

1 Definition of AI



Artificial Intelligence

- Definition by the European Commission:
- “**Artificial intelligence (AI)** systems are software (and possibly also hardware) systems designed by **humans** that, given a complex **goal**, act in the physical or digital dimension by perceiving their **environment** through data acquisition, interpreting the collected structured or unstructured **data**, reasoning on the **knowledge**, or processing the **information**, derived from this data and deciding the best **action(s)** to take to achieve the given goal.”

[European Commission - A definition of Artificial Intelligence: main capabilities and scientific disciplines](#)



Artificial vs. Human Intelligence

Levels of Artificial Intelligence





Narrow AI < HI

- Systems able to perform **one or few specific tasks**
- Operate under a **narrow** set of constraints and limitations
- **Simulates** human behaviour based on parameters and context
- All progress in AI nowadays is in narrow AI
- One trick ponies, but can still be extremely **valuable**



General AI = HI

- System able to perform **most human activities**
- Learn to solve **any** problem
- Machine that **mimics** human intelligence and/or behaviours
- Researchers have **not yet** achieved general AI
- Will take some technological **breakthroughs** to get there



Super AI > HI

- System that evokes emotions, needs, beliefs and desires **of its own**
- Machines become self-aware and **surpass** the capacity of humans
- Decision-making and problem-solving **far superior** to human beings

- Pure **speculation** if this will ever be possible
- And what about its **consequences?**



Realistic view on AI

- Too optimistic:
 - sentient super-intelligent killer robots coming soon
- Too pessimistic:
 - AI can't do everything, so let's give up completely
- Just right:
 - AI can't do everything ...
 - ... but enough valuable applications to transform industries
- Important to understand what AI can and can't do for you



Taxonomy of AI

ARTIFICIAL INTELLIGENCE (AI)

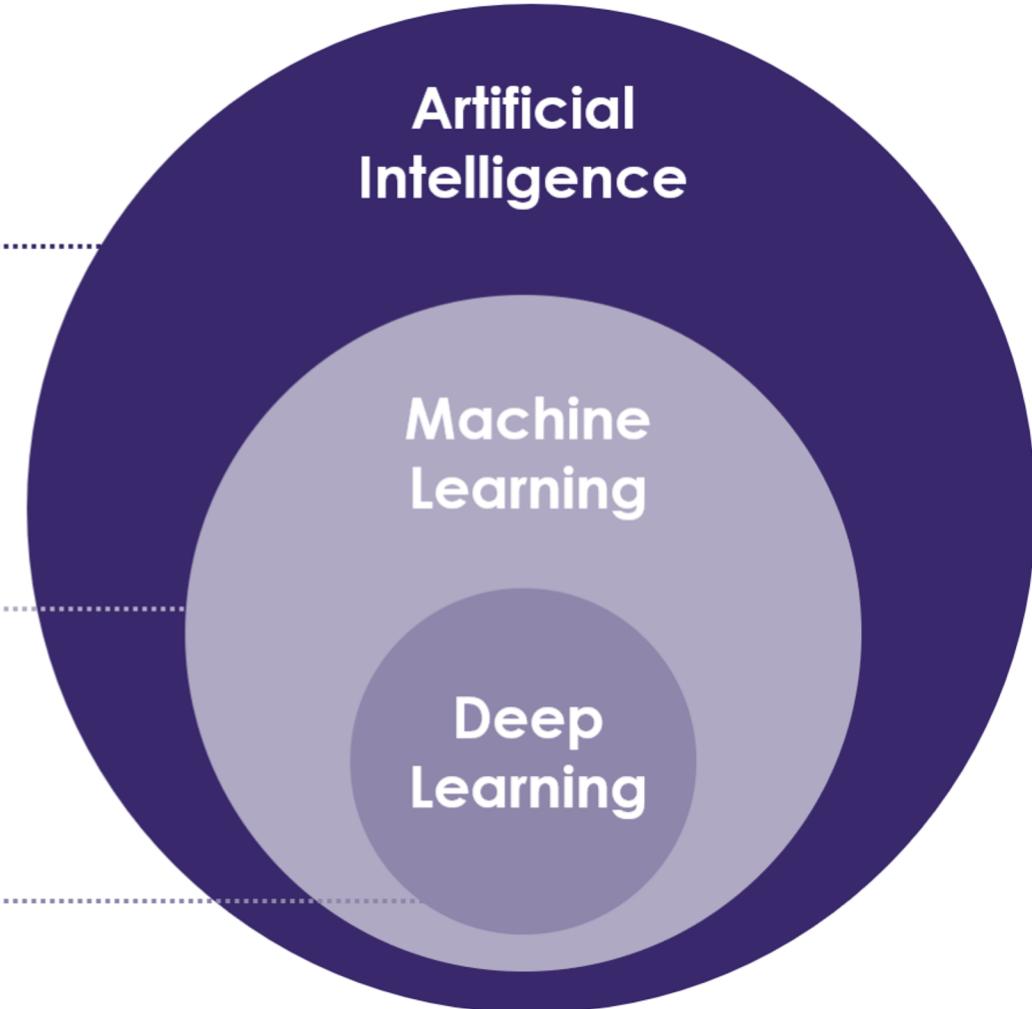
Programming systems to perform tasks which usually require human intelligence.

MACHINE LEARNING (ML)

Training algorithms to solve tasks by pattern recognition instead of specifically programming them how to solve the task.

DEEP LEARNING (DL)

Training algorithms by using deep neural networks with multiple layers.



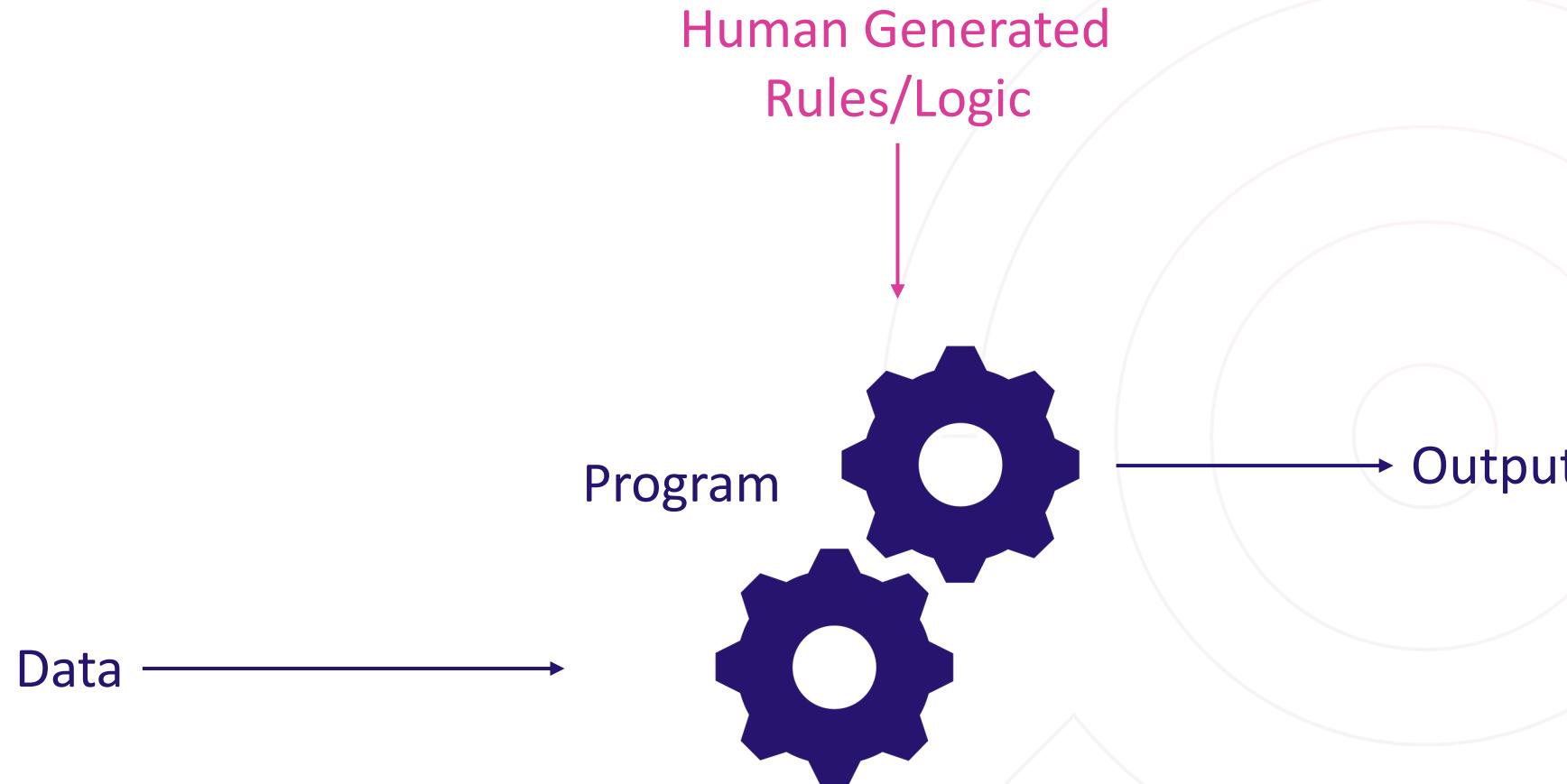


AI > ML > DL

- AI: theory and development of computer systems able to perform tasks normally requiring **human intelligence**
- ML: a subfield of AI that gives computers the ability to **learn without being explicitly programmed**
 - Conventional programming: data + rules = answers
 - Machine learning: **data + answers = rules**
- DL: subset of ML methods based on **deep artificial neural nets**
 - Perform **automatic** feature engineering/creation

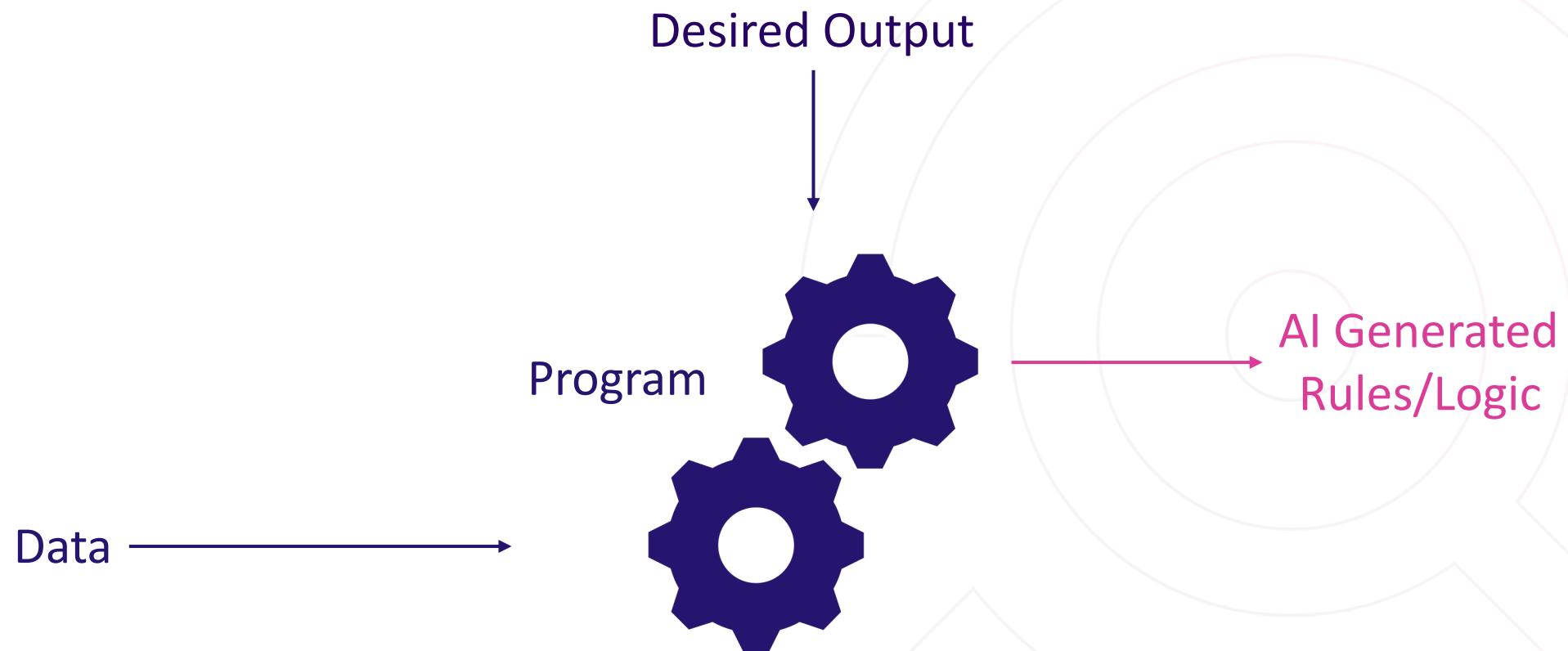


Conventional Programming



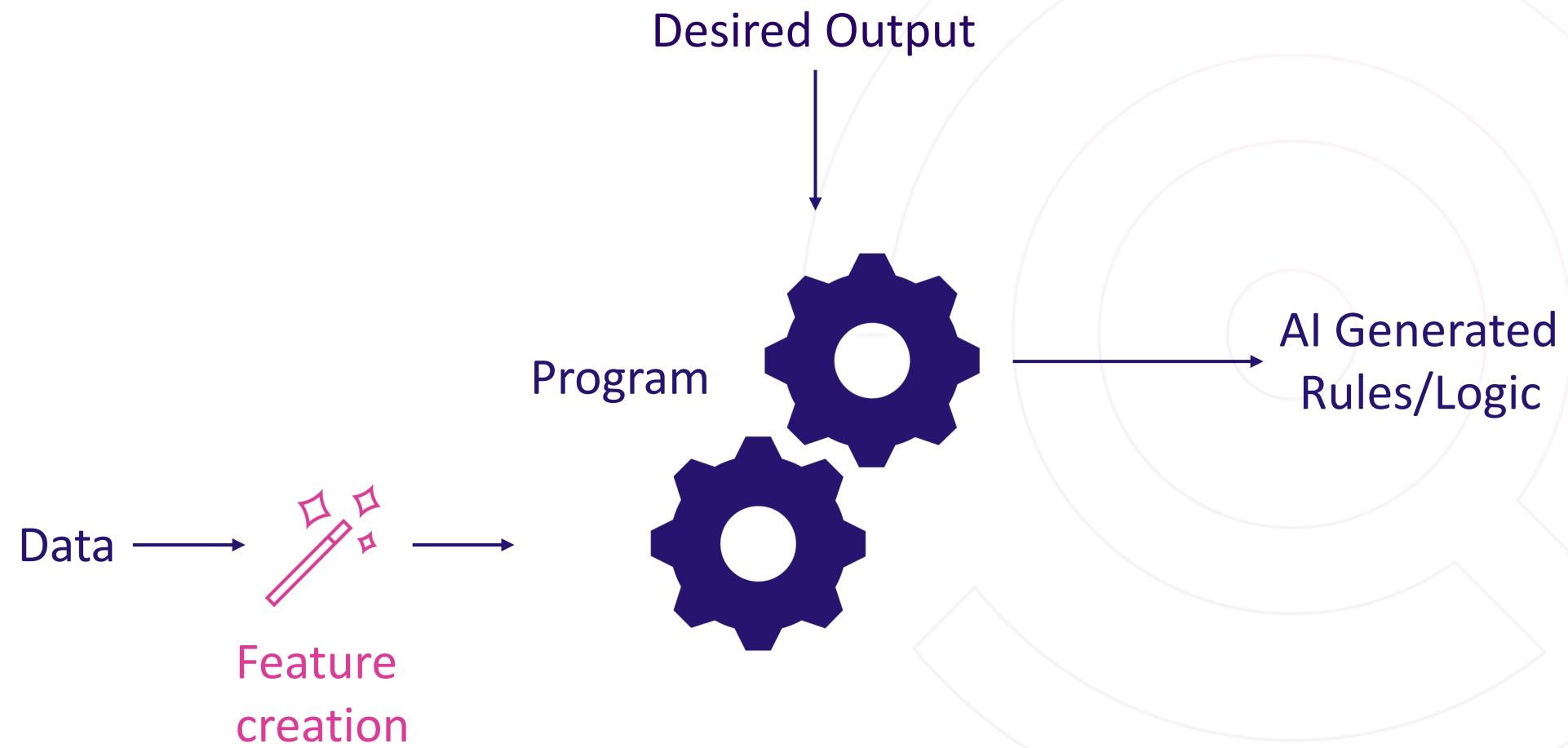


Machine Learning





Deep Learning





Exercise

Statement

- AI learns on its own without any help from outside
- AI trained to do one task will excel at other tasks as well
- AI is objective
- AI will take your job

True/False

- ...
- ...
- ...
- ...
- ...



Reality check

Misconceptions

- AI learns on its own without any help from outside
- AI trained to do one task will excel at other tasks as well
- AI is objective
- AI will take your job

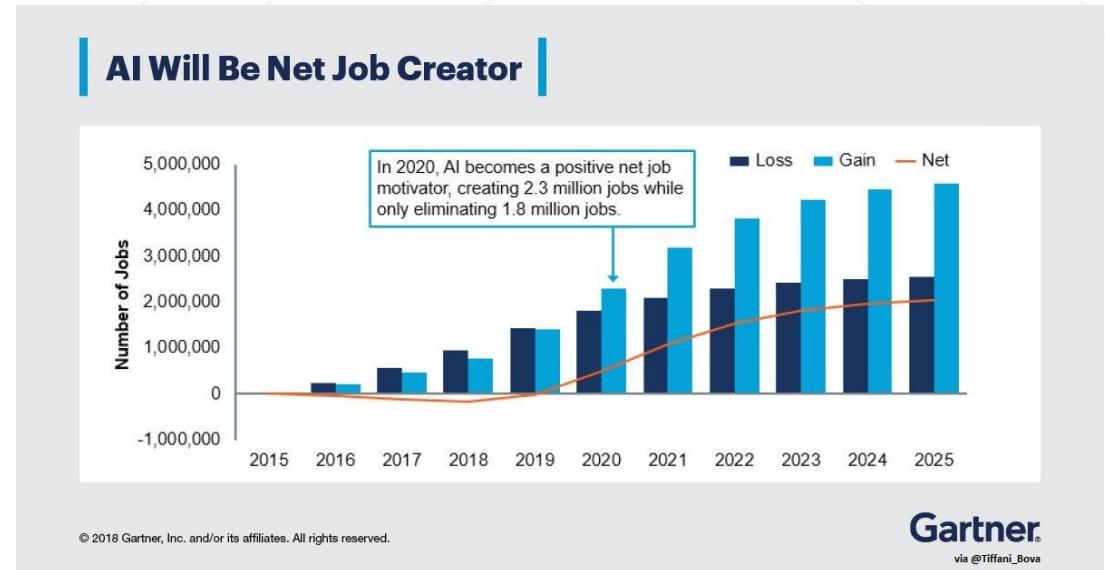
Reality

- Human supervision to ensure adequate performance
- Need a model for each use case and will heavily depend on data
- Patterns are learned from data
- AI will be job creator



AI and the job market

- “Automation will displace 85 million jobs but generate 97 million new ones worldwide by 2025” *World Economic Forum*
- “AI-related job creation will reach two million net-new jobs in 2025.” *Gartner*



Gartner – AI and the future of work