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|---|---|
| **Started on** | Friday, 8 March 2024, 9:00 PM |
| **State** | Finished |
| **Completed on** | Friday, 8 March 2024, 9:37 PM |
| **Time taken** | 37 mins 38 secs |
| **Grade** | **9.00** out of 10.00 (**90**%) |

Question **1**

Correct

Mark 1.00 out of 1.00

The likelihood of the complete data is

- (selected) $\prod_{j=1}^{M}\prod_{i=1}^{K}\left(p_i \times \left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\|\bar{\mathbf{x}}(j)-\bar{\boldsymbol{\mu}}_i\|^2}\right)^{\alpha_i(j)}$ ✔
- $\prod_{j=1}^{M}\prod_{i=1}^{K}\left(\alpha_i(j)p_i \times \left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\|\bar{\mathbf{x}}(j)-\bar{\boldsymbol{\mu}}_i\|^2}\right)$
- $\prod_{j=1}^{M}\sum_{i=1}^{K} p_i \times \left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\|\bar{\mathbf{x}}-\bar{\boldsymbol{\mu}}_i\|^2}$
- $\sum_{j=1}^{M}\sum_{i=1}^{K} \alpha_i(j)p_i \times \left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\|\bar{\mathbf{x}}-\bar{\boldsymbol{\mu}}_i\|^2}$

Your answer is correct.

The correct answer is: $\prod_{j=1}^{M}\prod_{i=1}^{K}\left(p_i \times \left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\|\bar{\mathbf{x}}(j)-\bar{\boldsymbol{\mu}}_i\|^2}\right)^{\alpha_i(j)}$

Question **2**

Correct

Mark 1.00 out of 1.00

The quantity $\alpha_i^{(l)}(j) = \Pr\left(\mathcal{C}_i \middle| \bar{\mathbf{x}}(j)\right)$ is given as

- $$\frac{p_i \times \left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\left\|\bar{\mathbf{x}}(j)-\bar{\boldsymbol{\mu}}_i^{(l-1)}\right\|^2}}{\prod_{k=1}^{K} p_k \times \left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\left\|\bar{\mathbf{x}}(j)-\bar{\boldsymbol{\mu}}_k^{(l-1)}\right\|^2}}$$
- $$\frac{\left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\left\|\bar{\mathbf{x}}(j)-\bar{\boldsymbol{\mu}}_i^{(l-1)}\right\|^2}}{\sum_{k=1}^{K} \left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\left\|\bar{\mathbf{x}}(j)-\bar{\boldsymbol{\mu}}_k^{(l-1)}\right\|^2}}$$
- $$\frac{p_i \times \left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\left\|\bar{\mathbf{x}}(j)-\bar{\boldsymbol{\mu}}_i^{(l-1)}\right\|^2}}{\sum_{k=1}^{K} p_k \times \left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\left\|\bar{\mathbf{x}}(j)-\bar{\boldsymbol{\mu}}_k^{(l-1)}\right\|^2}}$$
- $$\frac{p_i}{\sum_{k=1}^{K} p_k}$$

Your answer is correct.

The correct answer is:

$$\frac{p_i \times \left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\left\|\bar{\mathbf{x}}(j)-\bar{\boldsymbol{\mu}}_i^{(l-1)}\right\|^2}}{\sum_{k=1}^{K} p_k \times \left(\frac{1}{2\pi\sigma^2}\right)^{\frac{N}{2}} e^{-\frac{1}{2\sigma^2}\left\|\bar{\mathbf{x}}(j)-\bar{\boldsymbol{\mu}}_k^{(l-1)}\right\|^2}}$$

Question **3**

Correct

Mark 1.00 out of 1.00

The entropy $H(X)$ of this source is

- $\sum_{i=1}^{n} p(x_i) \log_2 p(x_i)$
- $\sum_{i=1}^{n} \frac{1}{p(x_i)} \log_2 \frac{1}{p(x_i)}$
- $\sum_{i=1}^{n} p(x_i) \log_2 \frac{1}{p(x_i)}$ ✔
- $\sum_{i=1}^{n} \log_2 \frac{1}{p(x_i)}$

Your answer is correct.

The correct answer is:

$$\sum_{i=1}^{n} p(x_i) \log_2 \frac{1}{p(x_i)}$$

Question **4**

Incorrect

Mark 0.00 out of 1.00

Consider a source with symbols with probabilities $\frac{1}{2^n}$, $n = 1,2, \ldots, \infty$. What is its entropy?

- 1 ✖
- 1.5
- 3
- 2

Your answer is incorrect.

The correct answer is:
2

Question **5**

Correct

Mark 1.00 out of 1.00

Consider the table given below

| | **IC** | $\overline{\textbf{IC}}$ |
|---|---|---|
| **CHOC** | $\frac{1}{2}$ | $\frac{1}{8}$ |
| $\overline{\textbf{CHOC}}$ | $\frac{1}{4}$ | $\frac{1}{8}$ |

The quantity $H(Y|X = \mathbf{IC})$ is

- 0.73
- 0.92
- 0.55
- 0.29

Your answer is correct.

The correct answer is:
0.92

Question **6**

Correct

Mark 1.00 out of 1.00

How to calculate constant $b$ in the SVM?

- For any point for which $\lambda_i \neq 0$, solve $y_i(\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b) - 1 = 0$
- For any point for which $\lambda_i = 0$, solve $y_i(\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b) - 1 = 0$
- For any point for which $\lambda_i = 0$, solve $y_i(\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b) = 0$
- For any point for which $\lambda_i = 0$, solve $y_i(\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b) + 1 = 0$

Your answer is correct.

The correct answer is:

For any point for which $\lambda_i \neq 0$, solve $y_i(\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b) - 1 = 0$

Question **7**

Correct

Mark 1.00 out of 1.00

The kernel $K(\bar{\mathbf{x}}_i, \bar{\mathbf{x}}_j) = (\bar{\mathbf{x}}_i^T \bar{\mathbf{x}}_j)^2$ can be written as $\phi^T(\bar{\mathbf{x}}_i)\phi(\bar{\mathbf{x}}_j)$, where $\phi(\bar{\mathbf{x}}_j)$ is defined as

- $\bar{\mathbf{x}}_j^T \bar{\mathbf{x}}_j$
- $\bar{\mathbf{x}}_j \odot \bar{\mathbf{x}}_j$
- $(\bar{\mathbf{x}}_j^T + \bar{\mathbf{x}}_j)^T (\bar{\mathbf{x}}_i^T + \bar{\mathbf{x}}_j)$
- $\bar{\mathbf{x}}_j \otimes \bar{\mathbf{x}}_j$

Your answer is correct.

The correct answer is:

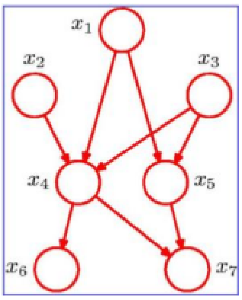
$\bar{\mathbf{x}}_j \otimes \bar{\mathbf{x}}_j$

Question **8**

Correct

Mark 1.00 out of 1.00

Consider the graphical model shown




The joint PDF $p(x_1, x_2, x_3, x_4, x_5, x_6)$ This can be simplified as

- $p(x_1) \times p(x_2) \times p(x_3) \times p(x_4) \times p(x_5) \times p(x_6) \times p(x_7)$
- $p(x_1) \times p(x_1|x_2) \times p(x_1|x_3) \times p(x_4|x_1, x_2, x_3) \times p(x_5|x_1,\ x_3) \times p(x_6|x_4) \times p(x_7|x_4, x_5)$
- $p(x_1) \times p(x_2) \times p(x_3) \times p(x_4|x_1, x_2, x_3) \times p(x_5|x_1,\ x_3) \times p(x_6|x_4) \times p(x_7|x_4, x_5)$
- $p(x_1) \times p(x_1|x_2) \times p(x_1, x_2|x_3) \times p(x_1, x_2, x_3|x_4) \times p(x_1, x_2, x_3, x_4|x_5) \times p(x_1, x_2, x_3, x_4, x_5|x_6) \times p(x_1, x_2, x_3, x_4, x_5, x_6|x_7)$

Your answer is correct.

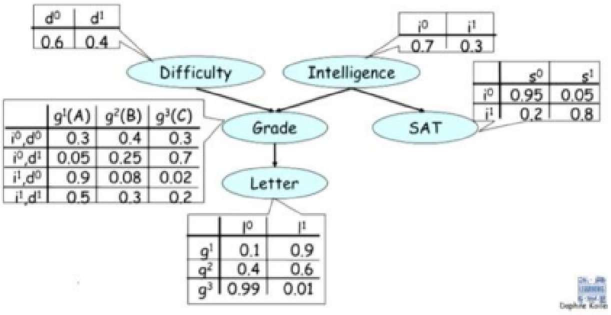
The correct answer is: $p(x_1) \times p(x_2) \times p(x_3) \times p(x_4|x_1, x_2, x_3) \times p(x_5|x_1,\ x_3) \times p(x_6|x_4) \times p(x_7|x_4, x_5)$

Question **9**

Correct

Mark 1.00 out of 1.00

Consider the model below




$p(d^0, i^1, g^2, s^1, l^0)$ can be evaluated as approximately

- 0.004608
- 0.002315
- 0.019827
- 0.000379

Your answer is correct.

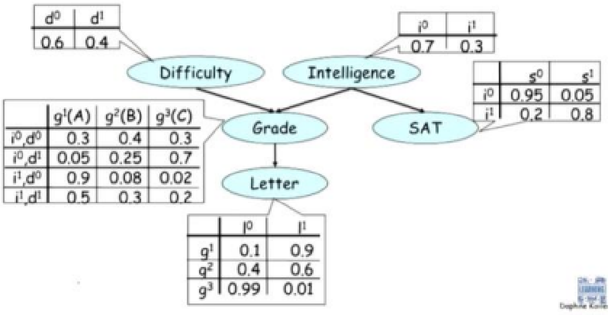
The correct answer is:
0.004608

Question **10**

Correct

Mark 1.00 out of 1.00

Consider the model below




The quantity $p(i^1 | g^2, d^1)$ is an example of

- Evidential Reasoning
- Not possible to evaluate
- Intercausal Reasoning
- Causal reasoning

Your answer is correct.

The correct answer is:
Intercausal Reasoning