

# IBM AI course (MOD 2)

## what are the three eras of computing?

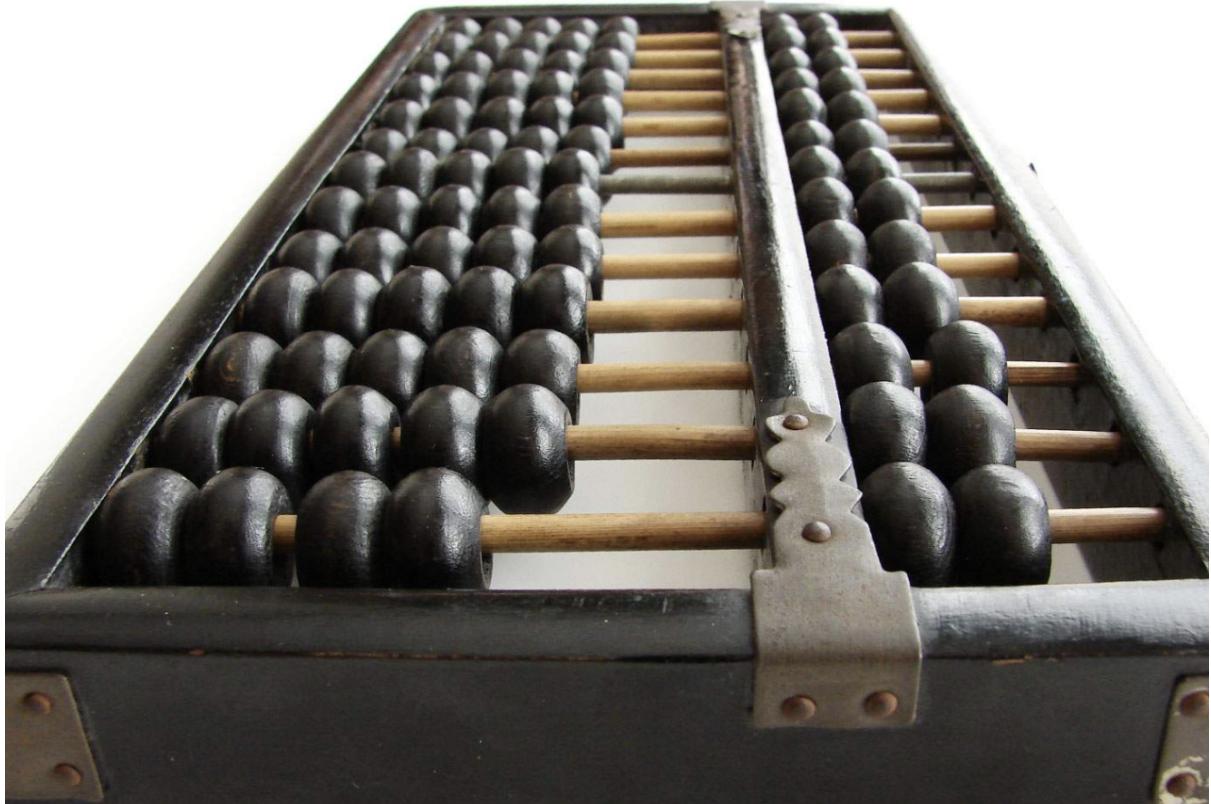
| people have analyzed data for centuries.

### what is Dark data?

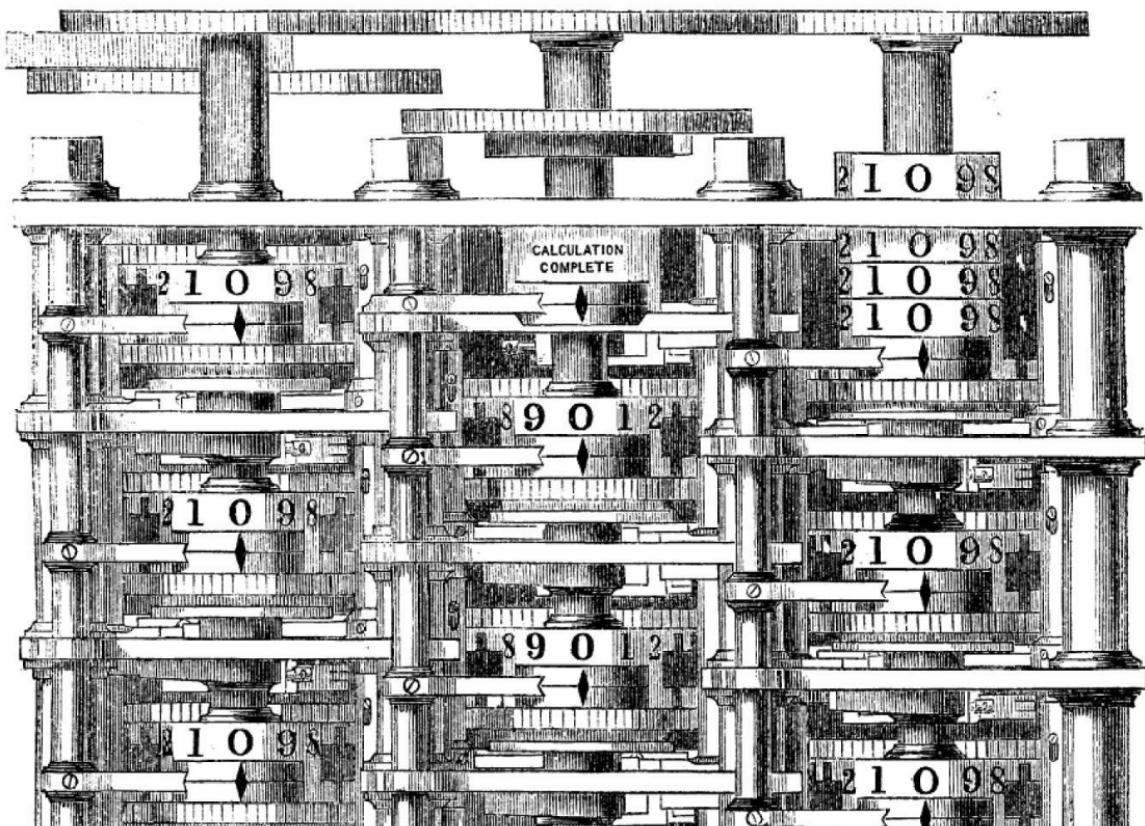
Dark data refers to the unutilized or untapped information organizations possess, typically collected but not analyzed or leveraged for decision-making.

to sort out data from unstructured data

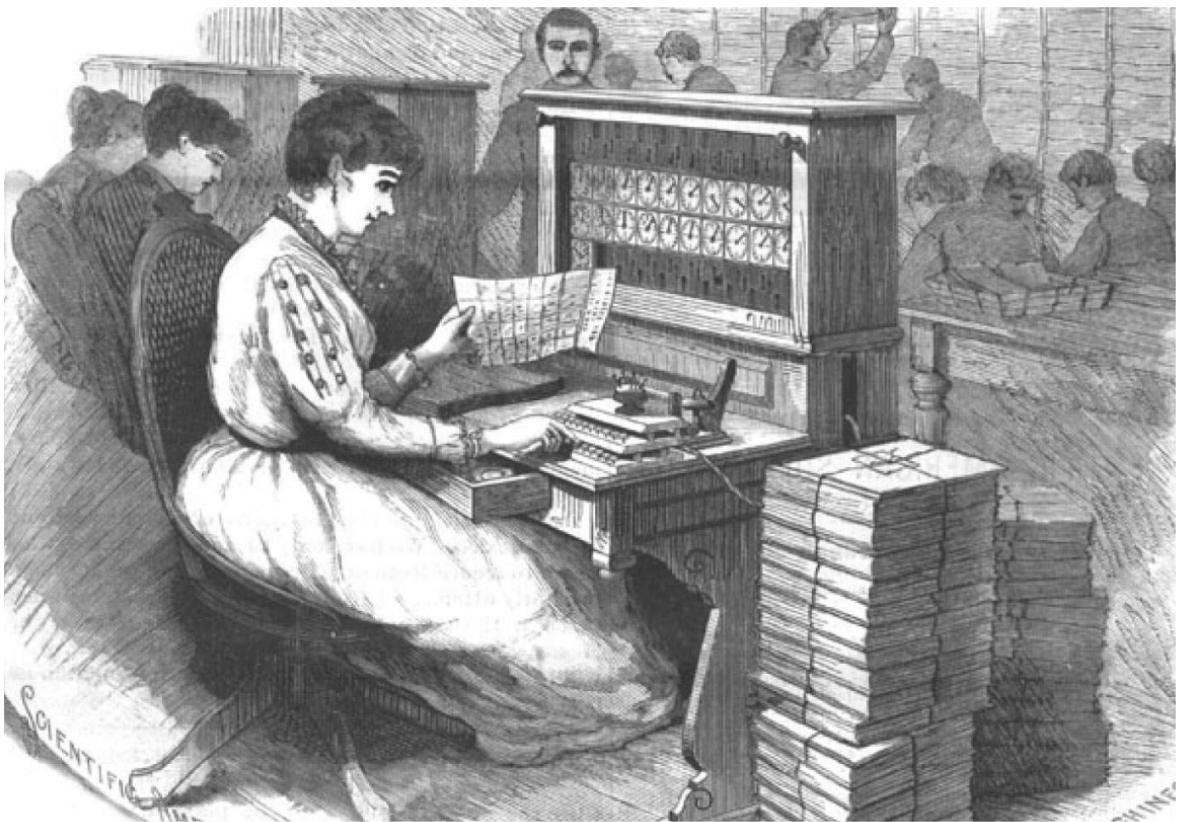
humans have created many different calculating machines. Over 2000 years ago, tax collectors for Emperor Qin Shihuang used the abacus—a device with beads on wires—to break down tax receipts and arrange them into categories. From this, they could determine how much the Emperor should spend on building extensions to the Great Wall of China.



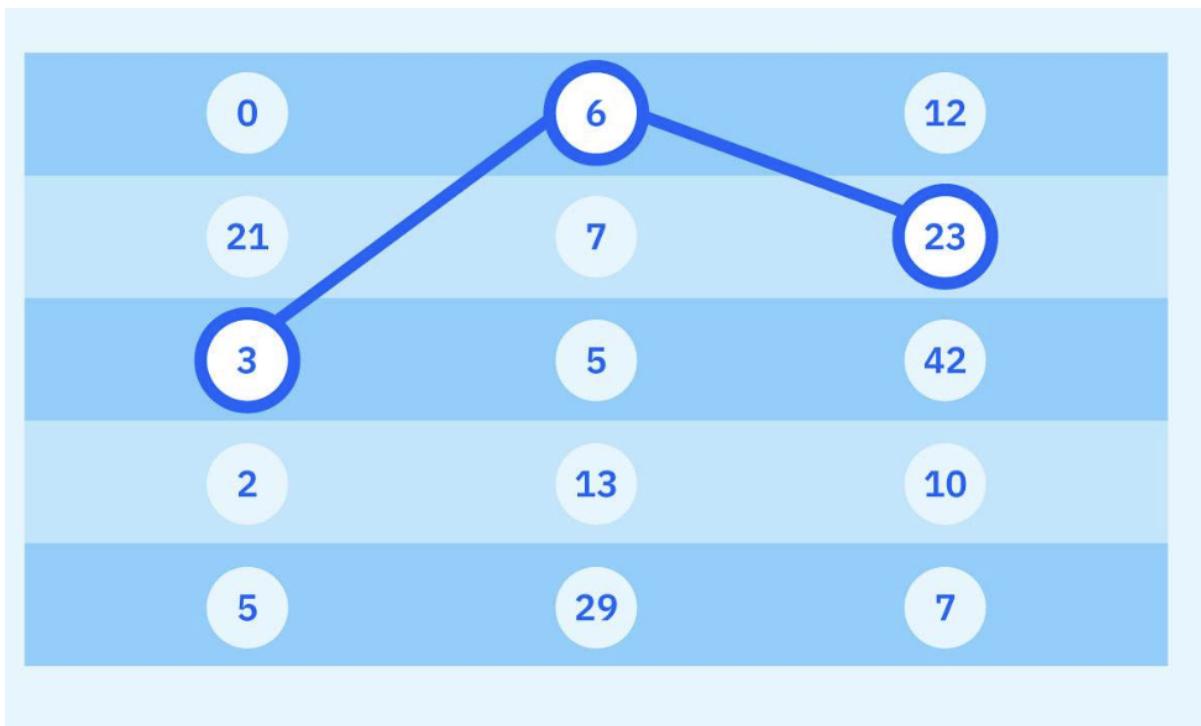
In England during the mid-1800s, Charles Babbage and Ada Lovelace designed (but never finished) what they called a “difference engine” designed to handle complex calculations using logarithms and trigonometry. Had they built it, the difference engine might have helped the English Navy build tables of ocean tides and depth soundings that could guide English sailors through rough waters.



By the early 1900s, companies like IBM were using machines to tabulate and analyze the census numbers for entire national populations. They didn't just count people. They found patterns and structure within the data—useful meaning beyond mere numbers. These machines uncovered ways that different groups within the population moved and settled, earned a living, or experienced health problems—information that helped governments better understand and serve them.



what is the relation I don't understand myself?



The word to remember across those twenty centuries is **tabulate**. Think of tabulation as “slicing and dicing” data to give it a structure, so that people can uncover patterns of useful information. You tabulate when you want to get a feel for what all those columns and rows of data in a table really mean.

Researchers call these centuries the **Era of Tabulation**, a time when machines helped humans sort data into structures to reveal its secrets.

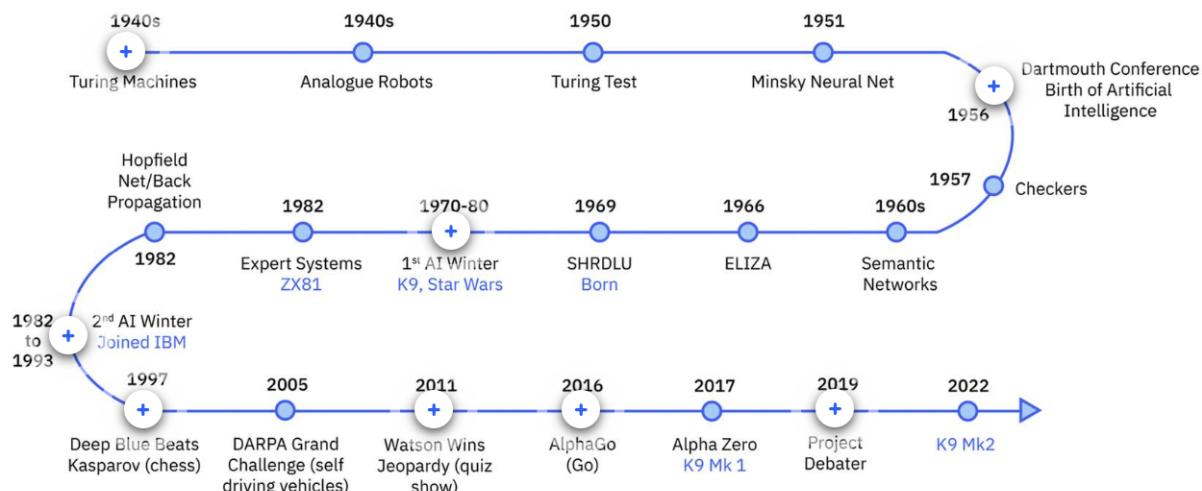
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## Data analysis changed in the 1940s

- During World War II, the Era of Programming began with the development of electronic computers like ENIAC, capable of running different instructions or programs for various calculations, such as artillery firing tables and nuclear weapon feasibility studies.
  - Programmable computers played a crucial role in guiding astronauts to the moon and solving issues like Apollo 13's troubled mission.
  - The Era of Programming has continued to shape modern technology, from smartphones to supercomputers.
  - Despite advancements, the dark data problem has grown as businesses and technology generate massive amounts of data that exceed computational capacity.
  - The sheer volume of data challenges even the most powerful supercomputers, highlighting a crisis in electronic computing's ability to process all this information effectively.
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## A Brief History of AI

- The history of artificial intelligence traces back to philosophical pondering about the potential of technology.
- Philosophers contemplated "What more can be done with the world we live in?" as a foundational question.
- The advent of electronic computing marked a significant turning point in AI development.



- Several important events and milestones have shaped the evolution of artificial intelligence.

## The Era of AI began one summer in 1956

- In the summer of 1956, a group of researchers, led by John McCarthy and Marvin Minsky, convened at Dartmouth College, coining the term "artificial intelligence."
- They proposed that machines could simulate every aspect of learning and intelligence with precise descriptions.
- This vision of "artificial intelligence" attracted substantial funding with the goal of achieving it within 20 years.
- Over the following two decades, significant achievements were made, including machines capable of proving geometry theorems, speaking simple English, and solving algebraic word problems.
- During this period, AI became one of the most exciting and dynamic fields in computer science.

## But then came winter

- In the early 1970s, it became evident that the challenges in artificial intelligence were more formidable than initially anticipated.
- Researchers realized that there were fundamental limits that could not be overcome despite significant funding and efforts.

## Select the following sections to learn about two of these limits.

Limited calculating power	Limited information storage.
<p>Today, it is important for a computer to have enough processing power and memory. Every ad you see for companies like Apple or Dell emphasizes how fast their processors run and how much data they can work with. But in 1976, scientists realized that even the most successful computers of the day, working with natural language, could only manipulate a vocabulary of about 20 words. But a task like matching the performance of the human retina might require millions of instructions per second, at a time when the world's fastest computer could run only about a hundred. By the early 1970s, it became clear that the problem was larger than researchers imagined. There were fundamental limits that no amount of money and effort could solve.</p>	Even simple, commonsense reasoning requires a lot of information to back it up. But no one in 1970 knew how to build a database large enough to hold even the information known by a 2-year-old child.

As these issues became clear, the money dried up for **The First Winter of AI**.

## The weather was rough for half a century

- It took roughly a decade for technology and AI theory to advance, leading to the emergence of "expert systems" in the 1980s.
- Expert systems were specialized AI programs limited to specific knowledge areas that could be manipulated with predefined rules.
- These systems enjoyed popularity and attracted significant investment, with researchers using expensive mainframe machines.
- However, the growing demands of scientists, businesses, and governments eventually outstripped the capabilities of these expert systems, resulting in another collapse of funding for AI.

## Then came another AI chill

- In the late 1980s, the enthusiasm for AI research waned, partially due to the increasing popularity and power of personal computers, such as those from

Apple and IBM, which surpassed the capabilities of recent large corporate systems.

- The reduced investment in large-scale computing research by businesses and governments led to a decline in funding.
- During this period, known as the "Second Winter of AI," over 300 AI companies either shut down or went bankrupt, reflecting the challenges faced by the field at that time.

## **Now, the forecast is sunny**

- In the mid-1990s, nearly 50 years after the Dartmouth research project, the "Second Winter of AI" started to thaw as computer processing power reached levels capable of solving complex problems.
- During this time, the public witnessed AI's prowess in playing sophisticated games:
  - In 1997, IBM's Deep Blue defeated the world chess champion by processing over 200 million possible moves per second.
  - In 2005, a Stanford University robot successfully navigated a 131-mile desert trail autonomously.
  - In 2011, IBM's Watson outperformed two grand champions in the game of Jeopardy!, showcasing AI's progress.
- AI has demonstrated its capabilities in diverse fields, including cancer research, big data analysis, defense systems, and energy production, signifying its maturity.
- AI is now one of the most dynamic and influential domains within computer science, with achievements that affect daily life and capabilities that are growing exponentially.
- The periods known as the "Two Winters of AI" have concluded, marking the resurgence and continued advancement of artificial intelligence.