AI Domains and Predictive Techniques

Standard difficulty · 20 questions · 40 marks · Time: 37 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. Predicting a number, like tomorrow's temperature, from past data is:

(a) clustering **(b)** translation **(c)** classification **(d)** regression

2. Which AI domain is mainly used in a machine that spots damaged fruit on a belt?

(a) Automation only **(b)** Data Science
(c) Computer Vision **(d)** Natural Language Processing

3. Which predictive technique fits marking a message as "urgent" or "not urgent"?

(a) sorting by size **(b)** clustering
(c) regression **(d)** classification

4. The pages read goes up by the same amount every day: day 1: 28 pages, day 2: 37 pages, day 3: 46 pages, day 4: 55 pages. A regression model continues the pattern. What does it predict for day 8?

(a) 91 pages **(b)** 82 pages **(c)** 224 pages **(d)** 100 pages

5. Animal pictures are described by two numbers (ear shape score, snout length score) and labelled: (12, 12) cat; (13, 17) dog; (3, 11) cat; (3, 18) dog; (18, 10) cat; (10, 15) dog. A new picture scores (5, 19). A nearest-neighbour model gives it the label of the closest example, measuring distance as the difference in the first number plus the difference in the second. Which label does it give?

(a) neither **(b)** cat **(c)** dog **(d)** both

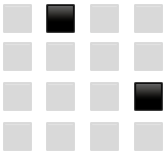
6. A clustering method groups these times (in minutes) that children took to finish a puzzle into two clusters of close values: 18, 20, 59, 58, 19, 57, 13. How many numbers are in the same cluster as 19 (counting 19)?

(a) 3 **(b)** 7 **(c)** 5 **(d)** 4

7. A language program first counts how often each word appears. In the text "the sun is hot and the sky is blue. it rained all day and all night.", how many times does the word "the" appear?

(a) 4 **(b)** 3 **(c)** 1 **(d)** 2

8. A computer sees a tiny picture as a grid of pixels (■ = 1, □ = 0):



How many pixels have the value 1?

(a) 3 **(b)** 14 **(c)** 2 **(d)** 1

Section B — Short answer — 8 × 2 = 16 marks

9. What is the difference between classification and regression?

10. Name the AI domain (Computer Vision, Natural Language Processing or Data Science): (a) using past sales figures to plan how much stock to order (b) a program that reads handwriting from a scanned page

11. Name the technique (classification, regression or clustering): (a) predicting tomorrow's temperature in °C (b) grouping news stories on the same topic, with no labels

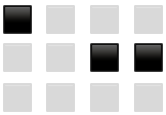
12. The pages read goes up by the same amount every day: day 1: 6 pages, day 2: 15 pages, day 3: 24 pages, day 4: 33 pages. A regression model continues the pattern. What does it predict for day 9?

13. Animal pictures are described by two numbers (ear shape score, snout length score) and labelled: (12, 7) cat; (9, 16) dog; (15, 17) cat; (16, 14) dog; (18, 2) cat; (10, 11) dog. A new picture scores (15, 4). A nearest-neighbour model gives it the label of the closest example, measuring distance as the difference in the first number plus the difference in the second. Which label does it give?

14. A clustering method groups these times (in minutes) that children took to finish a puzzle into two clusters of close values: 63, 17, 19, 69, 22, 67, 66, 21. How many numbers are in the same cluster as 63 (counting 63)?

15. A language program first counts how often each word appears. In the text "my friend has a red kite and a blue kite. birds sing in the morning and in the evening.", how many times does the word "birds" appear?

16. A computer sees a tiny picture as a grid of pixels (■ = 1, □ = 0):



What percentage of the pixels are 1?

Section C — Word problems — 4 × 4 = 16 marks

17. Explain classification, regression and clustering with one everyday example each, and say what kind of answer each gives.

18. Match each with its AI domain: (a) finding which items a shop sells most in each season (b) an app that names a plant from a photo (c) a program that checks the grammar of a sentence. Choose from: Natural Language Processing; Data Science; Computer Vision.

19. Match each with its technique: (a) labelling a handwritten digit as 0 to 9 (b) finding groups of houses that use similar amounts of water (c) predicting a plant's height next week. Choose from: classification; regression; clustering.

20. (a) The height of a plant goes up by the same amount every week: week 1: 16 cm, week 2: 23 cm, week 3: 30 cm, week 4: 37 cm. A regression model continues the pattern. What does it predict for week 9?
(b) A computer sees a tiny picture as a grid of pixels (■ = 1, □ = 0):



How many pixels have the value 1?

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Answer key

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Q	Answer	Working
1	**(d) regression**	—
2	**(c) Computer Vision**	—
3	**(d) classification**	—
4	**(a) 91 pages**	+9 each day: 28 + 7 × 9
5	**(c) dog**	closest is (3, 18) at distance 3
6	**(d) 4**	in order: 13, 18, 19, 20, 57, 58, 59; the biggest gap splits {13, 18, 19, 20} from {57, 58, 59}
7	**(d) 2**	16 words in all; "the" appears 2 times
8	**(c) 2**	4 rows of 4; count the ■
9	**Classification predicts a group or label (cat or dog); regression predicts a number (a price or a temperature).**	—
10	**(a) Data Science (b) Computer Vision**	—
11	**(a) regression (b) clustering**	—
12	**78 pages**	+9 each day: 6 + 8 × 9
13	**cat**	closest is (18, 2) at distance 5
14	**4**	in order: 17, 19, 21, 22, 63, 66, 67, 69; the biggest gap splits {17, 19, 21, 22} from {63, 66, 67, 69}
15	**1**	19 words in all; "birds" appears 1 time
16	**25%**	3 of 12
17	**Classification: sorting fruit photos into apple or mango (a label). Regression: predicting how many units a shop will sell next week (a number). Clustering: grouping songs that sound alike with no labels (groups found by the machine).**	—
18	**(a) Data Science (b) Computer Vision (c) Natural Language Processing**	—
19	**(a) classification (b) clustering (c) regression**	—
20	**(a) 72 cm; (b) 8**	(a) +7 each week: 16 + 8 × 7; (b) 4 rows of 6; count the ■

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