

Artificial Intelligence - What does it hold for our future?

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What is Artificial Intelligence?

Artificial Intelligence (AI)

Artificial Intelligence can be defined as the branch of computer science that is concerned with automation of intelligent behaviour[\[1\]](#)

Put more simply ...

Can we create a machine that can think for itself (i.e. be considered intelligent)?

A (not so) Brave New World

Aldous Huxley

- A dystopian novel written in 1931, but published in 1932 [2]
- Describes a futuristic new **World State** whose citizens are environmentally engineered
- Describes an **intelligence-based social hierarchy**
- Citizens are engineered through **artificial wombs** and children are born into pre-determined classes based on intelligence and labour

Can we create something that is *artificially intelligent*?

Challenges

- Intelligence is hard to define (computationally speaking)
- We are getting closer, but so far no-one has managed to create a machine that can truly think like a human - annual Hugh Loebner prize has seen some come close
- The *holy grail* of Artificial Intelligence is the so-called **Turing test**
- Aim is to create a computer program that is indistinguishable from a human being

A brief history of AI ...

Historical perspective

- Greek Origins: **Aristotle** - defined, and was fascinated by change - computing is about finding patterns, and an early application of AI was in *pattern recognition*
- More recently Logicians such as Leibniz produced formal systems of logic that lay the foundations for AI
- Charles Babbage (19th Century mathematician) is cited as one of the earliest practitioners of AI - "Difference Engine"
- The first truly programmable computer was not developed, however, until the 1940's, and Alan Turing's seminal 1936 work was the foundation
- AI - first coined at a workshop in the USA in 1956

Cybernetics and early Neural Networks

Neural Networks

- One of the first pieces of work in AI was the development of an artificial model of the brain - a **neural network**
- Neural networks simulate the functions and part of the brain (e.g. dendrites, synapses and neurons)
- Computational models are built that can then solve problems - e.g. recognising a face in a picture

Applications of Artificial Intelligence in practice

Some applications of AI

- Geographical Analysis of social deprivation
- Big Data and predictive analytics
- Targeted marketing
- Purchase recommendations
- Aviation - combat and training missions
- Medical diagnosis (heart sound analysis, breast cancer, medical imaging etc.)
- To attack diseases/search for cures (e.g. Cancer)

Some more AI applications ...

AI is everywhere

- Market analysis and data mining (finance)
- Insurance applications (trend analysis)
- Algorithmic trading (multi-agent systems and stock markets)
- Law
- To find a job! (job searching)

Some challenges for AI

Barriers?

- Being able to (accurately) represent intelligence in a computer
- Having enough data to make decisions
- Human resistance to machine intelligence
- Being real (indistinguishable from a human)

Why hasn't AI changed the world yet

BBC news

Let's take a look at [Wewalk](#)



Key lessons

- Not reached the potential predicted in the 1970's
- Great progress made; not visible to users
- Most AI communication is between a machine and human
- The biggest challenge - predicting the future!

There is hope ...

A couple of areas where AI has enjoyed success include:

- Drug development (within 12 months)
- Autonomous vehicles and avoiding pedestrians - long way to go in path planning and routing!

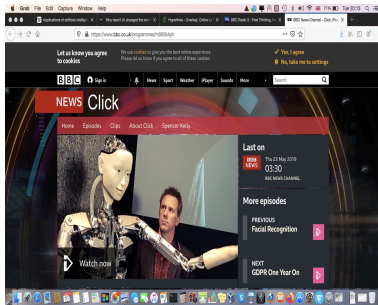
AI in everyday life

Some examples

- Amazon Alexa (a virtual assistant using AI)
- Facebook (look at your news feed - wonder why things are there?)
- Amazon (ever wondered how Amazon knows so much about what you like to buy ...)
- Google, Email, aeroplanes ...

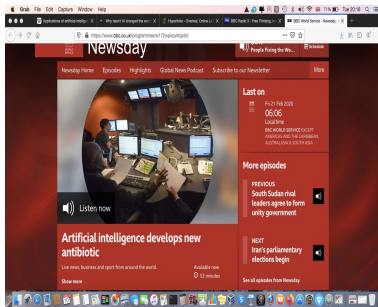
AI machines

Let's take a look at **Rise of the Machines**



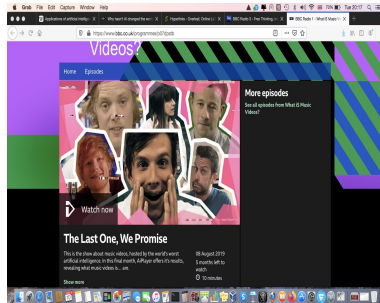
Feb. 2020 - AI develops new antibiotic

AI has recently helped design a new antibiotic



A programme made entirely by AI ...

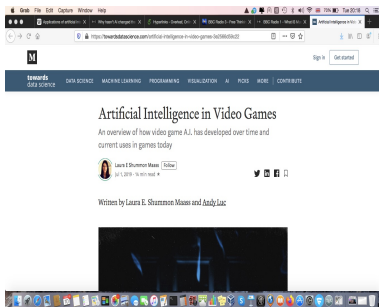
In 2019 we saw the first AI TV programme made entirely using
artificial intelligence



AI and computer games

Intelligent gaming?

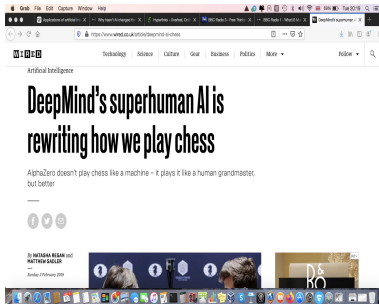
For many years AI has been part of computer games, but how has it **changed**?



AI and chess - the next Kasparov?

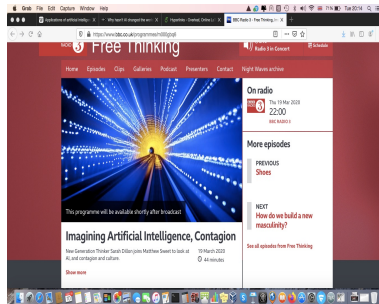
DeepMind

- **DeepMind** is a supercomputer that is learning to play chess not like a machine, but like a **human**
- **DeepMind** also beat the number one **Go champion**



Looking to the future ...

In one week's time we will learn about **the future** ...



AI helping to fight bowel cancer

We have seen great advances in AI technology and the NHS is using AI to fight **bowel cancer**

Finding the cures for cancer - AI can help

Towards a solution

The European Commission is looking at how AI and supercomputers can pave the way to **personalised medicine**

What does the future of AI hold

- Exciting opportunities in the era of big data and predictive (forecasting) analytics
- Significant advances in the health sector, including in developing new therapies, drugs and helping to find cures
- Jobs for future generations
- Even bigger and more exciting challenges - [AI](#) is one of the 4 challenges set out in the UK's [Industrial Strategy](#)

References



Luger, G.F & Stubblefield, W.A. (1997) Artificial Intelligence, 3rd Edition, Addison-Wesley, ISBN: 97808805311969



Huxley, A. (1932) A Brave New World, Chatto & Windus, ISBN: 9780099518471