Introduction

AI: Study Day

for

NHS Library and Knowledge Service Staff

Thursday 3rd December

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My interest in AI

kenchadconsulting Ltd

Health Education England (HEE) is funding an innovative project to explore the potential of artificial intelligence (AI) and machine learning to improve knowledge discovery. HEE is working with Yewno and Ken Chad Consulting on a pilot implementation of an advanced AI research solution – Yewno Discover. **A key strand of the project, led by Ken Chad Consulting, will be an analysis of the user experience (Ux)** using a variety of Ux methodologies. Working with the Library and Knowledge Services team at University Hospitals of Derby and Burton NHS Foundation Trust (UHDB) – one of the largest NHS trusts in the country – a range of user 'problems to be solved' will be investigated and analysed in a busy and complex user environment.

https://www.kenchadconsulting.com/recent-projects/

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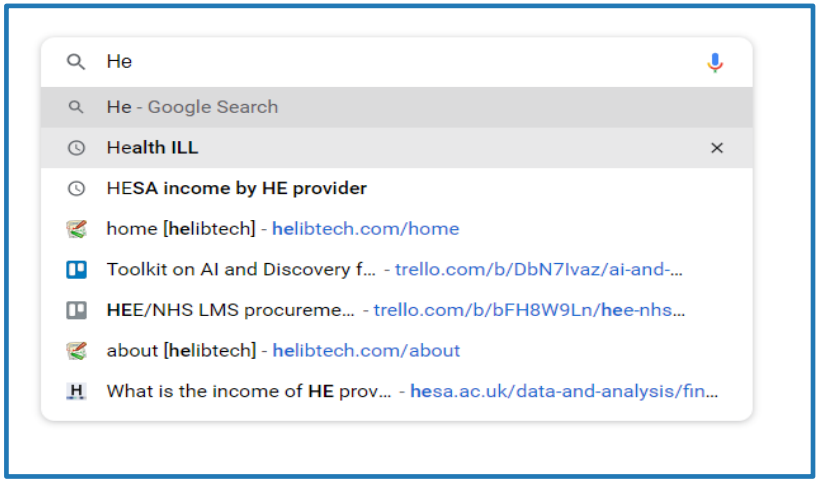
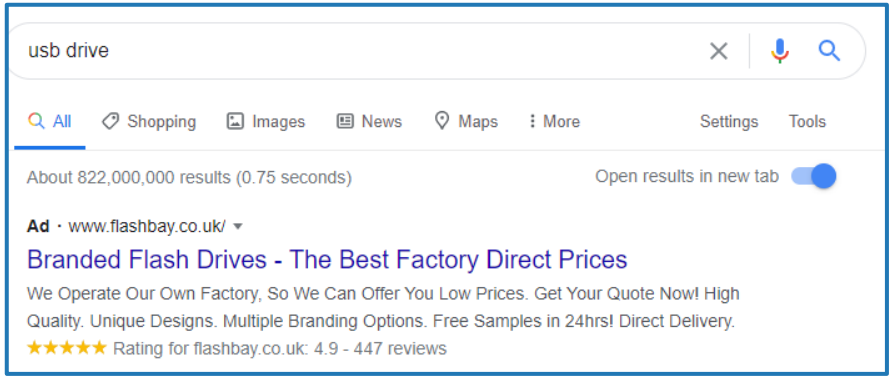
Agenda

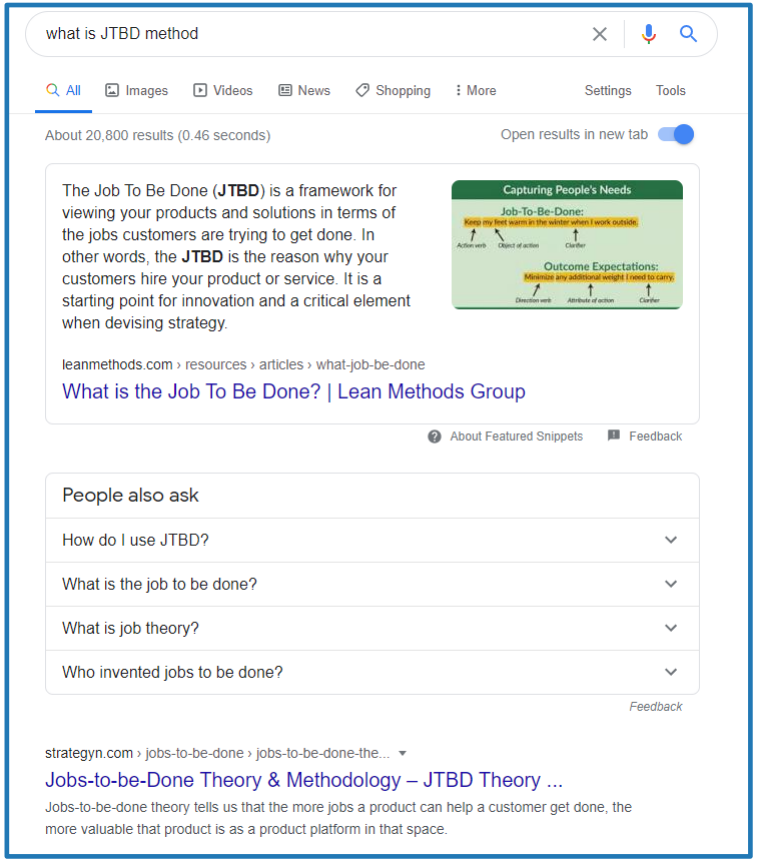
- The basics of AI
- Some examples of AI
- How AI might impact on libraries - particularly health libraries
- Engaging with AI

AI in action

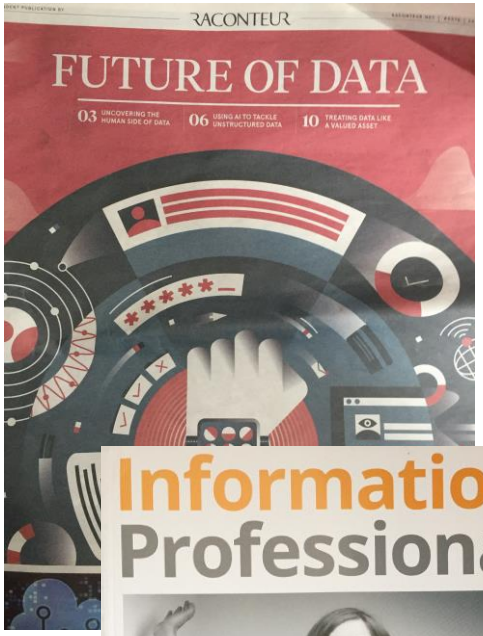
You'll have used A.I. if you used Google today

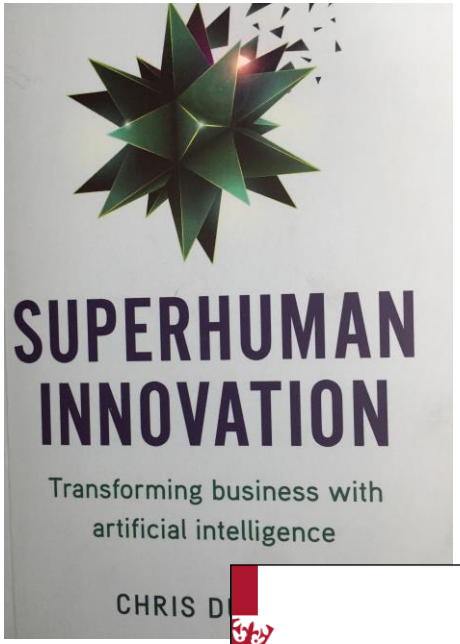


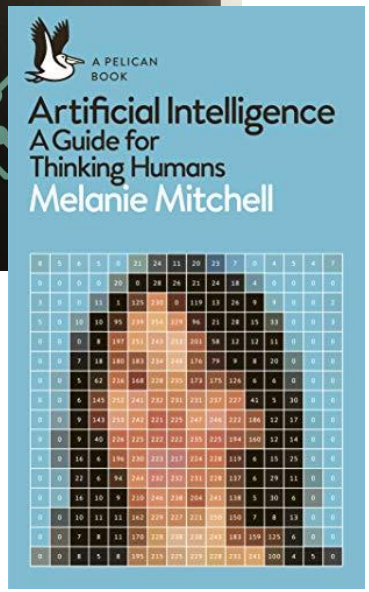


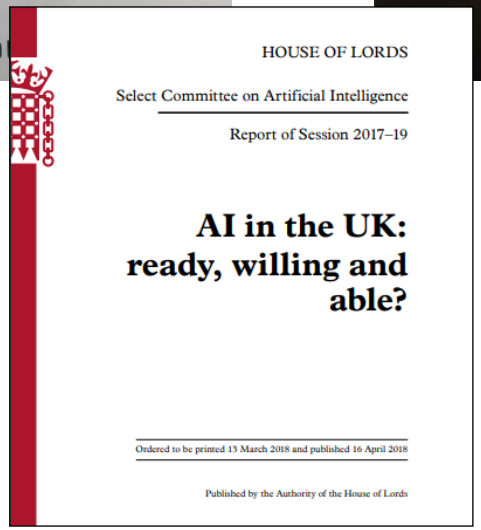


Discussion about AI seems to be everywhere



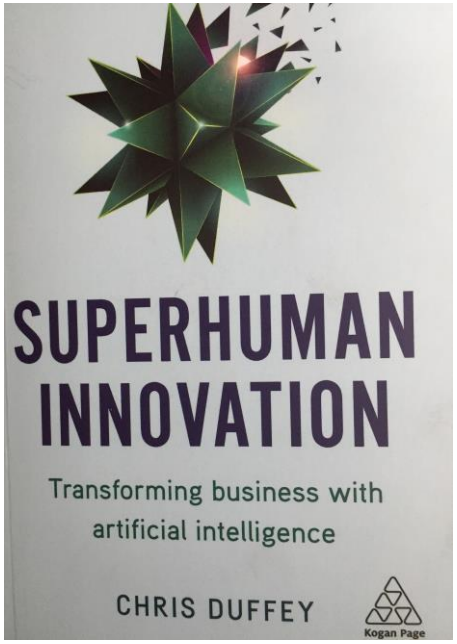






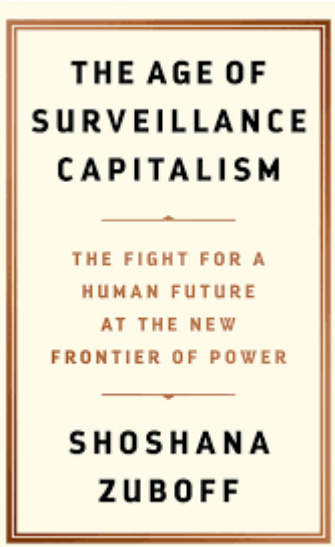
Kenchadconsulting helping create more effective libraries.....

How do you feel about AI? - the optimistic view



Human beings and artificial intelligence will work together to create a **brave new world**...This will be a world where **people are freed** to use their natural creative abilities and their amplified intelligence without concern for the drudgery of mundane, repetitive and quite frankly boring tasks. **This is the true mission of artificial intelligence**

Pessimistic view



This power to **shape behaviour for others' profit** or power is entirely self-authorising. It has no foundation in democratic or moral legitimacy, as **it usurps decision rights and erodes the processes of individual autonomy** that are essential to the function of a democratic society. The message here is simple: Once I was mine. Now I am theirs.

The Guardian

'The goal is to automate us': welcome to the age of surveillance capitalism

The goal is to automate us': welcome to the age of surveillance capitalism. John Naughton. The Observer Technology 20 June 2019
https://www.theguardian.com/technology/2019/jan/20/shoshana-zuboff-age-of-surveillance-capitalism-google-facebook

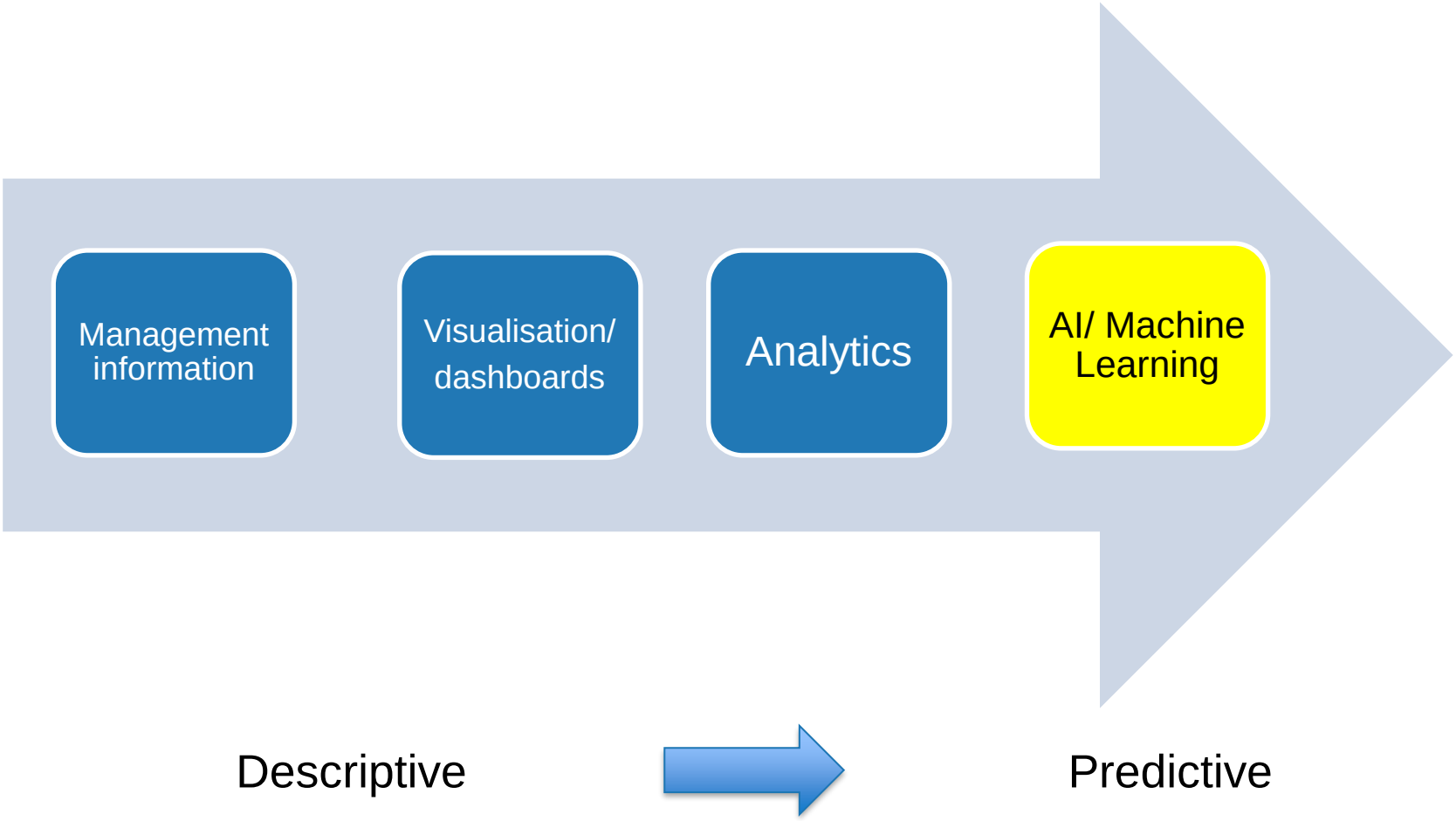
Take a poll

What *is* AI?

Adopting AI ...is a journey, not a silver bullet that will solve problems in an instant. It begins with gathering data into simple visualizations and statistical processes that allow you to better understand your data and get your processes under control. From there, you'll progress through increasingly advanced analytical capabilities, until you achieve that utopian goal .....

Data Is The Foundation For Artificial Intelligence And Machine Learning, By Willem Sundblad Forbes [magazine] 18 October 2018
https://www.forbes.com/sites/willemsundbladeurope/2018/10/18/data-is-the-foundation-for-artificial-intelligence-and-machine-learning/#6750b0a151b4

From management information to AI



What is AI?

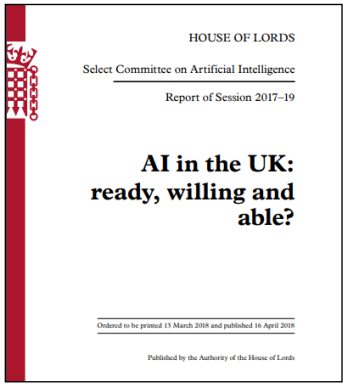
The AI bucket consists of:

- Big data
- Analytics
- Machine learning
- Natural language processing
- Data visualisation
- Decision logic

Cox, A.M. Pinfield, S. and Rutter, S. (2018) The intelligent library: Thought leaders' views on the likely impact of artificial intelligence on academic libraries. Library Hi Tech. ISSN 0737-8831 https://doi.org/10.1108/LHT-08-2018-0105

AI in the UK: ready, willing and able? HOUSE OF LORDS Select Committee on Artificial Intelligence Report of Session 2017–19 HL Paper 100 16 April 2018

Common terms used in artificial intelligence



HOUSE OF LORDS

Select Committee on Artificial Intelligence

Report of Session 2017–19

AI in the UK: ready, willing and able?

Ordered to be printed 13 March 2018 and published 16 April 2018

Published by the Authority of the House of Lords

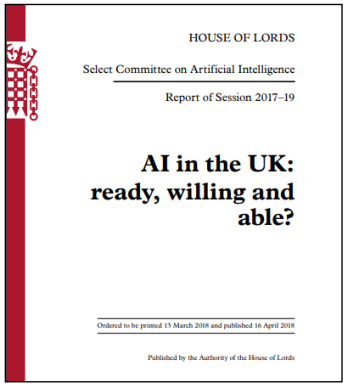
Algorithm

A series of instructions for performing a calculation or solving a problem, especially with a computer. They form the basis for everything a computer can do, and are therefore a fundamental aspect of all AI systems.

```
Find the largest number among three different numbers
Step 1: Start
Step 2: Declare variables a,b and c.
Step 3: Read variables a,b and c.
Step 4: If a > b
          If a > c
            Display a is the largest number.
          Else
            Display c is the largest number.
        Else
          If b > c
            Display b is the largest number.
          Else
            Display c is the greatest number.
Step 5: Stop
```

```
If stock=0
Then message= order new stock
Else message= there is stock
End
If
```

Common terms used in artificial intelligence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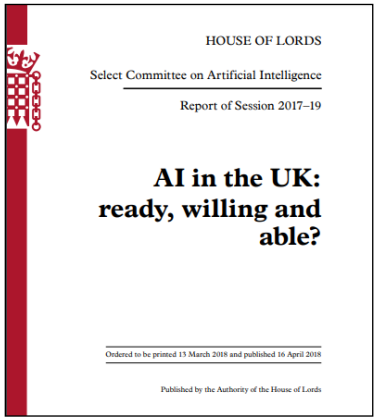
Expert system

A computer system that mimics the decision-making ability of a human expert by following pre-programmed rules, such as 'if this occurs, then do that'. These systems fuelled much of the earlier excitement surrounding AI in the 1980s, but have since become less fashionable, particularly with the rise of neural networks.

Machine learning

One particular form of AI, which gives computers the ability to learn from and improve with experience, without being explicitly programmed. When provided with sufficient data, a machine learning algorithm can learn to make predictions or solve problems, such as identifying objects in pictures or winning at particular games, for example.



Neural network

Also known as an artificial neural network, this is a type of machine learning loosely inspired by the structure of the human brain. A neural network is composed of simple processing nodes, or 'artificial neurons', which are connected to one another in layers. Each node will receive data from several nodes 'above 'it, and give data to several nodes 'below' it. Nodes attach a 'weight' to the data they receive, and attribute a value to that data. If the data does not pass a certain threshold, it is not passed on to another node. The weights and thresholds of the nodes are adjusted when the algorithm is trained until similar data input results
in consistent outputs.

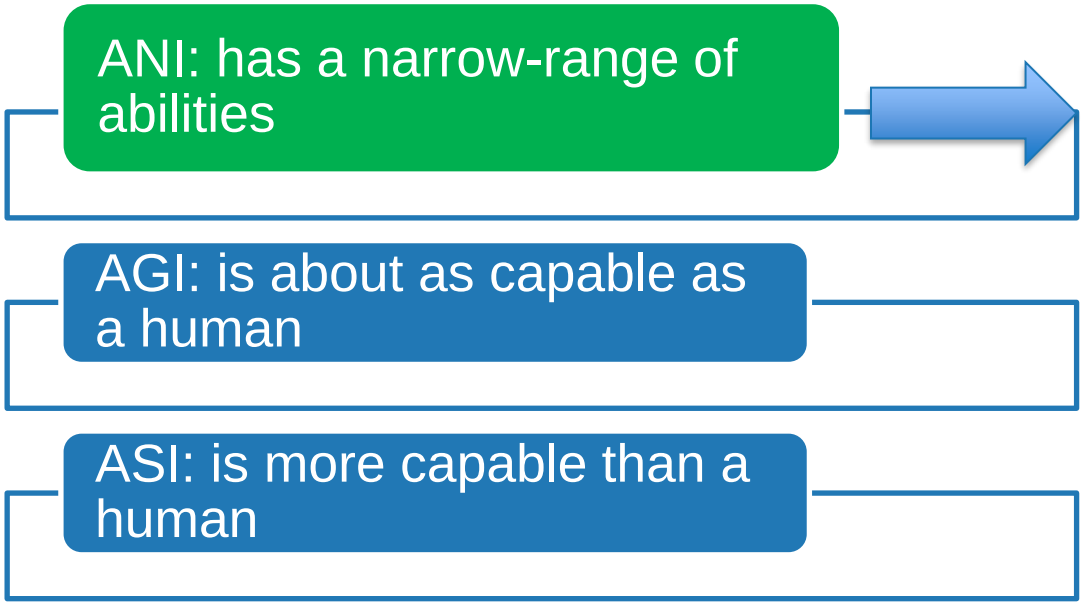
Deep learning

A more recent variation of neural networks, which uses many layers of artificial neurons to solve more difficult problems. Its popularity as a technique increased significantly from the mid-2000s onwards, as it is behind much of the wider interest in AI today. It is often used to classify information from images, text or sound

Types of AI: Narrow (ANI), General (AGI), and Super (ASI)

There are several types of Artificial intelligence: ANI, AGI, and ASI. **For now, AGI** (artificial general intelligence) **and ASI** (artificial super intelligence) **are Sci-Fi** **all existing AI is ANI (narrow)**

The 3 types of AI: Narrow (ANI), General (AGI), and Super (ASI). Thomas J Ackermann. 1-Apr-2019. https://www.bgp4.com/2019/04/01/the-3-types-of-ai-narrow-ani-general-agi-and-super-asi/



AI, or machine learning, refers to **a broad set of algorithms that can solve a specific set of problems**, if trained properly.

The success of artificial intelligence depends on data, Nick Ismail Information Age [blog] 23 April 2018 https://www.information-age.com/success-artificial-intelligence-data-123471607/

Narrow AI

The Economist

Narrow AI is responsible for many useful tools that have already become mainstream: speech and image recognition, search engines, spam filters, product and movie recommendations. The list goes on…..

Do the benefits of artificial intelligence outweigh the risks? Frank L. Ruta The Economist. 10th September 2018
https://www.economist.com/open-future/2018/09/10/do-the-benefits-of-artificial-intelligence-outweigh-the-risks

The importance of data

The importance of data

AI works best when large amounts of rich, big data are available.

According to industry predictions, in 2018, AI's greatest limitation — high quality data — will become more evident. **Successful machine learning depends on large and broad data sets**.

In the next wave of AI empowerment, the **algorithms are commoditised**, but

whoever owns the data is king

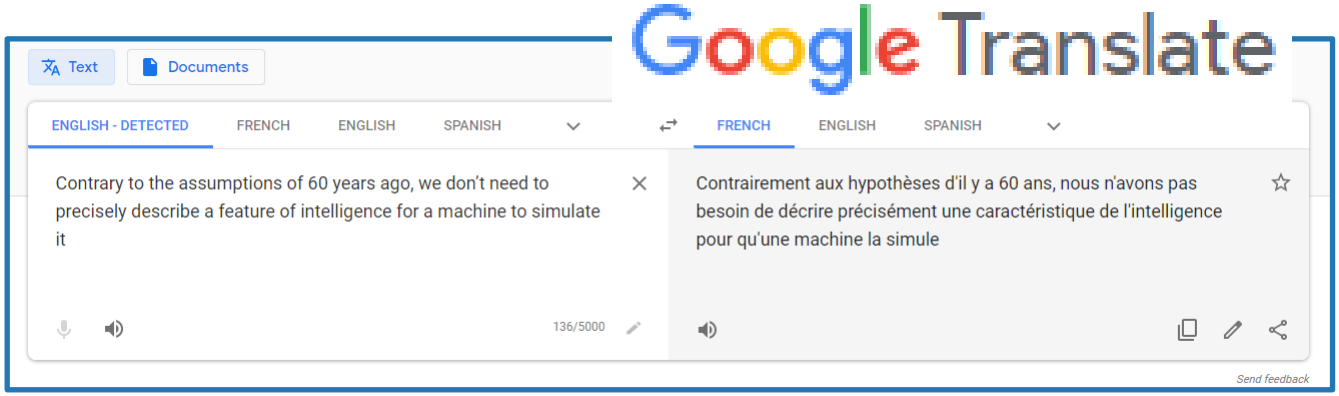
The success of artificial intelligence depends on data, Nick Ismail Information Age [blog] 23 April 2018 https://www.information-age.com/success-artificial-intelligence-data-123471607/

The unreasonable effectiveness of data

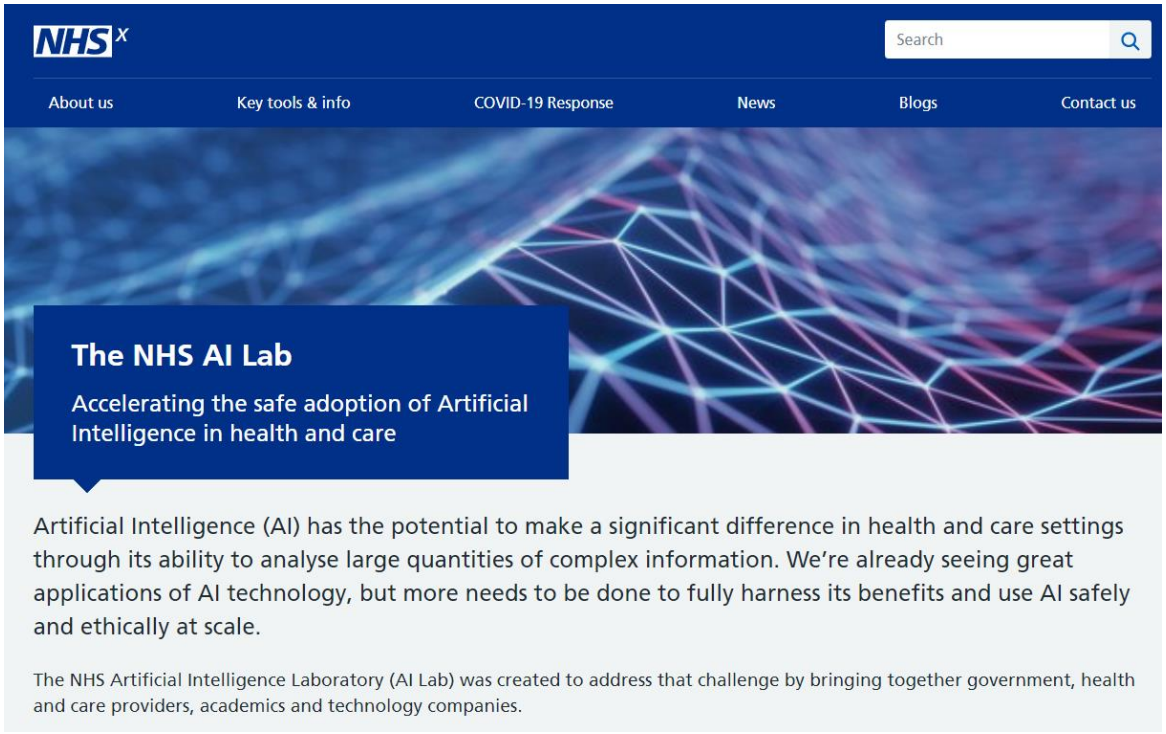
Contrary to the assumptions of 60 years ago, we don't need to precisely describe a feature of intelligence for a *machine* to *simulate* it

*"The unreasonable effectiveness of data"…***simple statistical tricks, combined with vast amounts of data,** have delivered the kind of behaviour that had eluded its [AI's] best theoreticians for decades

Artificial Intelligence: Hope or hype. Nello Cristianini. In *New Scientist Collection. 17 more things you need to understand.* October 2019. p 120 -123



AI, data and the NHS



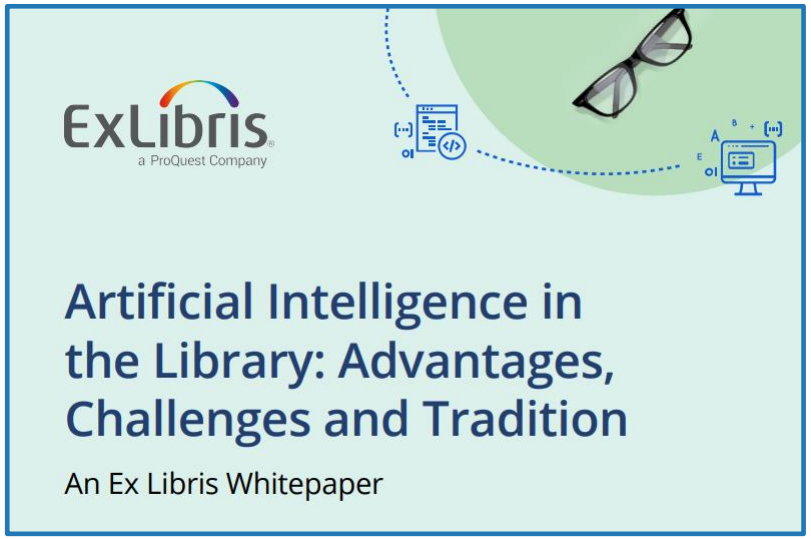
The Health Foundation

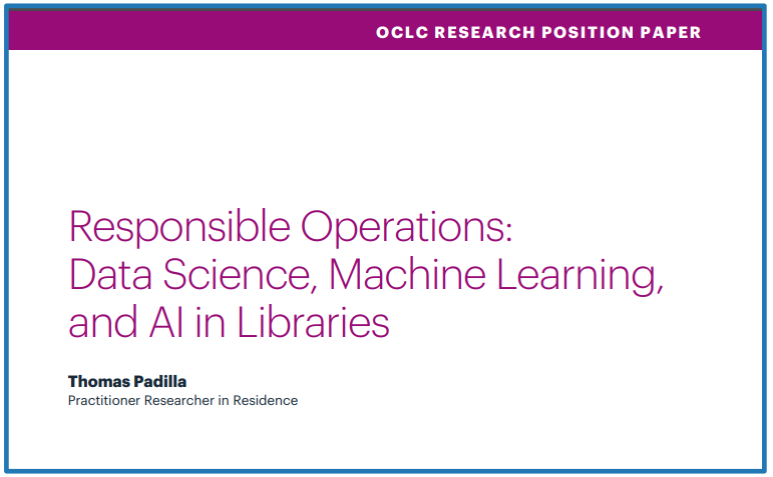
AI is powered by data. …. the NHS potentially has the best health data in the world

https://www.health.org.uk/news-and-comment/blogs/artificial-intelligence-in-the-nhs-getting-the-priorities-right

AI and libraries

Library technology vendors are starting to engage with the AI opportunity





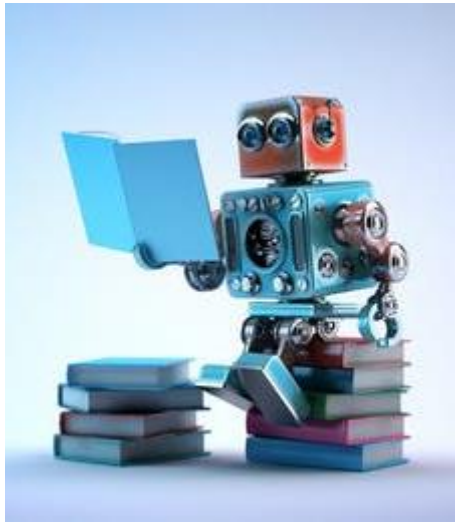
Workflows

“How libraries are starting to apply artificial intelligence in their work”

At MIT, Chris Bourg, director of libraries, is focusing on building a technical infrastructure so its collections are accessible by APIs and therefore can be used by machine-learning algorithms. MIT Libraries is working with AI/ML researchers at the university to **analyze various library tasks and workflows that might be enhanced by AI.**

How libraries are starting to apply artificial intelligence in their work By Loida Garcia-Febo. American libraries 1 March 2019 https://americanlibrariesmagazine.org/2019/03/01/exploring-ai/

Chatbots



The newest librarian at the University of Oklahoma is a robot.
It's a chatbot, which library officials plan to add to the library's website this summer to answer some of the most common questions students come in with, as well as to help them get started with their research. The system can tackle things like "where can I print?" or "what databases do you have about biology?" Anything it can't answer gets sent to a human librarian.

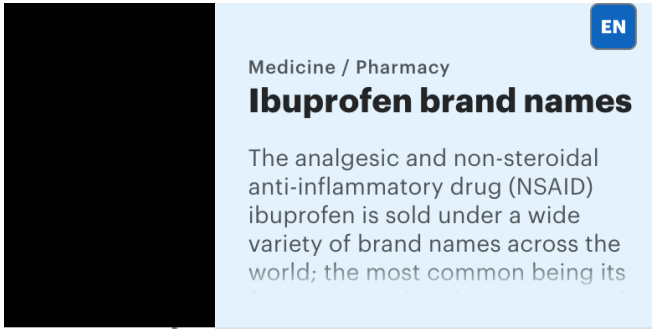
https://www.edsurge.com/news/2019-06-14-bots-in-the-library-colleges-try-ai-to-help-researchers-but-with-caution

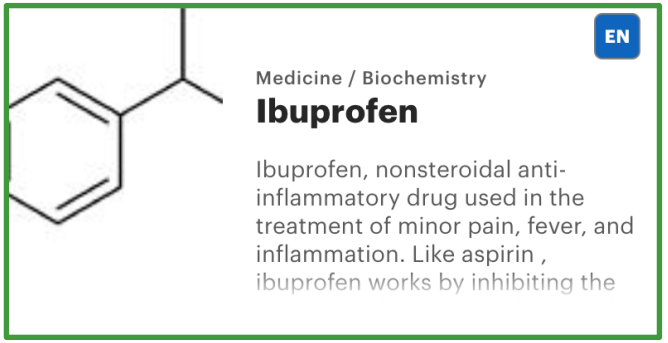
Discovery: Concepts not keywords

- Terms change over time
- A concept/keyword must be attached to a definition

Brexit

Nurofen





Discovery: Understanding context and meaning

Routes to plastic models and prototypes using the SLS selective laser sintering process

2004 - SPIE

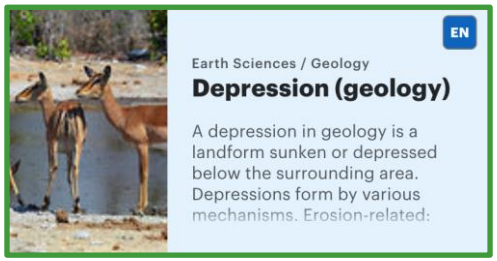
13 minutes

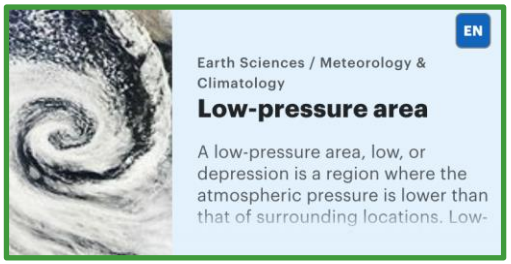
For the production of real technical prototypes injection mould inserts can be produced by the RapidTool process that can be employed for the production of up to 80,000 parts depen on the injected material and part geometry. By changes in the chemical composition and by new processing parameters, average cycle time could be reduced from 4 to 5 days down to 2 to 3 days. Keywords: Rapid Pototyping, Rapid Tooling, Selective Laser Sintering, plastic parts, tooling inserts, injection moulding elastomer, Free Form Fabrication 1. INTRODUCTION The SLS process was developed in 1989 at the University of Texas in Austin. The principle of SLS is illustrated in Fig Layers of fine powdery materials with a specific geometry and specific surface features are applied to a work platform can be positioned accurately in the z-direction. The part to be build is sliced into layers of typically 0.05 to 0.3 mm thickness based on a 3D-CAD-file that describe closed volume (.STL-format).

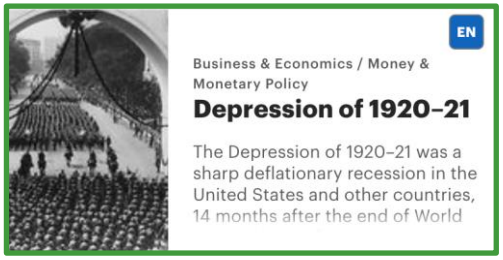
3D printing

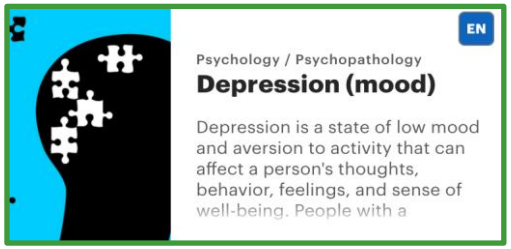
- The term ‘3D printing’ isn’t mentioned in the text itself
- Algorithms understand meaning - what is being written about
- They can also understand context

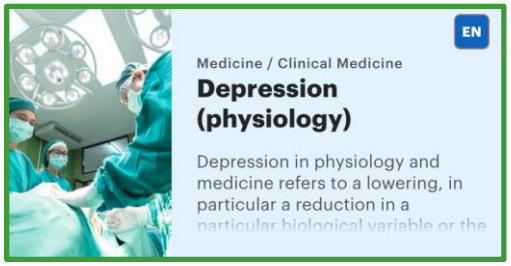
Disambiguation





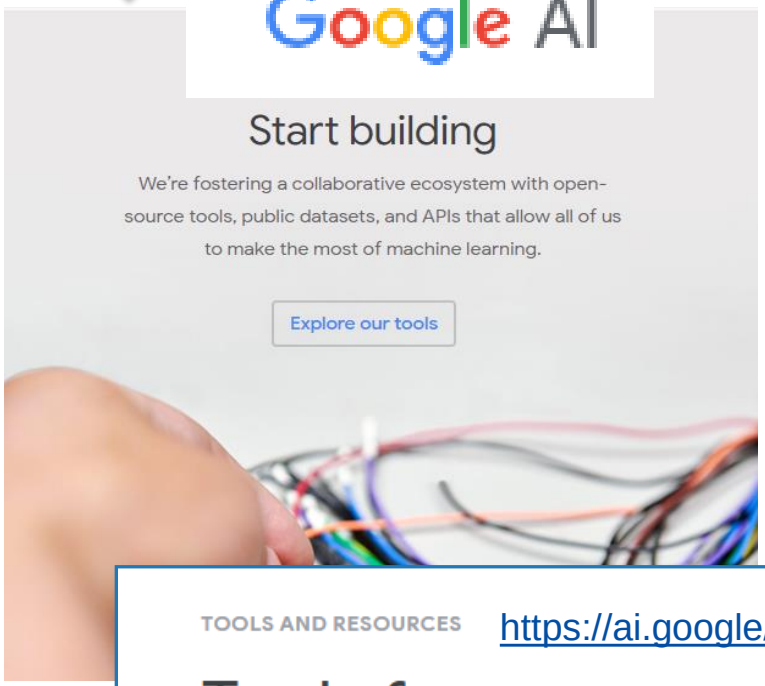






What should libraries do?

AI companies want your data



TOOLS AND RESOURCES https://ai.google/tools/

Tools for everyone

We're making tools and resources available so that anyone can use technology to solve problems. Whether you're just getting started or you're already an expert, you'll find the resources you need to reach your next breakthrough.

FINANCIAL TIMES

Google LLC + Add to myFT

NHS trusts sign first deals with Google

Contracts with five trusts to share patient data are part of transfer of DeepMind Health

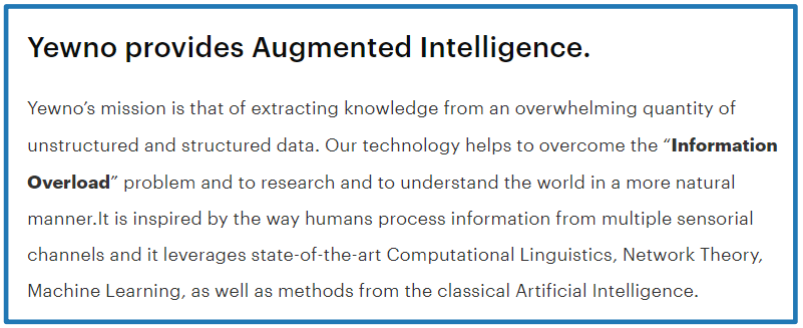
SEPTEMBER 19 2019 Five National Health Service trusts have signed partnerships with Google to process sensitive patient records, in what are believed to be the first deals of their kind
https://www.ft.com/content/641e0d84-da21-11e9-8f9b-77216ebe1f17

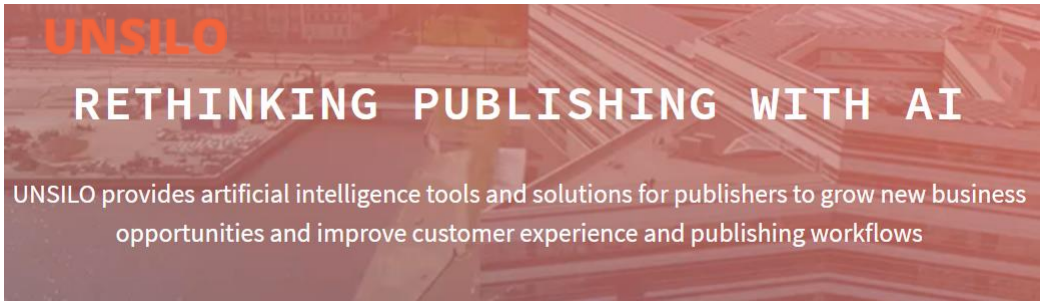
Do you want to apply AI to Discovery?

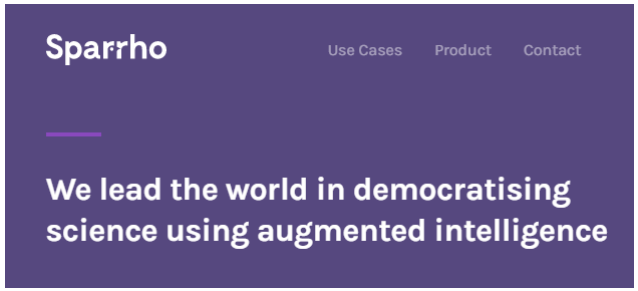
or

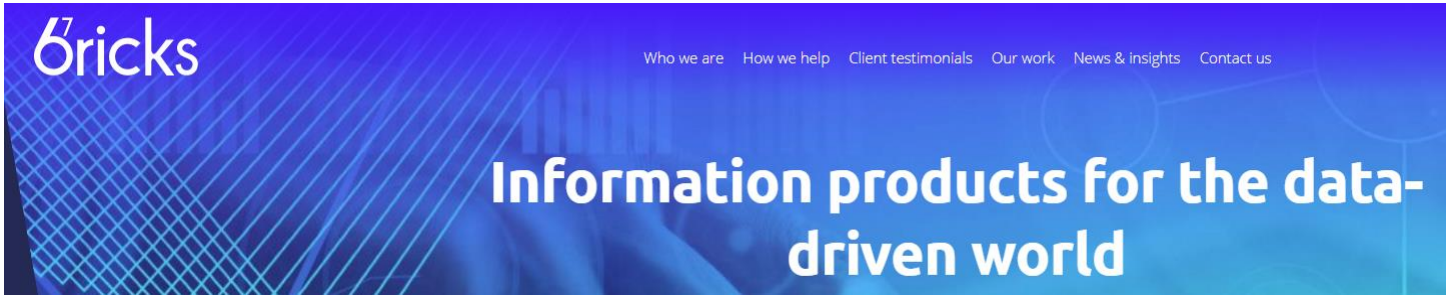
Do you have local content that AI techniques could exploit –e.g. repositories?

Lots of companies are keen to help…









Kenchadconsulting helping create more effective libraries.....

Doing it ethically : Libraries can be exemplars of good practice

Certain personal data are often required in order for digital systems to deliver information, particularly subscribed content. Additionally, user activity data can provide useful insights on how to improve collections and services. However, **the gathering, storage, and use of these data must respect the trust users place in libraries and their partners.** There are ways to address these operational needs while also respecting the rights and expectations of privacy

NISO

Libraries can be the 'good guys' in terms of data and AI

NISO Consensus Principles on User's Digital Privacy in Library, Publisher, and Software-Provider Systems (NISO Privacy Principles)

Published on December 10, 2015

https://www.niso.org/publications/privacy-principles

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