

18 What AI is – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)
Artificial intelligence	_____
machine learning	_____
deep learning	_____
neural networks	_____
hidden layers	_____

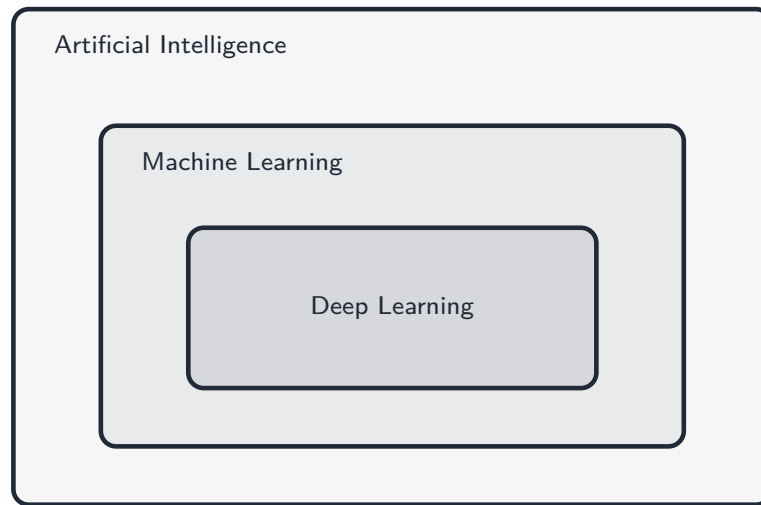
Recall

Artificial intelligence (AI) builds systems that do tasks normally needing human intelligence – seeing, speaking, translating, playing games.

New ideas

Read these first. Each idea has a short worked example. Then do the Practice.

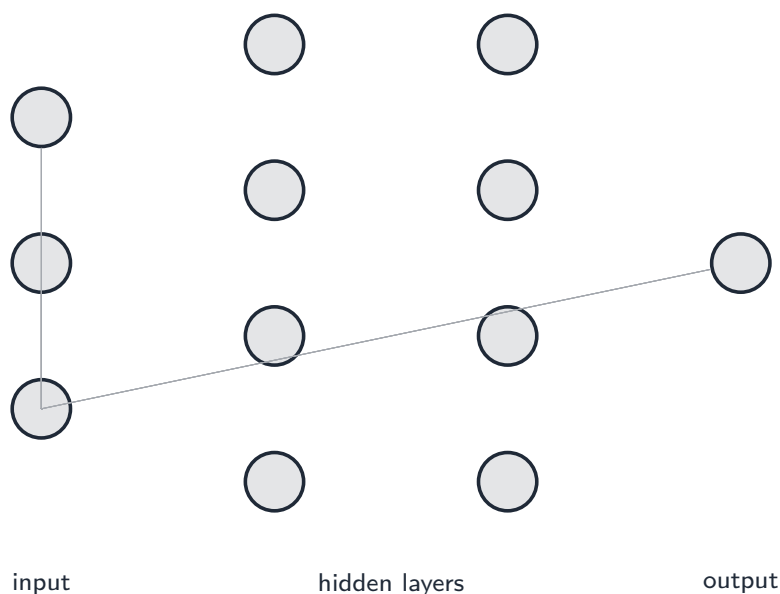
■ 1 AI, ML and deep learning



- **machine learning** learns patterns from data instead of being programmed step by step;
- **deep learning**, using **neural networks** with many layers, is part of machine learning.

Worked example. To filter spam, you don't hand-write a rule for every spam word. Instead, machine learning is shown thousands of emails already labelled "spam" or "not spam", and it learns the patterns by itself.

■ 2 A neural network



A neural network has an input layer, one or more **hidden layers**, and an output layer. With many hidden layers it is a *deep* network.

Worked example. To read a handwritten digit, the pixels enter the input layer, pass through hidden layers that pick out edges and shapes, and the output layer gives the most likely digit, 0–9.

Watch out: machine learning learns from *data* – it is not given explicit rules. And the three terms are *nested*: deep learning is inside machine learning, which is inside AI – they are not three separate things.

Practice

Try these in order.

18.1 What does *AI* build systems to do? [1]

18.2 How does *machine learning* work? [1]

18.3 Is *deep learning* part of machine learning, or the other way round? [1]

18.4 What sits between the input and output layers of a neural network? [1]

18.5 When is a neural network called *deep*? [1]

18.6 A traditional program uses fixed rules; a machine-learning spam filter does not. Explain the key difference in how each decides whether an email is spam. [2]

18.7 Challenge. Explain why machine learning is useful for a task like recognising faces, where writing explicit rules would be very hard. [2]
