

Algorithms

The word "algorithm" has probably had more usage over the last few years than it has in its entire history. It is often associated with artificial intelligence and sometimes comes with a bit of a scary undertone. But what exactly is an algorithm?



A page from al-Khwārizmī's book *Algebra*.

The word itself is derived from the name of the mathematician, astronomer and general polymath [Muhammad ibn Mūsā al-Khwārizmī](#) who lived around the turn of the 9th century. When his books were translated in the 12th century, his name was Latinised to "algorismi" — and that's where the word "algorithm" comes from.

An algorithm is simply a list of instructions that enable you to complete a task. A detailed cooking recipe is an algorithm, and so are (or at least should be) instructions to put together flatpack furniture. In maths terms, long division is an algorithm that enables you to divide one number by another.

When we communicate instructions to fellow humans, we often leave out things we consider obvious — for example, if a cooking recipe requires eggs, we don't normally specify that the eggs need to be broken. No human in their right mind would put unbroken eggs into a cake. Computers, however, do not have the brains or life experience to infer what's obvious, so a computer program has to be a water tight algorithm where every single step is clearly defined.

When we talk about algorithms today, it's usually computer programs we mean. Quicksort is an algorithm used to sort things and is used by online shops to help you filter your searches by price, size, colour, date or customer ratings.

A small number of these programs involve something called machine learning.

The machine learns directly from the experience of repeatedly doing the task itself. The algorithm adjusts itself in response to data sets it has been shown, so it develops the ability to spot patterns in data that humans might find hard to spot. It can then apply this ability to other data sets to make predictions, such as a suggestion for someone's online shopping, adverts for holidays or concerts you may wish to go to.

Machine learning is so surprisingly powerful that people think of it as a form of artificial intelligence — it's what powers the [large language models](#) that give us things like ChatGTP and it's also behind other forms of [generative AI](#) (along with more mundane things such as online shopping suggestions).

Coming back to the general notion of an algorithm though, it doesn't

Tasks: Have to be sophisticated or scary. It can literally just be about making an omelette.

1. Fill in the blanks, using the words: experience, instructions, recipe, intelligence.
An algorithm is a list of _____. We often associate it with computers and artificial _____ but in everyday life a _____ is an algorithm.
Computers do not have life _____, so algorithms for computer programs need to have every step very clearly defined.

2. What is machine learning?

3. Write an algorithm for either putting on your tie or tying your shoelaces. You can use the other side of this sheet.

4. Try to find out where machine learning is being used and having a very positive benefit to humans. (To discuss in class).