

18 Graphs and neurons – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
graph	图	_____	_____	_____
nodes	节点	_____	_____	_____
edges	边	_____	_____	_____
artificial neuron	人工神经 元	_____	_____	_____
weight	权重	_____	_____	_____
activation func- tion	激活函数	_____	_____	_____

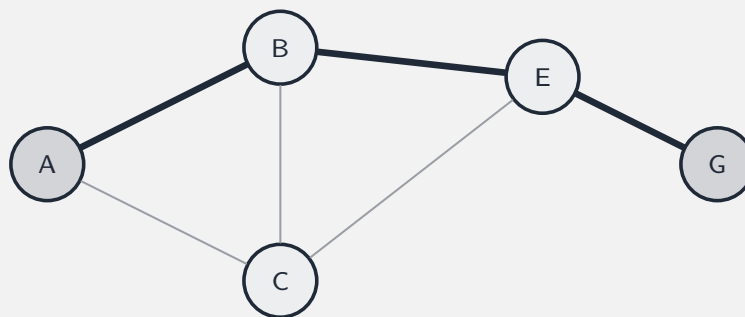
Recall

Many AI problems are solved by searching a graph, and neural networks are built from simple artificial neurons.

New ideas

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

■ 1 Graphs in AI

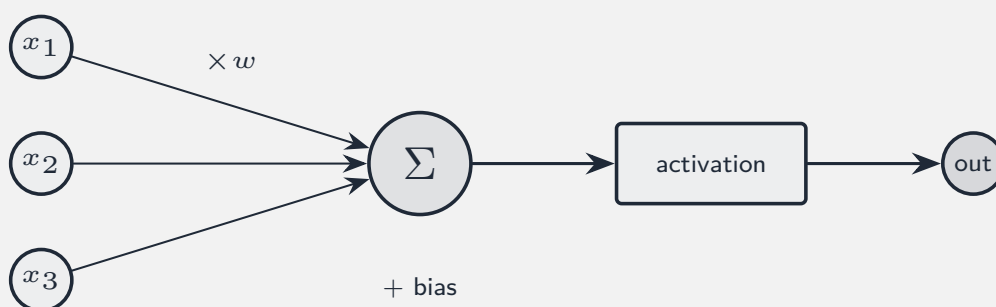


the shortest path $A \rightarrow B \rightarrow E \rightarrow G$ is highlighted

Many problems sit on a **graph** 图—**nodes** 节点 joined by **edges** 边. Finding a route (pathfinding) or a game move is a graph search.

Worked example. A road map is a graph: each town is a node, each road an edge labelled with its distance. A sat-nav finds the best route by searching this graph from your start node to your destination.

■ 2 An artificial neuron



An **artificial neuron** 人工神经元 multiplies each input by a **weight** 权重, adds them up with a bias, then applies an **activation function** 激活函数 to give its output.

Worked example. A neuron has inputs 1.0 and 2.0 with weights 0.5 and 0.5. It computes $1.0 \times 0.5 + 2.0 \times 0.5 = 1.5$, then the activation function turns 1.5 into the neuron's output.

Watch out: a graph "node" can be any state or place and an "edge" any connection—not only maps. And a neuron is just a weighted sum plus an activation function—ordinary arithmetic, not magic.

Practice

Try these in order.

18.1 In a *graph*, what joins the nodes? [1]

18.2 Give one AI problem that is solved on a graph. [1]

18.3 What does a neuron multiply each input by? [1]

18.4 What does the neuron apply after summing its inputs? [1]

18.5 What is a node in a graph? [1]

18.6 A neuron has inputs 2.0 and 3.0 with weights 0.5 and 1.0. Find the weighted sum (before the activation function). [2]

18.7 Challenge. A sat-nav models a city as a graph to find the quickest route. Explain what the nodes and edges represent, and what a "weight" on an edge might mean. [2]