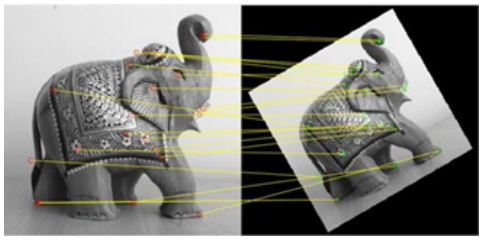
Started on	Saturday, 10 February 2024, 3:30 PM
State	Finished
Completed on	Saturday, 10 February 2024, 3:48 PM
Time taken	18 mins 2 secs
Grade	**10.00** out of 10.00 (**100**%)

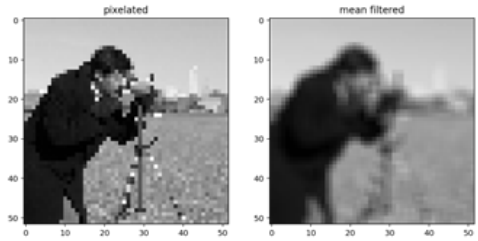
Question **1**

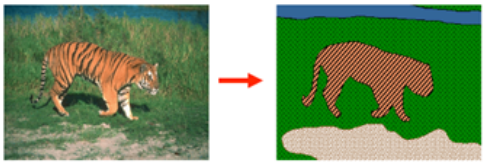
Correct

Mark 1.00 out of 1.00

Which for the following shows image segmentation

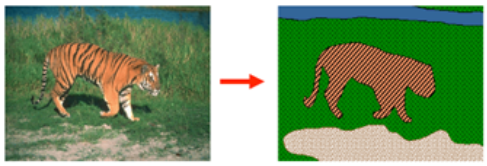






Your answer is correct.

The correct answer is:



Question **2**

Correct

Mark 1.00 out of 1.00

What is the modified optimization problem for linear classification

- $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq 0,\ 1 \leq i \leq M$
  $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq \mathbf{0},\ M+1 \leq i \leq 2M$
- $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b = 1,\ 1 \leq i \leq M$
  $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b = -1,\ M+1 \leq i \leq 2M$
- $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq 1,\ 1 \leq i \leq M$
  $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq -1,\ M+1 \leq i \leq 2M$ ✔
- $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq -1,\ 1 \leq i \leq M$
  $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq 1,\ M+1 \leq i \leq 2M$

Your answer is correct.

The correct answer is:
$\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq 1,\ 1 \leq i \leq M$
$\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq -1,\ M+1 \leq i \leq 2M$

Question **3**

Correct

Mark 1.00 out of 1.00

The modified optimization problem for linear classification

- Separates both classes by a **slab** ✔
- Separates both classes by a **sphere**
- Separates both classes by a **ellipsoid**
- Separates both classes by a **hyperplane**

Your answer is correct.

The correct answer is:
Separates both classes by a **slab**

Question **4**

Correct

Mark 1.00 out of 1.00

What is the distance between the two hyperplanes given below

$$x_1 + \sqrt{2}x_2 + \sqrt{3}x_3 + \cdots + \sqrt{N}x_N = \frac{1}{\sqrt{2}}$$
$$x_1 + \sqrt{2}x_2 + \sqrt{3}x_3 + \cdots + \sqrt{N}x_N = -\frac{1}{\sqrt{2}}$$

- $\frac{2}{\sqrt{N(N+1)}}$ ✔
- $\frac{\sqrt{2}}{\sqrt{N(N+1)}}$
- $\frac{2}{\sqrt{\frac{N(N+1)(2N+1)}{6}}}$
- $\frac{2\sqrt{2}}{\sqrt{N(N+1)}}$

Your answer is correct.

The correct answer is:

$\frac{2}{\sqrt{N(N+1)}}$

Question **5**

Correct

Mark 1.00 out of 1.00

The slack variables satisfy the property

- $u_i \geq 0, v_i \geq 0$ ✔
- $u_i \geq 0, v_i < 0$
- $u_i < 0, v_i \geq 0$
- $u_i < 0, v_i < 0$

Your answer is correct.

The correct answer is:

$u_i \geq 0, v_i \geq 0$

Question **6**

Correct

Mark 1.00 out of 1.00

In the example considered in lectures, the size of the feature vector equals

- Number of emails in the set
- Number of words in the dictionary ✔
- 2
- Number of words in an e-mail

Your answer is correct.

The correct answer is:
Number of words in the dictionary

Question **7**

Correct

Mark 1.00 out of 1.00

The naïve Bayes assumption states that

- $p(\bar{\mathbf{x}} = \bar{\mathbf{v}}) = \prod_{i=1}^{N} p(x_i = v_i)$
- $p(y = u|\bar{\mathbf{x}} = \bar{\mathbf{v}}) = \prod_{i=1}^{N} p(y = u|x_i = v_i)$
- $p(y = u, \bar{\mathbf{x}} = \bar{\mathbf{v}}) = p(y = u) \times p(\bar{\mathbf{x}} = \bar{\mathbf{v}})$
- $p(\bar{\mathbf{x}} = \bar{\mathbf{v}}|y = u) = \prod_{i=1}^{N} p(x_i = v_i|y = u)$ ✔

Your answer is correct.

The correct answer is:
$p(\bar{\mathbf{x}} = \bar{\mathbf{v}}|y = u) = \prod_{i=1}^{N} p(x_i = v_i|y = u)$

Question **8**

Correct

Mark 1.00 out of 1.00

The probability $p(x_j = 1|y = 0)$ can be evaluated using the formula

- $\frac{\sum_{i=1}^{M} 1(x_j(i)=1)}{\sum_{i=1}^{M} 1(y(i)=0)}$
- $\frac{\sum_{j=1}^{N} \mathbf{1}(x_j(i)=1, y(i)=0)}{N}$
- $1 - p(x_j = 0|y = 0)$ ✔
- $\frac{\sum_{i=1}^{M} \mathbf{1}(x_j(i)=1, y(i)=0)}{M}$

Your answer is correct.

The correct answer is:

$1 - p(x_j = 0|y = 0)$

Question **9**

Correct

Mark 1.00 out of 1.00

The posterior probability $p(y = 1|\bar{\mathbf{x}} = \bar{\mathbf{v}})$ is given as

- $\frac{p(\bar{\mathbf{x}}=\bar{\mathbf{v}}|y=1)}{p(\bar{\mathbf{x}}=\bar{\mathbf{v}})}$
- $\frac{p(\bar{\mathbf{x}}=\bar{\mathbf{v}}|y=1)\times p(y=1)+p(\bar{\mathbf{x}}=\bar{\mathbf{v}}|y=0)\times p(y=0)}{p(\bar{\mathbf{x}}=\bar{\mathbf{v}})}$
- $\frac{p(\bar{\mathbf{x}}=\bar{\mathbf{v}})}{p(\bar{\mathbf{x}}=\bar{\mathbf{v}}|y=1)\times p(y=1)}$
- $\frac{p(\bar{\mathbf{x}}=\bar{\mathbf{v}}|y=1)\times p(y=1)}{p(\bar{\mathbf{x}}=\bar{\mathbf{v}})}$ ✔

Your answer is correct.

The correct answer is:

$\frac{p(\bar{\mathbf{x}}=\bar{\mathbf{v}}|y=1)\times p(y=1)}{p(\bar{\mathbf{x}}=\bar{\mathbf{v}})}$

Question **10**

Correct

Mark 1.00 out of 1.00

To avoid zero prior probabilities, during computation of prior probabilities, one can add

- one to the numerator and two in the denominator ✔
- one to the numerator and one in the denominator
- two to the numerator and two in the denominator
- two to the numerator and one in the denominator

Your answer is correct.

The correct answer is:
one to the numerator and two in the denominator