18. Artificial Intelligence (AI)

Starter Quiz · 课前小测

A-Level Computer Science Name: _____ Score: _____

1. Machine learning means an algorithm that:

   ☐ learns patterns from data rather than being programmed step by step

   ☐ is written entirely in assembly

   ☐ never needs any data

   ☐ only follows fixed rules

2. Supervised learning uses:

   ☐ labelled data, learning to map input → label

   ☐ unlabelled data, finding hidden structure

   ☐ rewards from an environment

   ☐ no data at all

3. The difference between regression and classification is that regression predicts:

   ☐ a number, while classification predicts a category

   ☐ a category, while classification predicts a number

   ☐ nothing

   ☐ only true/false

4. How do AI, machine learning and deep learning relate?

   ☐ deep learning is part of machine learning, which is part of AI

   ☐ they are three competing approaches

   ☐ AI is part of machine learning

   ☐ deep learning replaced AI

5. Unsupervised learning is used to:

   ☐ find structure in unlabelled data, such as clusters

   ☐ map inputs to known labels

   ☐ maximise a reward signal

   ☐ compile code

6. Regression predicts a continuous number (a price, a temperature), while classification predicts a category (cat vs dog).

   ☐ True ☐ False

7. A road network is modelled as a graph to find the shortest route. Which statements are correct? Select **all** that apply.

   ☐ each town is a node

   ☐ each road is an edge joining two nodes

   ☐ each edge carries a weight, the distance or travel time

   ☐ each town is an edge and each road a node

   Tick every correct option.

8. In reinforcement learning the agent learns a _____ that maximises its total reward over time.

   _____

9. A neural network is called ”deep” when it has many hidden layers, and each neuron takes a weighted sum of its inputs (plus a bias) before applying an activation function.

   ☐ True ☐ False

10. In gradient descent the learning rate sets how big a step each weight update takes — too large overshoots the minimum, too small makes training slow.

    ☐ True ☐ False

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Answers · 答案

A-Level Computer Science

1. **learns patterns from data rather than being programmed step by step**

   ML learns from data; deep learning is ML using multi-layer neural networks.

2. **labelled data, learning to map input → label**

   Supervised learning trains on labelled examples (e.g. images tagged cat/dog).

3. **a number, while classification predicts a category**

   Regression outputs a continuous number (price, temperature); classification outputs a category.

4. **deep learning is part of machine learning, which is part of AI**

   AI is the goal, machine learning is the dominant approach to it, and deep learning is machine learning with many-layered networks.

5. **find structure in unlabelled data, such as clusters**

   With no labels, unsupervised learning discovers patterns/clusters in the data.

6. **True**

   Number out = regression; category out = classification — the two main kinds of supervised prediction.

7. **each town is a node; each road is an edge joining two nodes; each edge carries a weight, the distance or travel time**

   Places are nodes and connections are edges. Saying what the weights represent is the third mark.

8. **policy**

   It learns by trial and error from rewards, with no labelled examples at all, which is why it suits sequences of decisions.

9. **True**

   Stacking many hidden layers lets the network learn richer patterns — training such a network is deep learning.

10. **True**

    Backpropagation finds each weight's gradient; the learning rate scales how far down that gradient the weight moves.