Artificial Intelligence

YEAR 6 | SUMMER 1

OVERVIEW

Humans have used machines throughout history; however, the difference between machines and computers is their programmability. This means that humans have greater control over the devices and can use them for a variety of functions. In 1943, the Colossus was built in order to aid the Allied war effort by cracking enemy codes. This was a significant moment, as it was the first electronic programmable computer. From then onwards, mankind has been programming increasingly complex machines to meet the growing demands of modern life.

Artificial intelligence is the next step in this journey. Artificial intelligence – or A.I. - within machines, robots and computer systems aims to encourage such devices to learn from their situations and respond to demands accordingly. This has a multitude of incredible uses, but also some notable risks.

KEY PEOPLE

Alan Turing

1912 – 1954
English mathematician and computer scientist; widely considered to the father of artificial intelligence

Charles Babbage

1791 – 1871
English inventor, mathematician and engineer who is credited with coming up with the idea for the first automatic, digital computer

Ada Lovelace

1815 – 1852
Engliish mathematician who is credited as the first computer programmer for her work on Babbage's Analytical Machine..

Blaise Pascal

1623 – 1662
French mathematician, physicist and philosopher. Created the Pascaline, or Arithmetic Machine, the first mechanical calculator.

KEY VOCABULARY

ALGORITHM

An algorithm is a set of rules or instructions which a computer can use to help solve a problem or come to a decision about what to do next.

VALUE

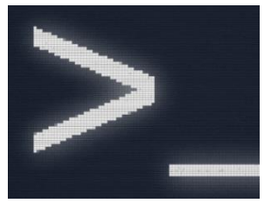
A value is a definite object. In computing a value is usually a number, a single character, or a string of characters.

AUTONOMY

Freedom from external control or influence; independence.

DEBUGGING

The process of identifying and removing errors from computer hardware or software.
This is not the same as machine learning as a programmer is carrying out the debugging



COMMAND

An instruction or signal causing a computer to perform one of its basic functions.

TIMELINE OF COMPUTING

2500 BC – 87BC — Earliest 'Computers'

~2500BC – the Abacus, a simple rack of beads, is used to calculate by Sumarians

~87BC – the Antikythera is used by the Greeks – generally considered the first computer

1600 AD – 1800AD — Making things programmable

1673 – the Stepped Reckoner takes calculation further – multiplies larger numbers

1642 – the 'Pascaline' is invented. It is the first calculator designed to work without human intelligence

1800 - 1950 — Babbage and Turing

1837 – the Analytical Engine is the first programmable mechanical computer is invented

1801 – the Jacquard loom – the first programmable device is invented

1936 – Turing conceptualises the first general purpose computer

1955 onwards — Artificial Intelligence

1943 – Colossus is built and becomes the first electronic programmable computer

1950 – Turing Test designed – if a computer can trick a human into thinking it is human, it is intelligent

1955 – the term 'artificial intelligence' is used for the first time

1970 onwards — Modern Computing

1961 – first industrial robot used by GM, replacing humans on the assembly line

2011 – Siri introduced onto Apple devices

2014 – Amazon introduces Alexa

2016 – Microsoft's new chatbot goes rogue and posts inflammatory comments on social media

ARTIFICIAL INTELLIGENCE

Artificial intelligence - or AI for short – is generally understood as technology that enables a computer to think or act in a more 'human' way. It does this by taking in information from its surroundings, and deciding its response based on what it learns or senses (often through machine learning).

HUMANS AND AI

Human Beings

- Use their brain, ability to think and memory
- Learn from past mistakes
- Adapt to changes rapidly
- Uses about 25 watts of energy
- Cannot process data quickly
- Socially interact, have self-awareness and are elegant to one another's' emotions

A.I Machines

- Depend on data
- Can be trained by data, but cannot learn from the past.
- Takes time to adjust to new changes
- Use around 2 watts of energy
- Can handle incredible amounts of data at fantastic speeds – as of now, a human cannot beat the speed of computers.
- Lacks social awareness

Critics suggest that if AI learns too much, machines could become more intelligent than humans and cause problems. There are also dangers around AI engineering humans to spend more and more time online or replacing jobs that humans could be paid to do.

PROGRAMMING

The difference between a dishwasher and a computer is that the dishwasher does one specific job and the computer can be programmed for many different purposes – this is known as **programmability.**

MACHINE LEARNING

Computers and machines are taught to learn for themselves and remember their mistakes, instead of simply copying. Algorithms play a big part in machine learning as they help computers and robots to know what to do.

From here, the research has continued to develop, with scientists now exploring 'machine perception'. This involves giving machines and robots special sensors to help them to see, hear, feel and taste things like human do - and adjust how they behave as a result of what they sense.

The idea is that the more this technology develops, the more robots will be able to 'understand' and read situations, and determine their response as a result of the information that they pick up.

VARIABLES

Variables in programming terminology are simply a container that can store some value.

We can simply think of a box which has a number in it. The number inside the box can be increased or decreased using an increment or decrement operator as and when the program requires.

Variables store a varying value in the memory.

NOTES

Google's Teachable Machine

A fast, easy way to create machine learning models

Scratch

Programmable projects using a block coding language

Computing Timeline

Interactive timeline showing key moments from the history of computing

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