exploration Rovers, A rover

4.Game playing

IBM's DEEP BLUE became the first computer program to defeat the world champion in a chess match

5.Spam fighting

Email spam

WHAT CAN AI DO TODAY?

6.Logistics planning

During the Persian Gulf crisis of 1991, U.S. forces deployed a Dynamic Analysis and Replanning Tool, DART (Cross and Walker, 1994), to do automated logistics planning and scheduling for transportation

7.Robotics

Roomba robotic vacuum cleaners for home use

8. Machine Translation