

AI in practice

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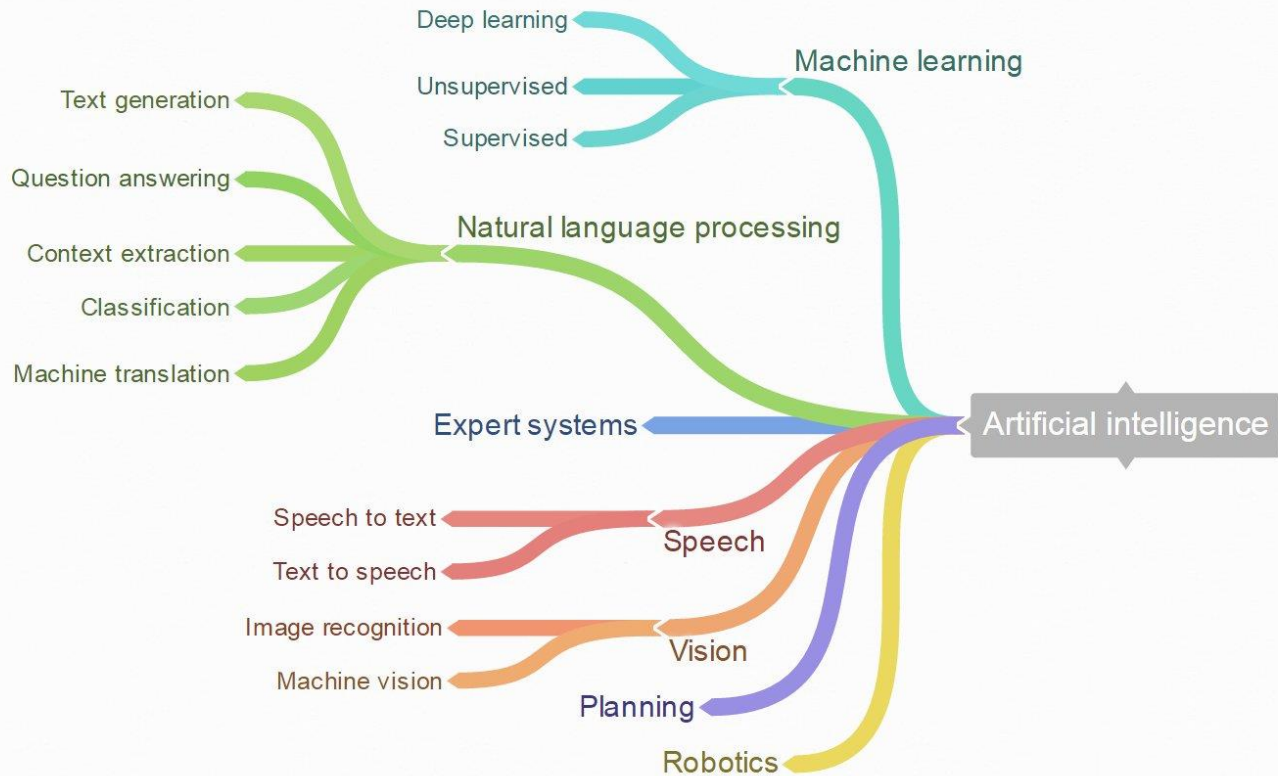
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What is AI?

Artificial Intelligence (AI) technologies aim to reproduce or surpass abilities (in computational systems) that would require 'intelligence' if humans were to perform them. [EPSRC]



It's a field of study...



...and in this it differs from "an artificial intelligence"

TIMELINE OF ARTIFICIAL INTELLIGENCE

HAL 9000 FROM "2001: A SPACE ODYSSEY" (CREDIT: WARNER BROS. STUDIOS)

Advances in artificial intelligence (AI) have given the world computers that can beat people at chess and "Jeopardy!", as well as drive cars and manage calendars. But despite the progress, engineers are still years away from developing machines that are self-aware. Some believe the resulting **technological singularity** will eradicate poverty and disease, while others warn it could endanger human survival.

- 1950:** Isaac Asimov publishes the influential sci-fi story collection "I, Robot." (Left: 2004 film version of "I, Robot")
- 1950:** Alan Turing introduces the **Turing test** in his paper "Computing Machinery and Intelligence." (Credit: National Portrait Gallery, London)
- 1956:** Summer of 1956: Dartmouth conference launches the field of AI and coins the term **"artificial intelligence."** (Right: room-filling IBM-702 computer, as used by first AI researchers)
- 1968:** "2001: A Space Odyssey," the book by Arthur C. Clarke and film by Stanley Kubrick, features the sentient and deadly computer **HAL 9000.**
- 1974-early 1980s:** The first **Winter of AI**, a period of reduced funding and waned interest in the field as type turned to disappointment.
- 1978:** The original "Battlestar Galactica" science fiction TV series introduces warlike robots called **Cylons.**
- 1984:** The first **"Terminator"** film depicts a near-future world overtaken by killing machines run by the artificial intelligence Skynet.
- 1987-93:** The second **Winter of AI**
- September 28, 1987:** The TV series "Star Trek: The Next Generation" introduces the self-aware android **Lieutenant Commander Data.**
- May 11, 1997:** **IBM's Deep Blue** computer beats reigning world chess champion Garry Kasparov. (Credit: Shutterstock)
- 2005:** A Stanford vehicle wins the **DARPA grand challenge**, driving autonomously across the desert for 131 miles (211 kilometers).
- 2005:** Inventor and futurist Ray Kurzweil predicts an event he calls **the Singularity** will occur around 2045, when the intelligence of artificial minds exceeds that of the human brain.
- 2011:** **IBM's Watson** wins "Jeopardy!", beating former champions Brad Rutter and Ken Jennings. (Credit: "Jeopardy!" screenshot from Wikimedia)
- October 14, 2011:** Apple introduces intelligent personal assistant **Siri** on the iPhone 4S.
- June 2012:** A Google Brain computer cluster **trains itself** to recognize a cat from millions of images in YouTube videos. (Credit: Shutterstock)
- December 18, 2013:** The movie "Her" (left), stars Joaquin Phoenix as a man who falls in love with his artificially intelligent computer operating system, voiced by Scarlett Johansson.
- April 10, 2014:** The film "Transcendence" (below) stars Johnny Depp as an AI researcher whose **mind is uploaded** to a computer and develops into a super-intelligence.
- June 7, 2014:** Chatbot Eugene Goostman is said to have **passed the Turing test** in University of Reading competition, launching controversy.
- August, 2014:** Researchers call for creation of a **new Turing test**, to be decided at 2015 workshop.

Sources:
<http://www.srs.org/news/jeopardy-history>
<http://twitter.com/Probot/Tweetdeck/t/1441437>
<http://www.yeswe-can.com/2012/02/01/yes-we-can-robot-robots-human-jeopardy-jeff-holt/>
<http://www.engadget.com/2011/04/04/iphone-4s-hands-on/>
<http://www.4mat.com/2011/04/04/iphone-4s-hands-on/>
<http://www.bbc.com/news/technology-20140810>
<http://www.bbc.com/news/technology-20140810>
<http://www.bbc.com/news/technology-20140810>
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What is ML?

- It is using algorithms to learn statistics and is very trendy
 - But not because of new science...

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On the Uniform Convergence of Relative Frequencies of Events to Their Probabilities

V. N. Vapnik and A. Ya. Chervonenkis

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ON THE UNIFORM CONVERGENCE OF RELATIVE FREQUENCIES OF EVENTS TO THEIR PROBABILITIES

V. N. VAPNIK AND A. YA. CHERVONENKIS

(Translated by B. Seckler)

- ...it a Moore's Law thing

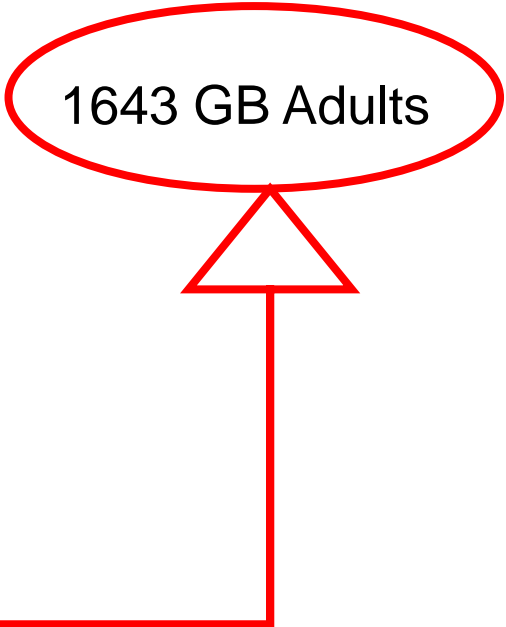
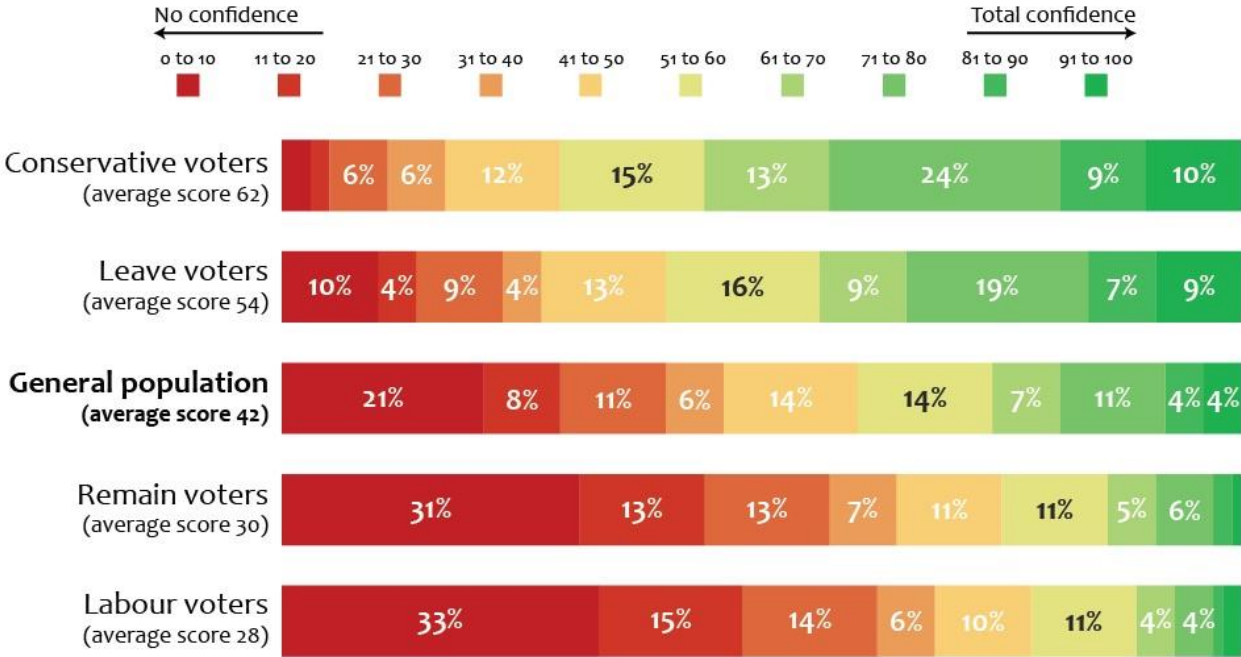


How much data?

- What's the question?

On a scale of 0-100 how confident are you that the Prime Minister, Theresa May, and her team will be able to negotiate a good deal for Britain in the Brexit negotiations...
 ... where 0 means you have absolutely no confidence and 100 means you have total confidence?
 Figures shown are average scores for each group

- Issues:
- Confidence
 - Bias



Lord Ashcroft Polls

Sample Size: 1643 GB Adults
 Fieldwork: 5th - 6th November 2017

Data to build a model

- So startup often helped by PORTABILITY, but...



- ...so better add UX design for data MOBILITY

Network effects

Come join my new service:

“ I have this great new social media application that takes in your social media feeds, links and interweaves them all together using AI”

“And what happens when facebook changes the API”

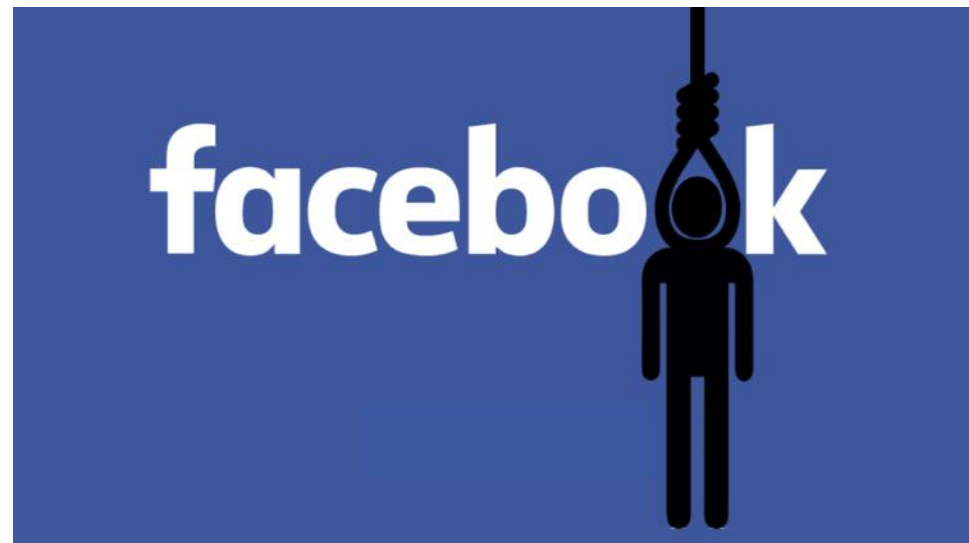
“Céad míle fecks!”

...

Game of Thrones Solution

...

“We must tear down facebook and replace it with a new siloed system that I control, join the revolution”



Network effects

Come join my new service:

“I have this great email web application that takes in your email, links and interweaves them all together and let’s you search them”

“Ah so a combination of Hotmail and Pachyderm”

“Umm, I guess that’s fair summary”

“Cool I’ll join because I can talk to all my friends who still use old email clients because email INTEROPERABILITY”

From tiny acorns...

Gmail



Data sharing as remedy



- Not for personal data...
- Not for pseudonymous personal data...
 - It can be reidentified by correlation with other data
- Anonymous personal data getting into models and hence IP...
- If not for personal data... I don't know or care
 - Until it's safety data related to autonomous cars...

<https://www.horizon.ac.uk>



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Abstract

- Will cover:
 - - demystifying AI and ML
 - - observations on the data access needed in different contexts
 - - hence comments on data “portability” and “interoperability”
 - - link to competition