Introduction to Artificial Intelligence

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Trainer Profile

- Master in Computer Science & Engineering
- Currently pursuing PhD in Artificial Intelligence
- AWS Certified Solutions Architect
- Microsoft Certified Specialist in Architecting Azure Solutions.
- 9+ years of experience in Cloud, Big Data, AI and IoT

Training Agenda Day wise

- Day – 1: Introduction to AI and Mathematical Foundations for AI
- Day – 2 : Introduction Machine Learning & Algorithms
- Day – 3 : Artificial Neural Networks
- Day – 4 : Hands on Tensor Flow and related tools (requires Python knowledge)

Day-1

Learning Objectives:

- To develop clear understanding of “What is AI ?”.
- To introduce basics of statistics, probability and calculus required for modeling and developing AI applications.

Introduction to AI

(Artificial Intelligence)

Why to know ?

“What is AI ?”

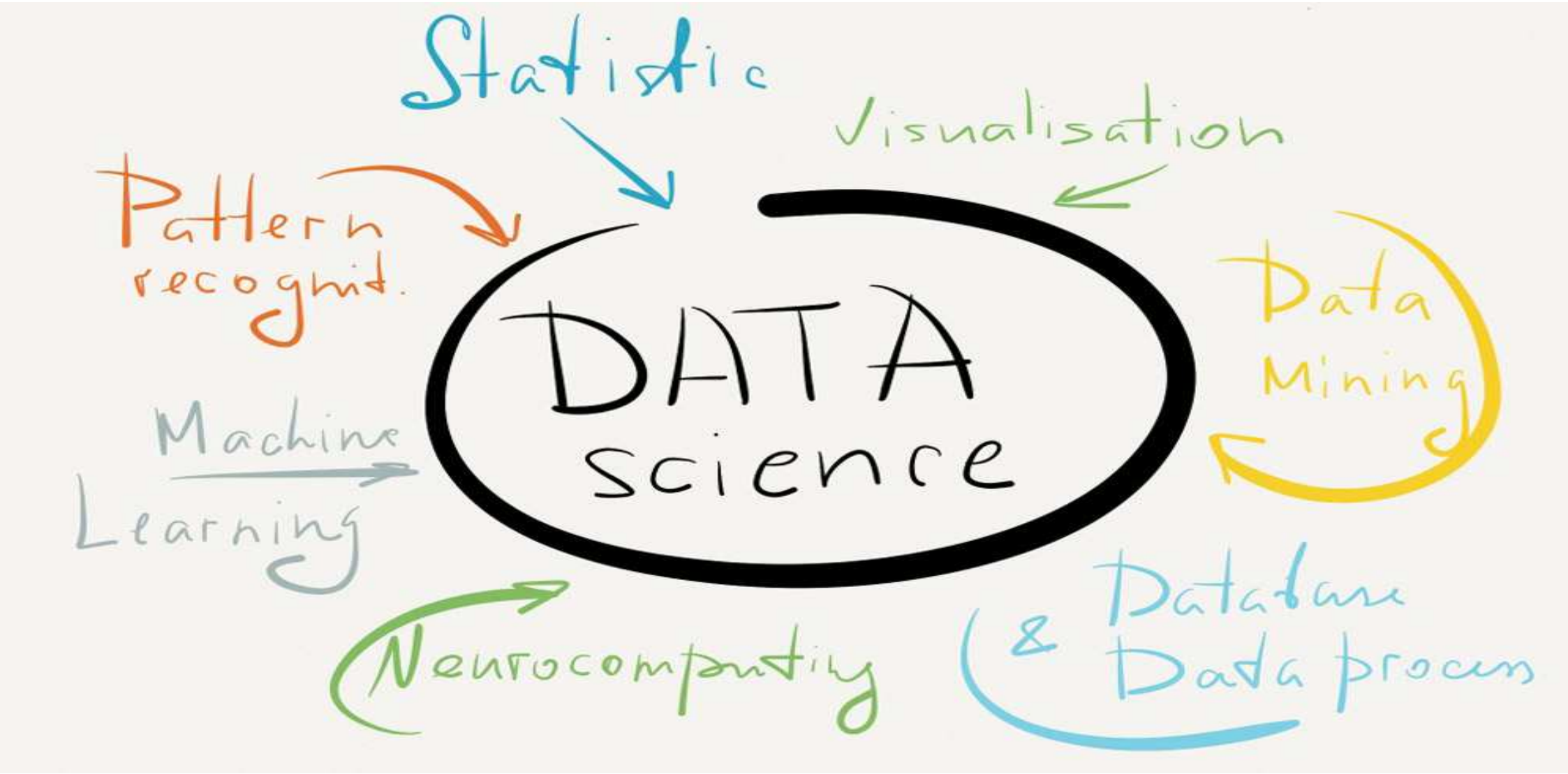
In 2016, the AI market was worth $644 million. In 2017, the market value of AI is expected to double and continue to grow exponentially until it reaches $38.6 billion in less than 10 years.

src: https://www.tractica.com/newsroom/press-releases/artificial-intelligence-revenue-to-reach-36-8-billion-worldwide-by-2025/

What is AI ?

- How is it different from ? Is there any difference at all ?
  - Data Science
  - Data Mining
  - Machine Learning
  - Curious readers can go to StackOverFLow Question on difference.

Lets us see……..


Statistic
Visualisation
Pattern recognit.
DATA science
Data Mining
Machine Learning
Neurocomputing
Database & Data procss

ML (Machine Learning)

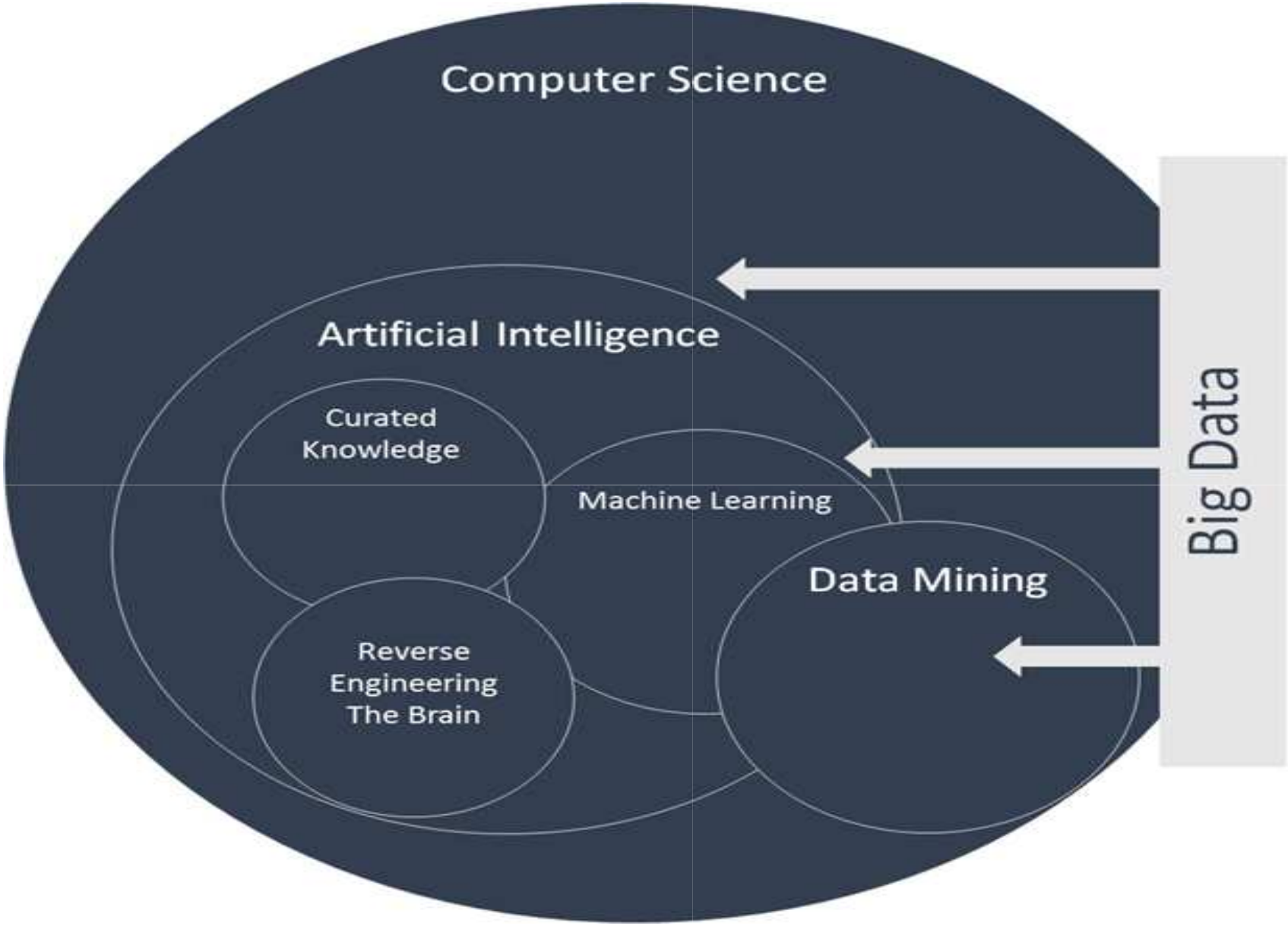
- Stanford: Machine learning is the science of getting computers to act without being explicitly programmed.
- Wikipedia: Machine learning is the subfield of computer science that gives computers the ability to learn without being explicitly programmed

ML and Data Mining

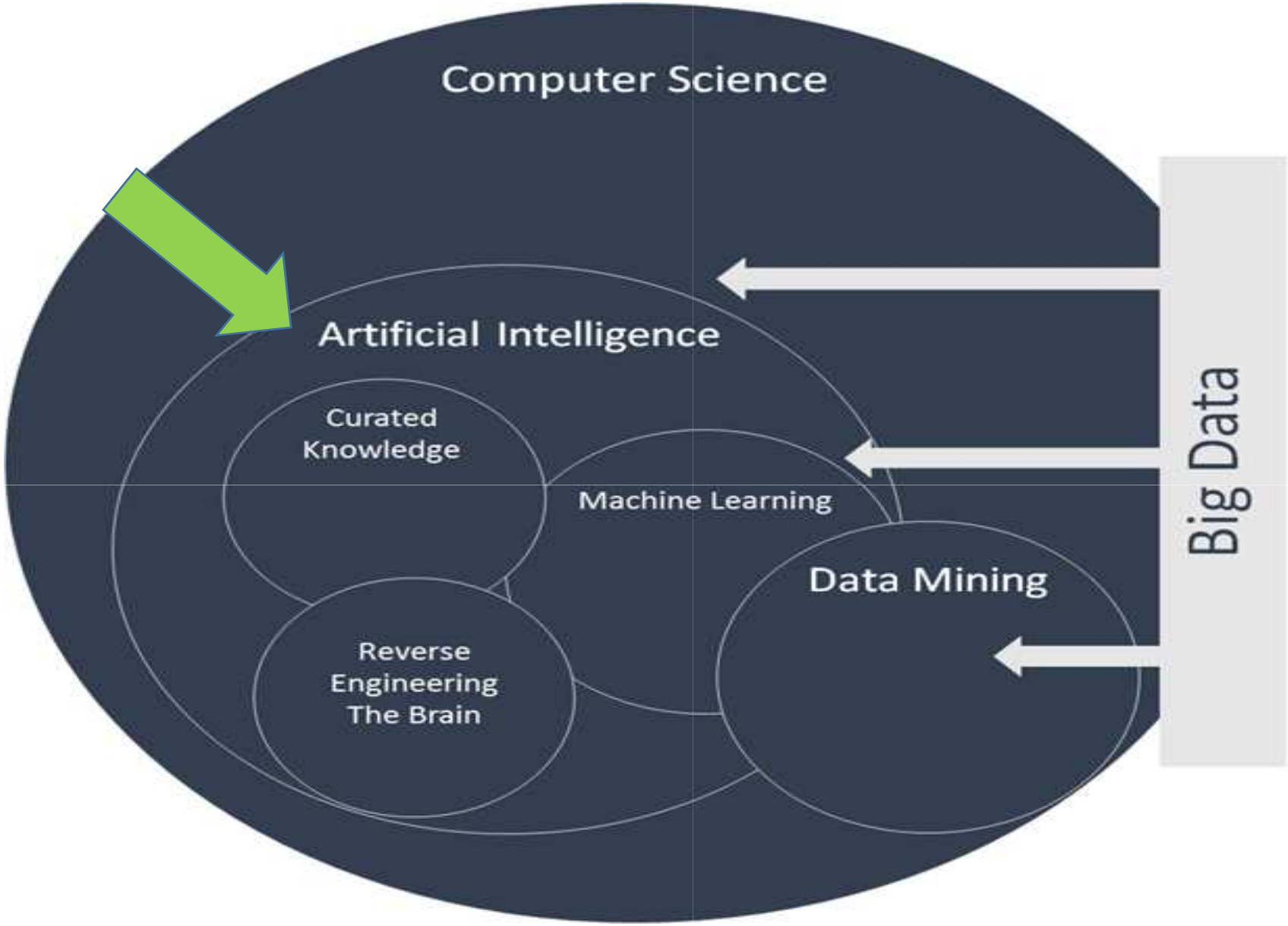
- Machine Learning = Data Mining?
  NO
- Machine learning focuses on prediction, based on *known* properties learned from the training data.
- Data mining; which is the analysis step of Knowledge Discovery in Databases focuses on the discovery of (previously) *unknown* properties on the data.

ML vs. Data Mining

Parameter	Data Mining	Machine Learning
Types	Association Rules Classification Clustering Sequential Patterns Sequence Similarity	Supervised Un Supervised Reinforcement
Relationship	Forecasting Classifying Things Associating Similar Things Clustering into Groups Sequence Making	Automating Employee Access Control Protecting Animals Predicting Emergency wait room times Identifying Heart Failure Classroom will learn, Digital Guardian, City will help you live in it and many more.....

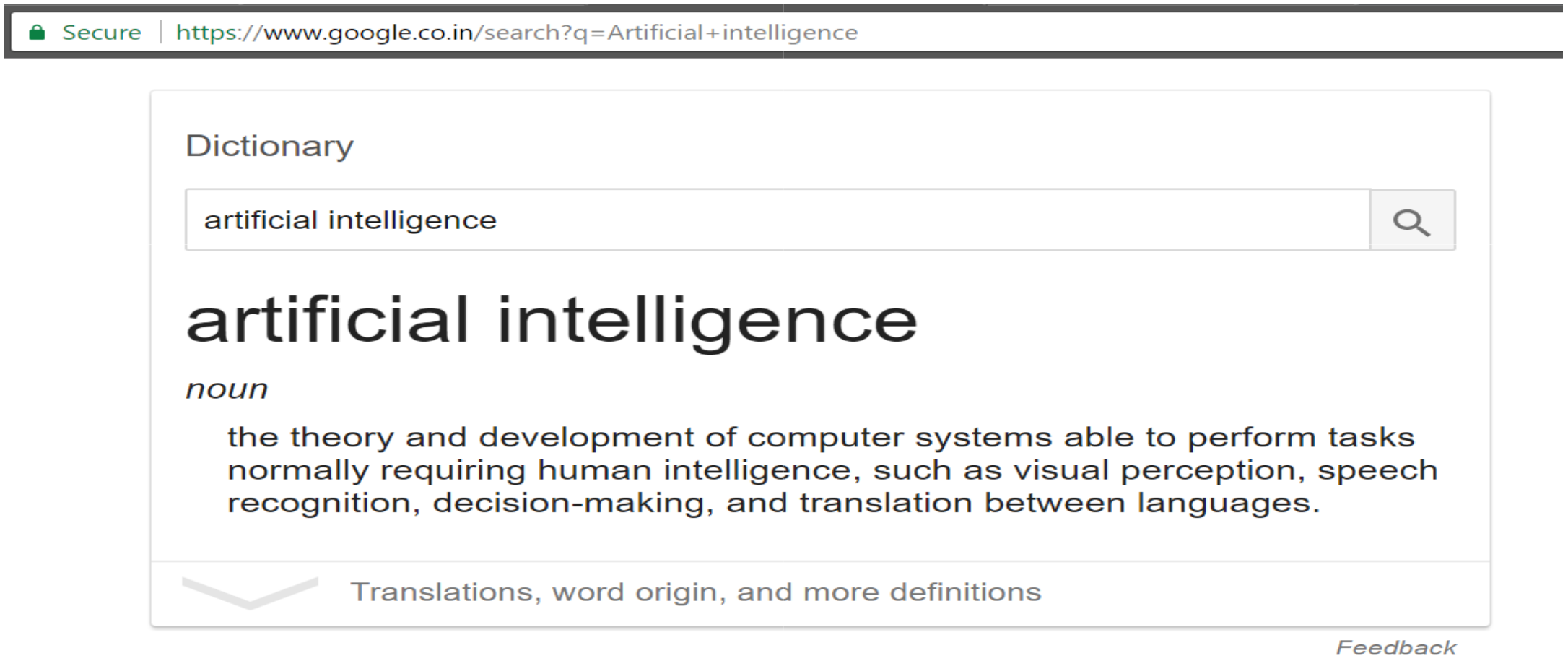


src: https://inovancetech.com/buzzwords.html

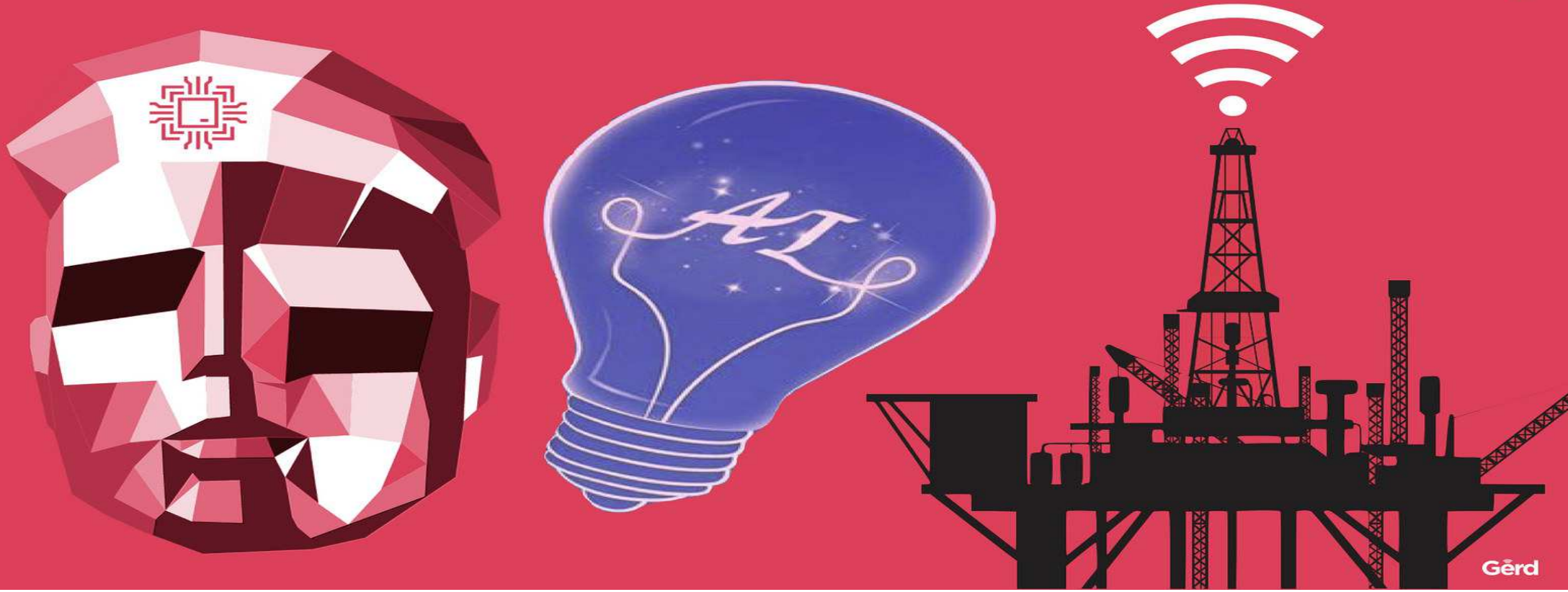


src: https://inovancetech.com/buzzwords.html

And here’s what Google tells me

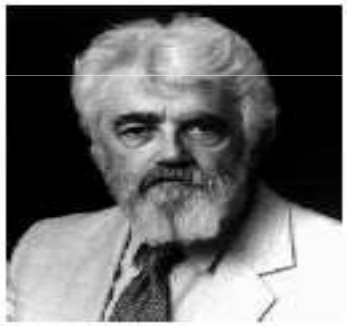


Data is the new oil, and AI is the new electricity



Brief history of AI

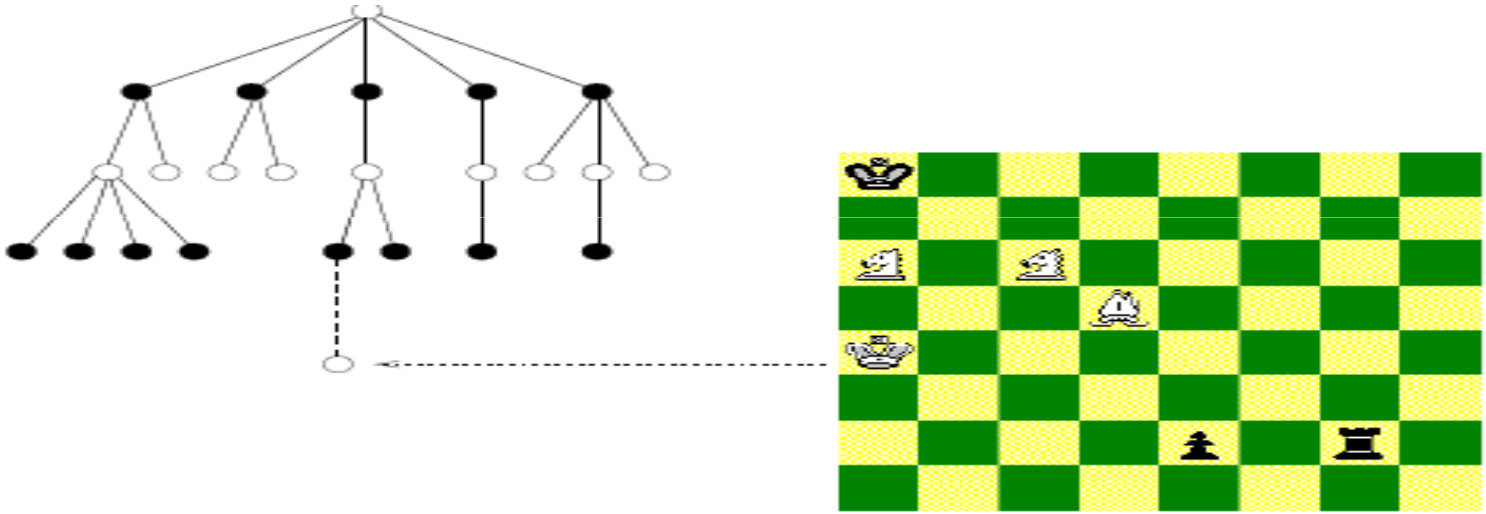
- **The birth of artificial intelligence**
  - 1956: Dartmouth Conference - "Artificial Intelligence" adopted
  - The term ‘Artificial Intelligence’ was coined in a proposal for the conference at Dartmouth College 1956




  - The term stuck, though it is perhaps a little unfortunate . . .

Brief history of AI

- One of the early research in AI is search problem such as for game-playing. Game-playing can be usefully viewed as a search problem in a space defined by a fixed set of rules



- Nodes are either white or black corresponding to reflect the adversaries' turns.
- The tree of possible moves can be searched for favourable positions.

Brief history of AI

- The real success of AI in game-playing was achieved much later after many years' effort.
- It has been shown that this search based approach works extremely well.
- In 1996 IBM Deep Blue beat Gary Kasparov for the first time. and in 1997 an upgraded versio won an entire match against the same opponent.

Brief history of AI

- Another of the early research in AI was applied the similar idea to **deductive logic**:

  All men are mortal

  Socrates is a man man(Socrates) $\forall x\,(man\ (x) \longrightarrow mortal\ (x))$

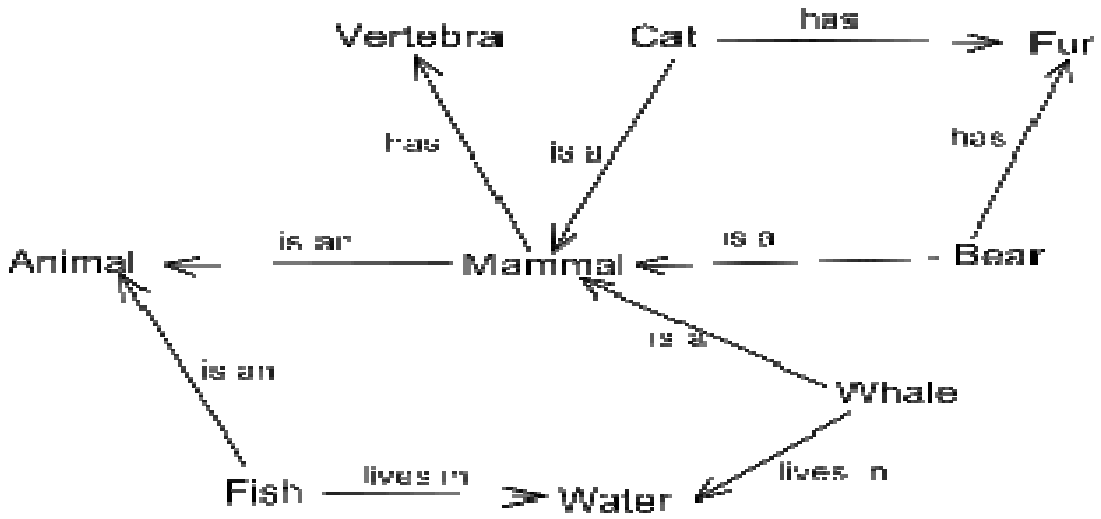
  ~~Socrates is mortal~~ ~~mortal(Socrates)~~

- The discipline of developing programs to perform such logical inferences is known as (automated) **theorem-proving**
- The idea was to code common sense knowledge as logical axioms, and employ a theorem-prover.
- But logic is rigid to a formalism to accommodate many aspects of common-sense reasoning.
- Major problem: **deductive logic** systems do not allow for the phenomenon of uncertainty.

Brief history of AI

Semantic Networks

- A semantic net is a network which represents semantic relations among concepts. It is often used a
  a form of knowledge representation.
- Nodes : used to represent objects and descriptions.
- Links : relate objects and descriptors and represent relationships.



Brief history of AI

Problems then:

- Limited computing power: There was not enough memory or processing speed to accomplish anything truly useful
- Intractability and the combinatorial explosion: In 1972 Richard Karp showed there are many problems that can probably only be solved in exponential time (in the size of the inputs).
- Common-sense knowledge and reasoning: Many important applications like vision or natural language require simply enormous amounts of information about the world and handling uncertainty.

AI Today ?

- AI today greatly benefits from:
  - the incredible power of computers today
  - a greater emphasis on solving specific sub problems
  - the creation of new ties between AI and other fields working on similar problems
  - a new commitment by researchers to solid mathematical methods and rigorous scientific standards, in particular, based probability and statistical theories
  - Significant progress has been achieved in neural networks, probabilistic methods for uncertain reasoning and statistical machine learning, machine perception (computer vision and Speech), optimisation and evolutionary computation, fuzzy systems, Intelligent agents.

So…..

- AI has been into existence since 1956
- AI was not into the mainstream IT until late 2012
- Then why now AI is back ?
  - Availability of cheap and incredibly high compute and parallel processing capabilities
  - Rapid Research into the niche mathematical fields pertaining to AI.
  - Deep Learning !
  - Probabilistic and Statistical Approach
  - Success achieved in recent times by “Tech Giants” in IT

ref: https://blogs.nvidia.com/blog/2016/07/29/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/

AI Applications

- Natural language processing such as
  - Natural Language Understanding
  - Speech Understanding
  - Language Generation
  - Machine Translation
  - Information retrieval and text mining
- Pattern recognition and machine perception, e.g.,
  - Computer vision
  - Speech recognition

AI Applications

- Social and business intelligence such as
  - Social and customer behaviour modelling
- Deduction, reasoning, problem solving such as
  - Theorem-provers, solve puzzles, play board games
- Knowledge representation such as
  - Expert systems
- Automated planning and scheduling
- Motion and manipulation such as
  - Robotics to handle such tasks as object manipulation and navigation, with sub-problems of localization (knowing where you are), mapping (learning what is around you) and motion planning (figuring out how to get there)

100 STARTUPS USING ARTIFICIAL INTELLIGENCE TO TRANSFORM INDUSTRIES

RSATIONAL AI/ BOTS

dMeld · semanticmachines · Maluuba · KITT.AI · snips · clara · mat · X.

VISION

clarifai · Chronocam · Orbital Insight · pilot.ai · aptricity · GROKSTYLE

AUTO

nuTonomy · drive.ai · AIMOTIVE · nauto · nexar · ZOOX

ROBOTICS

UBTECH Dream With Robot · anki · Rokid · dispatch

CYBERSECURITY

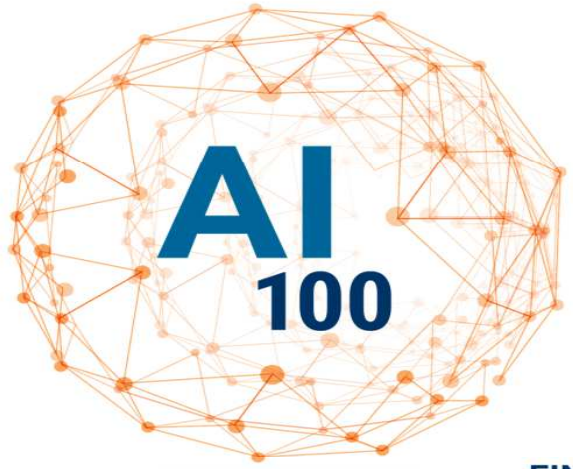
CYLANCE · sift scie · sparkcognition · deepinstin · Shift Technology · DARKTR

ESS INTELLIGENCE & ANALYTICS

Robot · TRIFACTA · rapidminer · tamr · SIGOPT · ata · context relevant · Dataminr · CrowdFlower · logz.io

AI

a · PETUUM · ALGORITHMIA · H_2O.ai · loop ai Labs COGNITIVE COMPUTING · itiveScale · sentient · Voyager Labs · Numenta · LED RENCE · skymind · vicarious · Digital Reasoning · sai · AYASDI



AD, SALES, CRM

TalkIQ · deep gram · [PERSADO] · Appier · CHORUS · drawbridge · DigitalGenius Human+AI Customer Service · RESCI

HEALTHCARE

freenome · CLOUD MEDX · zebra · enlitic · iCarbonX 碳云智能 · Atomwise Better medicines faster. · deep genomics · BenevolentAI · Lunit

THE OVATION UMMIT BINSIGHTS

TEXT ANALYSIS/ GENERATION

textio · fido.ai · cortical.io · NarrativeScience Tell the Stories Hidden in Your Data

IOT/IIOT

nanit · KONUX · VERDIGRIS · SIGHT MACHINE Manufacturing Analytics

COMMERCE

bloomreach · mode.ai

FINTECH & INSURANCE

CAPE ANALYTICS · KENSHO · NUMERAI · alphasense · Kasisto

OTHER

GIGSTER · prospera · BLUERIVER TECHNOLOGY · ROSS · Descartes Labs · gradescop · talla