

Artificial Intelligence

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August 27, 2021

What is AI?

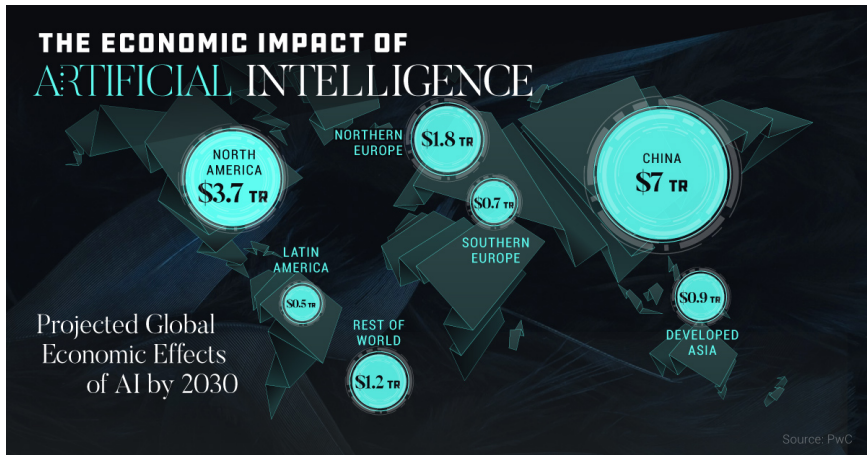
AI is the ability of a computer system to solve problems and to perform tasks that would otherwise require human intelligence.

What is AI?

Our 2019 Prediction	Grade
New natural language processing companies raise \$100M in 12 months.	Yes
No autonomous driving company drives >15M miles in 2019.	Yes
Privacy-preserving ML adopted by a F2000 company other than GAFAM (Google, Apple, Facebook, Amazon, Microsoft).	Yes
Unis build <i>de novo</i> undergrad AI degrees.	Yes
Google has major quantum breakthrough and 5 new startups focused on quantum ML are formed.	Sort of
Governance of AI becomes key issue and one major AI company makes substantial governance model change.	No

<https://www.stateof.ai/>

Why AI?



Why AI?

EXECUTIVE ORDERS

Executive Order on Maintaining American Leadership in Artificial Intelligence

INFRASTRUCTURE & TECHNOLOGY

Issued on: February 11, 2019



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Tech-driven change a key priority for new EC president



Why AI?



Figure 2. Identifying Societal Drivers.

Side Effects of AI

Google's AI for mammograms doesn't account for racial differences

By [Amrita Khatri](#) - January 9, 2020

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Report amplifies concerns about the rollout of algorithms that analyze images

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Training a single AI model can emit as much carbon as five cars in their lifetimes

Deep learning has a terrible carbon footprint.

Artificial Intelligence

Robots as Moral Agents

Is it possible to construct some kind of 'artificial moral agents'? (implicit vs. explicit)

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If so,

Which moral code should they be programmed with?

Moral Machine

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- making computers that think?
- the automation of activities we associate with human thinking, like decision making, learning, ...?
- the art of creating machines that perform functions that require intelligence when performed by people?
- the study of mental faculties through the use of computational models?

What is AI?

- the study of computations that make it possible to perceive, reason and act?
- a field of study that seeks to explain and emulate intelligent behaviour in terms of computational processes?
- a branch of computer science that is concerned with the automation of intelligent behaviour?
- anything in Computing Science that we don't yet know how to do properly? (!)

Weak AI vs. Strong AI

- **Strong (General) AI:** Computer software + hardware alone can emulate a human mind. There is no fundamental difference between man and machine.

Weak AI vs. Strong AI

- **Strong (General) AI:** Computer software + hardware alone can emulate a human mind. There is no fundamental difference between man and machine.
- **Weak (Narrow) AI:** Computer software + hardware alone can simulate every aspect of a human mind. Only people can think, machines cannot.

What is AI?

THOUGHT	Systems that think like humans	Systems that think rationally
BEHAVIOUR	Systems that act like humans	Systems that act rationally
	HUMAN	RATIONAL

Acting humanly: The Turing test

Turing (1950) “Computing machinery and intelligence”:

- “*Can machines think?*” → “*Can machines behave intelligently?*”
- Operational test for intelligent behavior: the *Imitation Game*

Thinking humanly: Cognitive Science

Requires scientific theories of internal activities of the brain

- What level of abstraction? “*Knowledge*” or “*circuits*”?
- How to validate? Requires
 - ① Predicting and testing behavior of human subjects (top-down) or
 - ② Direct identification from neurological data (bottom-up)

Both approaches (roughly, *Cognitive Science* and *Cognitive Neuroscience*) are now distinct from AI

Thinking and Acting rationally

- *Normative* (or *prescriptive*) rather than *descriptive*
- Direct line through mathematics and philosophy to modern AI

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- *Normative* (or *prescriptive*) rather than *descriptive*
- Direct line through mathematics and philosophy to modern AI
- Rational behavior: **doing the right thing**
- The right thing: that which is expected to maximize goal achievement, given the available information