EE902 Final Exam 2023-24 Q3

Venkateswar Reddy Melachervu | 10 Mar 2024

Test Name::

EE902 Final Exam 2023-24 Q3

Overall Status: Completed Detailed Status: Test-taker Completed | Test Finish Time: March 10, 2024 11:33:00 AM IST

VR

Venkateswar Reddy Melachervu

vmela23@iitk.ac.in

Test-Taker ID: - 130025089

Credibility Index: LOW

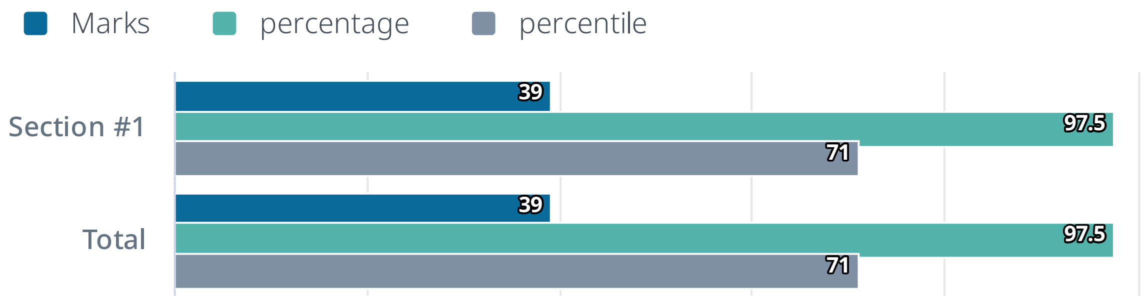
Profile Picture Snapshot

Identity Card Snapshot

Overall Summary

39 Marks Scored out of 40	97.5 % 71.43 percentile out of 14 Test Takers	2h 31m 8s Time taken of 3hr

Marks Scored



Attempt Summary

Distribution of questions attempted in a total of 40 question(s).

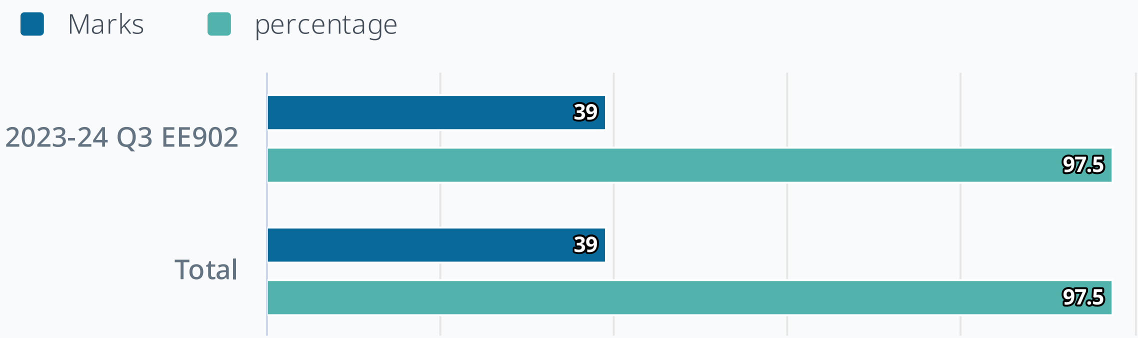
This shows the correctness of questions attempted by the test taker

Correct	39 Ques	39/39 Marks
Incorrect	1 Ques	0/1 Marks
Partially Correct	0 Ques	0/0 Marks
Not Attempted	0 Ques	0/0 Marks

Section-Wise Details

	question(s)	Time taken	Marks Scored
Section 1 Section #1	40 Q.	2h 31m 8s (Untimed)	39 / 40

Marks Scored



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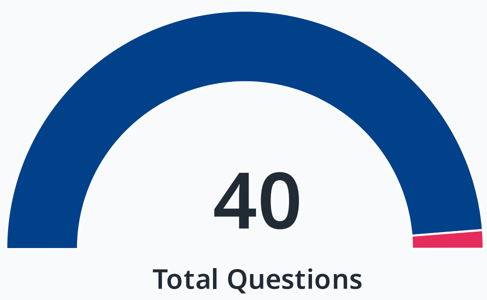

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Question-Wise Details

Section 1

Section #1

40	2h 31m 8s
question(s)	Time taken

Q. 1

Question 1

Time taken: 1m 55s

The Gaussian kernel is defined as

Response:

OPTIONS	RESPONSE	ANSWER
$\exp\left(\frac{\lVert \bar{\mathbf{x}}_i - \bar{\mathbf{x}}_j \rVert^2}{2\sigma^2}\right)$		
$\exp\left(-\frac{\lVert \bar{\mathbf{x}}_i - \bar{\mathbf{x}}_j \rVert}{2\sigma^2}\right)$		
$\exp\left(-\frac{\lVert \bar{\mathbf{x}}_i - \bar{\mathbf{x}}_j \rVert^2}{2\sigma^2}\right)$	✓	✓
$\lVert \bar{\mathbf{x}}_i - \bar{\mathbf{x}}_j \rVert \exp\left(-\frac{\lVert \bar{\mathbf{x}}_i - \bar{\mathbf{x}}_j \rVert}{2\sigma^2}\right)$		

Q. 2

Question 2

Time taken: 54s

Logistic regression can be used in which of the following applications

Response:

OPTIONS	RESPONSE	ANSWER
Stock price forecasting		
Disease detection	✓	✓
Predicting the price of a home		
Clustering of users based on shopping information		

Q. 3

Question 3

Time taken: 1m 9s

The learning model for the linear regression problem described in class is

Response:

OPTIONS	RESPONSE	ANSWER
$\underbrace{\begin{bmatrix} y(1) \\ y(2) \\ \vdots \\ y(M) \end{bmatrix}}_{\bar{\mathbf{y}}} = \underbrace{\begin{bmatrix} \bar{\mathbf{x}}(1) \\ \bar{\mathbf{x}}(2) \\ \vdots \\ \bar{\mathbf{x}}(M) \end{bmatrix}}_{\mathbf{X}} \bar{\mathbf{h}} + \underbrace{\begin{bmatrix} \epsilon(1) \\ \epsilon(2) \\ \vdots \\ \epsilon(M) \end{bmatrix}}_{\bar{\epsilon}}$		
$\underbrace{\begin{bmatrix} y(1) \\ y(2) \\ \vdots \\ y(M) \end{bmatrix}}_{\bar{\mathbf{y}}} = \underbrace{\begin{bmatrix} \bar{\mathbf{x}}^T(1) \\ \bar{\mathbf{x}}^T(2) \\ \vdots \\ \bar{\mathbf{x}}^T(M) \end{bmatrix}}_{\mathbf{X}} \bar{\mathbf{h}} + \underbrace{\begin{bmatrix} \epsilon(1) \\ \epsilon(2) \\ \vdots \\ \epsilon(M) \end{bmatrix}}_{\bar{\epsilon}}$	✔	✔
$\underbrace{\begin{bmatrix} y(1) \\ y(2) \\ \vdots \\ y(M) \end{bmatrix}}_{\bar{\mathbf{y}}} = \underbrace{\begin{bmatrix} \bar{\mathbf{x}}(1) \\ \bar{\mathbf{x}}(2) \\ \vdots \\ \bar{\mathbf{x}}(M) \end{bmatrix}}_{\mathbf{X}} \bar{\mathbf{h}}^T + \underbrace{\begin{bmatrix} \epsilon(1) \\ \epsilon(2) \\ \vdots \\ \epsilon(M) \end{bmatrix}}_{\bar{\epsilon}}$		
$\underbrace{\begin{bmatrix} y(1) \\ y(2) \\ \vdots \\ y(M) \end{bmatrix}}_{\bar{\mathbf{y}}} = \underbrace{\begin{bmatrix} \bar{\mathbf{x}}^T(1) \\ \bar{\mathbf{x}}^T(2) \\ \vdots \\ \bar{\mathbf{x}}^T(M) \end{bmatrix}}_{\mathbf{X}} \bar{\mathbf{h}}^T + \underbrace{\begin{bmatrix} \epsilon(1) \\ \epsilon(2) \\ \vdots \\ \epsilon(M) \end{bmatrix}}_{\bar{\epsilon}}$		

Q. 4

Question 4

Time taken: 1m 14s

Consider the table below

	$x_2 = 0$	$x_2 = 1$
$y = 0$	3	9
$y = 1$	6	12

The quantity is given as p (y = 1)

Response:

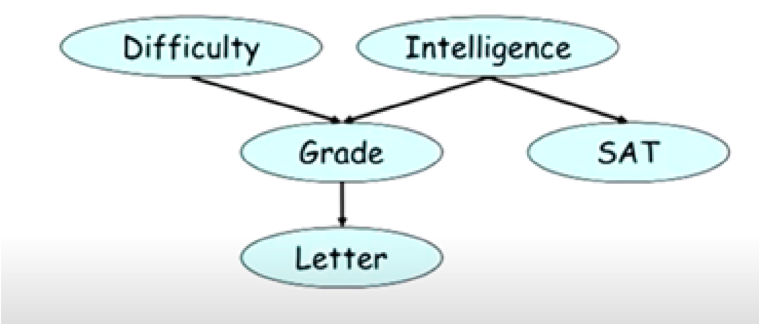
OPTIONS	RESPONSE	ANSWER
$\frac{3}{4}$		
$\frac{3}{5}$	✔	✔
$\frac{1}{3}$		
$\frac{2}{5}$		

Q. 5

Question 5

Time taken: 55s

Consider the model



The quantity $p(l^1|i^0, d^0)$ is an example of

Response:

OPTIONS	RESPONSE	ANSWER
Causal reasoning	✔	✔
Evidential Reasoning		
Intercausal Reasoning		
Not possible to evaluate		

Q. 6

Question 6

Time taken: 3m 53s

Consider the linear regression problem with the design matrix **X** and response vector $\bar{\mathbf{y}}$ given below X = $\begin{bmatrix} -1 & 1 \\ -1 & -1 \\ 1 & -1 \\ 1 & 1 \end{bmatrix}$, $\bar{\mathbf{y}}$ $\begin{bmatrix} 2 \\ -2 \\ 4 \\ -2 \end{bmatrix}$

The vector of regression coefficients is

Response:

OPTIONS	RESPONSE	ANSWER
$\frac{1}{2}\begin{bmatrix} 3 \\ -2 \end{bmatrix}$		
$\frac{1}{2}\begin{bmatrix} -2 \\ 3 \end{bmatrix}$		
$\begin{bmatrix} -1 \\ 1 \end{bmatrix}$		
$\frac{1}{2}\begin{bmatrix} 1 \\ -1 \end{bmatrix}$	✔	✔

Q. 7

Question 7

Time taken: 27s

What is the **margin** between two hyperplanes?

$$\bar{\mathbf{a}}^T\bar{\mathbf{x}} = c_1$$
$$\bar{\mathbf{a}}^T\bar{\mathbf{x}} = c_2$$

Response:

OPTIONS	RESPONSE	ANSWER
$\frac{\|\bar{\mathbf{a}}\|}{\|c_1 - c_2\|}$		
$\frac{\|c_1^2 - c_2^2\|}{\|\bar{\mathbf{a}}\|}$		
$\frac{\|c_1 - c_2\|}{\|\bar{\mathbf{a}}\|^2}$		
$\frac{\|c_1 - c_2\|}{\|\bar{\mathbf{a}}\|}$	✔	✔

Q. 8

Question 8

Time taken: 56s

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

Response:

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

Q. 9

Question 9

Time taken: 1m

The K - means **cost-function** to minimize is given as

Response:

OPTIONS	RESPONSE	ANSWER
$\min \sum_{i=1}^{K} \sum_{j=1}^{M} \alpha_i(j) \|\|\bar{\mathbf{x}}(j) - \bar{\boldsymbol{\mu}}_i\|\|$		
$\min \sum_{i=1}^{K} \sum_{j=1}^{M} \alpha_i(j) (\bar{\mathbf{x}}(j) - \bar{\boldsymbol{\mu}}_i)(\bar{\mathbf{x}}(j) - \bar{\boldsymbol{\mu}}_i)^T$		
$\min \sum_{i=1}^{K} \sum_{j=1}^{M} \alpha_i(j) \|\|\bar{\mathbf{x}}(j) - \bar{\boldsymbol{\mu}}_i\|\|^2$	✔	✔
$\min \sum_{i=1}^{K} \alpha_i(j) \|\|\bar{\mathbf{x}}(j) - \bar{\boldsymbol{\mu}}_i\|\|^2$		

Q. 10

Question 10

Time taken: 32s

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

Response:

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

Q. 11

Question 11

Time taken: 5m 21s

What is the distance between the two hyperplanes given below

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

Response:

OPTIONS	RESPONSE	ANSWER
$\frac{8}{\sqrt{N(N+1)}}$	✔	✔
$\frac{2\sqrt{2}}{\sqrt{N(N+1)}}$		
$\frac{2}{\sqrt{\frac{N(N+1)(2N+1)}{6}}}$		
$\frac{1}{2\sqrt{\frac{N(N+1)(2N+1)}{6}}}$		

Q. 12

Question 12

Time taken: 50s

Consider the linear regression model below

$$y(k) = h_0 + h_1 x_1(k) + \cdots + h_n x_n(k) + \epsilon(k)$$

The quantities $x_i(k)$ are

Response:

OPTIONS	RESPONSE	ANSWER
Response		
Regression coefficient		
Regressor	✔	✔
Model error		

Q. 13

Question 13

Time taken: 4m 23s

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

Response:

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

Q. 14

Question 14

Time taken: 30m 24s

To determine the cluster in iteration l, we assign $\bar{\mathbf{x}}(j)$ to cluster $\tilde{\imath}$ with centroid $\bar{\boldsymbol{\mu}}_i^{(l-1)}$ that satisfies

Response:

OPTIONS	RESPONSE	ANSWER
$\tilde{\imath} = \arg\max_i \bar{\mathbf{x}}^T(j)\bar{\boldsymbol{\mu}}_i^{(l-1)} - \left(\bar{\boldsymbol{\mu}}_i^{(l-1)}\right)^T \bar{\boldsymbol{\mu}}_i^{(l-1)}$	✔	✔
$\tilde{\imath} = \arg\max_i 2\bar{\mathbf{x}}^T(j)\bar{\boldsymbol{\mu}}_i^{(l-1)} + \left(\bar{\boldsymbol{\mu}}_i^{(l-1)}\right)^T \bar{\boldsymbol{\mu}}_i^{(l-1)}$		
$\tilde{\imath} = \arg\max_i \bar{\mathbf{x}}^T(j)\bar{\boldsymbol{\mu}}_i^{(l-1)} + \left(\bar{\boldsymbol{\mu}}_i^{(l-1)}\right)^T \bar{\boldsymbol{\mu}}_i^{(l-1)}$		

Q. 15

Question 15

Time taken: 22m 20s

The multivariate Gaussian PDF for parameters below is

$$\bar{\boldsymbol{\mu}} = \begin{bmatrix} -1 \\ 1 \end{bmatrix}, \mathbf{R} = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$$

Response:

OPTIONS	RESPONSE	ANSWER
$\frac{1}{\sqrt{12\pi}} e^{-\frac{1}{3}(x_1^2+x_2^2+3x_1+3x_2-x_1x_2+3)}$		
$\frac{1}{\sqrt{12\pi}} e^{-\frac{1}{3}(x_1^2+x_2^2+3x_1-3x_2+x_1x_2+3)}$		
$\frac{1}{\sqrt{12\pi}} e^{-\frac{1}{3}(x_1^2+x_2^2+3x_1-3x_2-x_1x_2+3)}$	✔	✔
$\frac{1}{\sqrt{12\pi}} e^{-\frac{1}{3}(x_1^2+x_2^2-3x_1-3x_2+x_1x_2+3)}$		

Q. 16

Question 16

Time taken: 1m 26s

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

Response:

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

Q. 17

Question 17

Time taken: 31s

Consider the ML example below for prediction of sales based on advertising

Year	Sales (Million Euro)	Advertising (Million Euro)
1	651	23
2	762	26
3	856	30
4	1,063	34
5	1,190	43
6	1,298	48
7	1,421	52
8	1,440	57
9	1,518	58

In this example, Advertising is the

Response:

OPTIONS	RESPONSE	ANSWER
Response		
Regression coefficient		
Model error		
Regressor	✔	✔

Q. 18

Question 18

Time taken: 1m 38s

The **kernel SVM** problem can be defined as

Response:

OPTIONS	RESPONSE	ANSWER
$\max \sum_{i=1}^{2M} \lambda_i - \frac{1}{2} \sum_{i,j=1}^{2M} \lambda_i \lambda_j y_i y_j \bar{\mathbf{x}}_i^T \bar{\mathbf{x}}_j$ subject to $\lambda_i \geq 0$ $\sum_{i=1}^{2M} \lambda_i y_i = 0$		
$\max \frac{1}{2} \sum_{i,j=1}^{2M} \lambda_i \lambda_j y_i y_j K(\bar{\mathbf{x}}_i, \bar{\mathbf{x}}_j)$ subject to $\lambda_i \geq 0$ $\sum_{i=1}^{2M} \lambda_i y_i = 0$		
$\max \sum_{i=1}^{2M} \lambda_i - \frac{1}{2} \sum_{i,j=1}^{2M} \lambda_i \lambda_j y_i y_j K(\bar{\mathbf{x}}_i, \bar{\mathbf{x}}_j)$ subject to $\lambda_i \geq 0$ $\sum_{i=1}^{2M} \lambda_i y_i = 0$	✔	✔
$\max \sum_{i=1}^{2M} \lambda_i - \frac{1}{2} \sum_{i,j=1}^{2M} \lambda_i \lambda_j y_i y_j K(\bar{\mathbf{x}}_i, \bar{\mathbf{x}}_j)$ subject to $\lambda_i \leq 0$ $\sum_{i=1}^{2M} \lambda_i y_i \geq 0$		

Q. 19

Question 19

Time taken: 1m

The regression coefficient vector from the training data is determined as

Response:

OPTIONS	RESPONSE	ANSWER
$\bar{\mathbf{h}} = (\mathbf{X}^T\mathbf{X})^{-1}\mathbf{X}^T\bar{\mathbf{y}}$	✔	✔
$\bar{\mathbf{h}} = \mathbf{X}^T(\mathbf{X}^T\mathbf{X})^{-1}\bar{\mathbf{y}}$		
$\bar{\mathbf{h}} = (\mathbf{X}^T\mathbf{X})^{-1}\mathbf{X}\bar{\mathbf{y}}$		
$\bar{\mathbf{h}} = (\mathbf{X}\mathbf{X}^T)^{-1}\mathbf{X}^T\bar{\mathbf{y}}$		

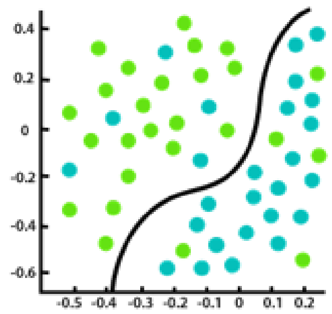
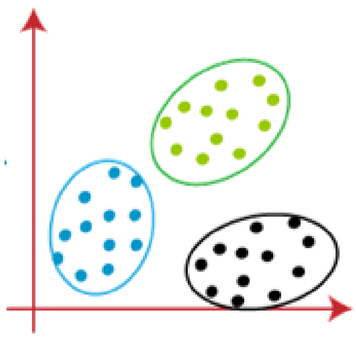
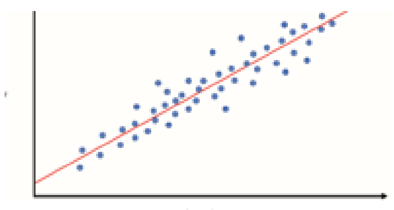
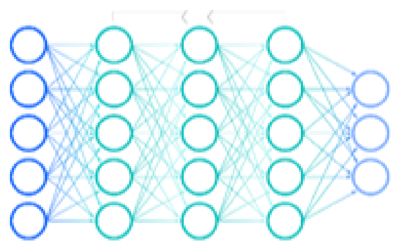
Q. 20

Question 20

Time taken: 12s

Which figure below represents linear regression

Response:

OPTIONS	RESPONSE	ANSWER
		
		
	✔	✔
		

Q. 21

Question 21

Time taken: 1m 56s

1. The log-likelihood of the regression parameter $\bar{\mathbf{h}}$ in logistic regression can be written as

Response:

OPTIONS	RESPONSE	ANSWER
$\Sigma_{k=1}^{M}(1-y(k))\ln g(\bar{\mathbf{x}}(k)) + y(k)\ln\left(1-g(\bar{\mathbf{x}}(k))\right)$		
$\Sigma_{k=1}^{M} y(k)\ln g(\bar{\mathbf{x}}(k)) + (1-y(k))\ln\left(1-g(\bar{\mathbf{x}}(k))\right)$	✔	✔
$\Pi_{k=1}^{M}\left(g(\bar{\mathbf{x}}(k))\right)^{y(k)}\left(1-g(\bar{\mathbf{x}}(k))\right)^{1-y(k)}$		
$\Pi_{k=1}^{M}\left(g(\bar{\mathbf{x}}(k))\right)^{1-y(k)}\left(1-g(\bar{\mathbf{x}}(k))\right)^{y(k)}$		

Q. 22

Question 22

Time taken: 1m 52s

The probability $p(x_j = 1|y = 1)$ can be evaluated using Laplace smoothing as

Response:

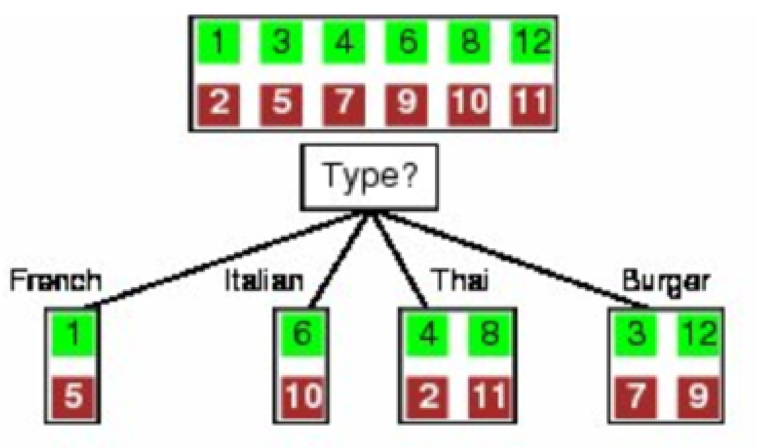
OPTIONS	RESPONSE	ANSWER
$\frac{\sum_{j=1}^{N} 1(x_j(i)=1, y(i)=1)+1}{\sum_{i=1}^{M} 1(y(i)=1)+2}$		
$\frac{\sum_{i=1}^{M} 1(x_j(i)=1, y(i)=1)+1}{\sum_{i=1}^{M} 1(y(i)=1)+2}$	✔	✔
$\frac{\sum_{i=1}^{M} 1(x_j(i)=1, y(i)=1)+1}{\sum_{i=1}^{M} 1(y(i)=1)+1}$		
$\frac{\sum_{i=1}^{M} 1(x_j(i)=1, y(i)=1)}{\sum_{i=1}^{M} 1(y(i)=1)}$		

Q. 23

Question 23

Time taken: 3m 39s

What is the quantity H (X |Type) for the type feature depicted in the figure below, where X is the final decision?



Response:

OPTIONS	RESPONSE	ANSWER
1	✔	✔
0.36		
0		
0.54		

Q. 24

Question 24

Time taken: 2m 19s

The ***conditional entropy*** $H(X|Y)$ is defined as

Response:

OPTIONS	RESPONSE	ANSWER
$\sum_{j=1}^{m} p(y_j) H(Y = y_j \| X)$		
$\sum_{j=1}^{m} p(y_j) H(X \| Y = y_j)$	✔	✔
$\sum_{j=1}^{m} H(X \| Y = y_j)$		
$\sum_{i=1}^{n} p(x_i) H(Y \| X = x_i)$		

Q. 25

Question 25

Time taken: 1m 14s

The Gaussian discriminant classifier for both classes with identical covariances is

Response:

OPTIONS	RESPONSE	ANSWER
Ellipsoidal		
Spherical		
Conical		
Linear	✔	✔

Q. 26

Question 26

Time taken: 49s

The cluster assignment indicator $\alpha_2(3)$

Response:

OPTIONS	RESPONSE	ANSWER
Equals 1 when $\bar{\mathbf{x}}(3)$ belongs to $\mathcal{C}_2$ and 0 otherwise	✔	✔
Equals 0 when $\bar{\mathbf{x}}(3)$ belongs to $\mathcal{C}_2$ and 1 otherwise		
Equals 1 when $\bar{\mathbf{x}}(2)$ belongs to $\mathcal{C}_3$ and 0 otherwise		
Equals 0 when $\bar{\mathbf{x}}(2)$ belongs to $\mathcal{C}_3$ and 1 otherwise		

Q. 27

Question 27

Time taken: 7m 47s

Consider the two classes $\mathcal{C}_0, \mathcal{C}_1$ distributed as below and determine when the classifier chooses $\mathcal{H}_0$

$$\mathcal{C}_0 \sim N\left(\begin{bmatrix} 2 \\ -2 \end{bmatrix}, \begin{bmatrix} \frac{1}{8} & 0 \\ 0 & \frac{1}{4} \end{bmatrix}\right), \mathcal{C}_1 \sim N\left(\begin{bmatrix} 4 \\ -4 \end{bmatrix}, \begin{bmatrix} \frac{1}{8} & 0 \\ 0 & \frac{1}{4} \end{bmatrix}\right)$$

Response:

OPTIONS	RESPONSE	ANSWER
$x_1 + 4x_2 \geq -1$		
$x_1 + 2x_2 \leq 5$		
$4x_1 - x_2 \leq 3$		
$2x_1 - x_2 \leq 9$	✔	✔

Q. 28

Question 28

Time taken: 1m 14s

The k - means algorithm is a/an

Response:

OPTIONS	RESPONSE	ANSWER
Supervised learning algorithm		
Reinforcement learning algorithm		
Deep learning algorithm		
Unsupervised learning algorithm	✔	✔

Q. 29

Question 29

Time taken: 2m 9s

The ***mean*** and ***covariance matrix*** of the multivariate Guassian are defined as

Response:

OPTIONS	RESPONSE	ANSWER
$E\{\bar{\mathbf{x}}\} = \bar{\boldsymbol{\mu}}, E\{(\bar{\mathbf{x}} - \bar{\boldsymbol{\mu}})^2\} = \mathbf{R}$		
$E\{\bar{\mathbf{x}}\} = \bar{\boldsymbol{\mu}}, E\{(\bar{\mathbf{x}} - \bar{\boldsymbol{\mu}})(\bar{\mathbf{x}} - \bar{\boldsymbol{\mu}})^T\} = \mathbf{R}$	✔	✔
$E\{\bar{\mathbf{x}}\} = \mu, E\{(\bar{\mathbf{x}} - \bar{\boldsymbol{\mu}})^T(\bar{\mathbf{x}} - \bar{\boldsymbol{\mu}})\} = \mathbf{R}$		
$E\{\bar{\mathbf{x}}\} = \mu, E\{\bar{\mathbf{x}}\bar{\mathbf{x}}^T\} = \mathbf{R}$		

Q. 30

Question 30

Time taken: 1m 35s

The optimization problem to determine the soft classifier is given as

Response:

OPTIONS	RESPONSE	ANSWER
$\min \sum_{i=1}^N u_i + \sum_{i=1}^N v_i$ $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq 1 - u_i, 1 \leq i \leq M$ $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq -1 + v_i,\ M+1 \leq i \leq 2M$ $u_i < 0,\ v_i < 0$		
$\min\|\bar{\mathbf{a}}\|$ $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq 1 - u_i, 1 \leq i \leq M$ $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq -1 + v_i,\ M+1 \leq i \leq 2M$ $u_i \geq 0,\ v_i \geq 0$		
$\min \sum_{i=1}^N u_i + \sum_{i=1}^N v_i$ $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq 1 - u_i, 1 \leq i \leq M$ $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq -1 + v_i,\ M+1 \leq i \leq 2M$ $u_i \geq 0,\ v_i \geq 0$	✔	✔
$\max \sum_{i=1}^N u_i + \sum_{i=1}^N v_i$ $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq 1 - u_i, 1 \leq i \leq M$ $\bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq -1 + v_i,\ M+1 \leq i \leq 2M$ $u_i \geq 0,\ v_i \geq 0$		

Q. 31

Question 31

Time taken: 28m 36s

Given a new observation $\bar{\mathbf{x}} = \bar{\mathbf{v}}$,, it can be labeled as belonging to the class

y = 1 if

Response:

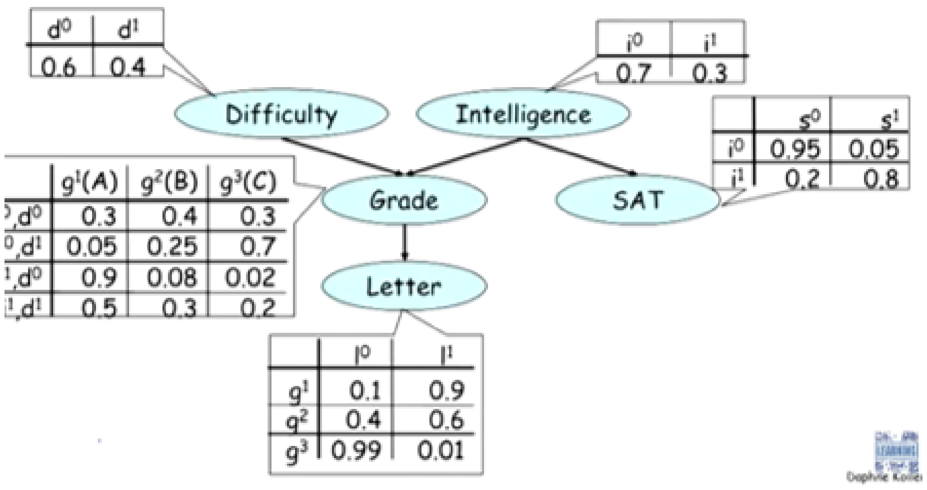
OPTIONS	RESPONSE	ANSWER
$\frac{\prod_{j=1}^{N} p(x_j=v_j \mid y=1)}{p(y=0)} > \frac{\prod_{j=1}^{N} p(x_j=v_j \mid y=0)}{p(y=1)}$		✔
$\frac{p(y=0)}{\prod_{j=1}^{N} p(x_j=v_j \mid y=1)} > \frac{p(y=1)}{\prod_{j=1}^{N} p(x_j=v_j \mid y=0)}$		
$\frac{\prod_{j=1}^{N} p(x_j=v_j \mid y=1)}{p(y=1)} > \frac{\prod_{j=1}^{N} p(x_j=v_j \mid y=0)}{p(y=0)}$	✔	
$\frac{p(y=1)}{\prod_{j=1}^{N} p(x_j=v_j \mid y=1)} > \frac{p(y=0)}{\prod_{j=1}^{N} p(x_j=v_j \mid y=0)}$		

Q. 32

Question 32

Time taken: 3m 43s

Consider the model below



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

Response:

OPTIONS	RESPONSE	ANSWER
0.05871		
0.12960	✔	✔
0.11664		
0.45332		

Q. 33

Question 33

Time taken: 59s

In Gaussian discriminant analysis, we **choose** $\mathcal{C}_0$ if

Response:

OPTIONS	RESPONSE	ANSWER
$p(\bar{\mathbf{x}}; \mathcal{C}_0) < p(\bar{\mathbf{x}}; \mathcal{C}_1)$		
$p(\bar{\mathbf{x}}; \mathcal{C}_0) = p(\bar{\mathbf{x}}; \mathcal{C}_1)$		
$p(\bar{\mathbf{x}}; \mathcal{C}_0) > 0$		
$p(\bar{\mathbf{x}}; \mathcal{C}_0) > p(\bar{\mathbf{x}}; \mathcal{C}_1)$	✔	✔

Q. 34

Question 34

Time taken: 1m 26s

The dual problem for the SVM can be formulated as

Response:

OPTIONS	RESPONSE	ANSWER
$\max \sum_{i=1}^{2M} \lambda_i - \frac{1}{2}\sum_{i,j=1}^{2M} \lambda_i \lambda_j y_i y_j \bar{\mathbf{x}}_i^T \bar{\mathbf{x}}_j$ subject to $\lambda_i \leq 0$		
$\max \frac{1}{2}\sum_{i,j=1}^{2M} \lambda_i \lambda_j y_i y_j \bar{\mathbf{x}}_i^T \bar{\mathbf{x}}_j$ subject to $\lambda_i \leq 0$ $\sum_{i=1}^{2M} \lambda_i y_i \geq 0$		
$\max \sum_{i=1}^{2M} \lambda_i + \frac{1}{2}\sum_{i,j=1}^{2M} \lambda_i \lambda_j y_i y_j \bar{\mathbf{x}}_i^T \bar{\mathbf{x}}_j$ subject to $\lambda_i = 0$ $\sum_{i=1}^{2M} \lambda_i y_i = 0$		
$\max \sum_{i=1}^{2M} \lambda_i - \frac{1}{2}\sum_{i,j=1}^{2M} \lambda_i \lambda_j y_i y_j \bar{\mathbf{x}}_i^T \bar{\mathbf{x}}_j$ subject to $\lambda_i \geq 0$ $\sum_{i=1}^{2M} \lambda_i y_i = 0$	✔	✔

Q. 35

Question 35

Time taken: 1m 27s

The optimization problem to determine the support vector classifier is

Response:

OPTIONS	RESPONSE	ANSWER
$\min\|\bar{\mathbf{a}}\|_2$ $\mathcal{C}_0: \bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq 1,\ 1 \leq i \leq M$ $\mathcal{C}_1: \bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq -1,\ M+1 \leq i \leq 2M$	✔	✔
$\min \frac{1}{\|\bar{\mathbf{a}}\|_2}$ $\mathcal{C}_0: \bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq 1,\ 1 \leq i \leq M$ $\mathcal{C}_1: \bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq -1,\ M+1 \leq i \leq 2M$		
$\min\|\bar{\mathbf{a}}\|_2$ $\mathcal{C}_0: \bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq 1,\ 1 \leq i \leq M$ $\mathcal{C}_1: \bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq -1,\ M+1 \leq i \leq 2M$		
$\min \frac{1}{\|\bar{\mathbf{a}}\|_2}$ $\mathcal{C}_0: \bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \leq 1,\ 1 \leq i \leq M$ $\mathcal{C}_1: \bar{\mathbf{a}}^T\bar{\mathbf{x}}_i + b \geq -1,\ M+1 \leq i \leq 2M$		

Q. 36

Question 36

Time taken: 1m 51s

The PDF of the Gaussian mixture is given as

Response:

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

Q. 37

Question 37

Time taken: 1m 41s

The update rule in logistic regression is

Response:

OPTIONS	RESPONSE	ANSWER
$\bar{\mathbf{h}}(k+1) = \bar{\mathbf{h}}(k) + \eta\left(y(k+1) - g\left(\bar{\mathbf{x}}(k+1)\right)\right)\bar{\mathbf{x}}(k+1)$	✔	✔
$\bar{\mathbf{h}}(k+1) = \bar{\mathbf{h}}(k) - \eta\left(y(k+1) - g\left(\bar{\mathbf{x}}(k+1)\right)\right)\bar{\mathbf{x}}(k+1)$		
$\bar{\mathbf{h}}(k+1) = \bar{\mathbf{h}}(k) + \eta\left(y(k+1) - \bar{\mathbf{h}}^T(k)\bar{\mathbf{x}}(k+1)\right)\bar{\mathbf{x}}(k+1)$		
$\bar{\mathbf{h}}(k+1) = \bar{\mathbf{h}}(k) - \eta\left(y(k+1) - \bar{\mathbf{h}}^T(k)\bar{\mathbf{x}}(k+1)\right)\bar{\mathbf{x}}(k+1)$		

Q. 38

Question 38

Time taken: 3m 46s

The expected value of the log-likelihood in iteration l is

Response:

OPTIONS	RESPONSE	ANSWER
$\prod_{j=1}^{M}\sum_{i=1}^{N}\left(\alpha_i^{(l)}(j)\ln p_i - \frac{N}{2}\ln 2\pi\sigma^2 - \frac{1}{2\sigma^2}\|\bar{\mathbf{x}}(j) - \bar{\boldsymbol{\mu}}_i\|^2\right)$		
$\prod_{j=1}^{M}\prod_{i=1}^{N}\left(\alpha_i^{(l)}(j)\ln p_i - \frac{N}{2}\ln 2\pi\sigma^2 - \frac{1}{2\sigma^2}\|\bar{\mathbf{x}}(j) - \bar{\boldsymbol{\mu}}_i\|^2\right)$		
$\sum_{j=1}^{M}\sum_{i=1}^{N}\alpha_i^{(l)}(j)\left(\ln p_i - \frac{N}{2}\ln 2\pi\sigma^2 - \frac{1}{2\sigma^2}\|\bar{\mathbf{x}}(j) - \bar{\boldsymbol{\mu}}_i\|^2\right)$	✔	✔
$\sum_{j=1}^{M}\prod_{i=1}^{N}\left(\ln p_i - \frac{N}{2}\ln 2\pi\sigma^2 - \frac{1}{2\sigma^2}\|\bar{\mathbf{x}}(j) - \bar{\boldsymbol{\mu}}_i\|^2\right)^{\alpha_i^{(l)}(j)}$		

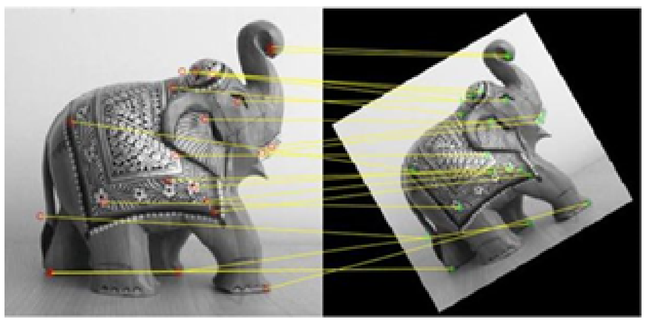
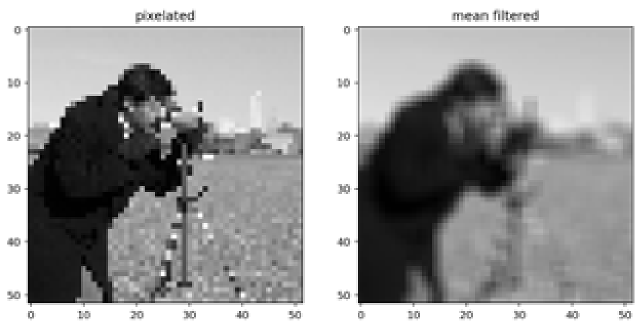
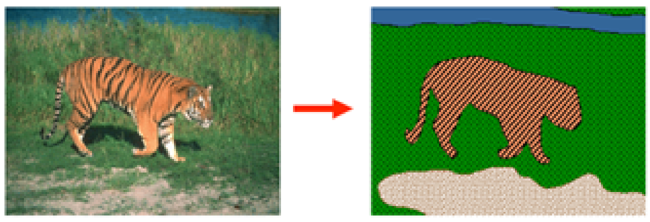
Q. 39

Question 39

Time taken: 34s

Which for the following shows image segmentation

Response:

OPTIONS	RESPONSE	ANSWER
		
		
	✓	✓
		

Q. 40

Question 40

Time taken: 1m 14s

As $z \to \infty, z \to -\infty$, the logistic function approaches the limits

Response:

OPTIONS	RESPONSE	ANSWER
0,1		
$\infty, 0$		
$0, \infty$		
1,0	✓	✓

Test Log

10th Mar 2024

09:01 AM	Started the test with Section #1
09:01 AM	Candidate gave us right to the following feeds - camera : HP TrueVision FHD RGB-IR (064e:3401) - microphone : Default - Microphone Array (Realtek High Definition Audio(SST))
09:01 AM	Candidate Looking Away from Screen
09:02 AM	Candidate Looking Away from Screen
09:03 AM	Away from test window
09:04 AM	Candidate Looking Away from Screen
09:05 AM	Away from test window
09:05 AM	Candidate Looking Away from Screen
09:07 AM	Candidate Looking Away from Screen for 02 mins
09:13 AM	Away from test window
09:14 AM	Candidate Looking Away from Screen
09:15 AM	Candidate Looking Away from Screen
09:15 AM	Candidate Looking Away from Screen
09:16 AM	Away from test window for 01 min
09:16 AM	Away from test window
09:16 AM	Candidate Looking Away from Screen
09:18 AM	Candidate Looking Away from Screen
09:18 AM	Away from test window for 01 min
09:19 AM	Candidate Looking Away from Screen
09:20 AM	Away from test window
09:21 AM	Away from test window
09:22 AM	Candidate Looking Away from Screen
09:22 AM	Away from test window
09:23 AM	Away from test window
09:26 AM	Candidate Looking Away from Screen
09:27 AM	Away from test window for 02 mins
09:29 AM	Candidate Looking Away from Screen
09:29 AM	Candidate Looking Away from Screen
09:30 AM	Candidate Looking Away from Screen for 01 min
09:32 AM	Candidate Looking Away from Screen for 06 mins
09:40 AM	Candidate Looking Away from Screen
09:43 AM	Candidate Looking Away from Screen for 03 mins
09:47 AM	Candidate Looking Away from Screen

09:48 AM	Candidate Face not Visible
09:48 AM	Away from test window for 18 mins
09:50 AM	Away from test window
09:54 AM	Away from test window
09:54 AM	Away from test window
09:57 AM	Away from test window for 02 mins
10:00 AM	Away from test window
10:00 AM	Candidate Looking Away from Screen
10:02 AM	Candidate Looking Away from Screen
10:03 AM	Candidate Looking Away from Screen
10:04 AM	Candidate Looking Away from Screen for 02 mins
10:06 AM	Away from test window for 05 mins
10:08 AM	Away from test window
10:08 AM	Away from test window
10:10 AM	Candidate Looking Away from Screen
10:11 AM	Away from test window
10:11 AM	Away from test window
10:12 AM	Candidate Looking Away from Screen
10:13 AM	Candidate Looking Away from Screen
10:15 AM	Away from test window for 02 mins
10:16 AM	Candidate Looking Away from Screen
10:17 AM	Candidate Looking Away from Screen
10:18 AM	Away from test window
10:18 AM	Candidate Looking Away from Screen
10:19 AM	Candidate Looking Away from Screen for 01 min
10:20 AM	Away from test window
10:21 AM	Away from test window
10:21 AM	Away from test window
10:22 AM	Away from test window
10:24 AM	Away from test window
10:24 AM	Away from test window
10:24 AM	Candidate Looking Away from Screen
10:25 AM	Away from test window
10:25 AM	Candidate Looking Away from Screen
10:26 AM	Away from test window
10:28 AM	Away from test window
10:28 AM	Candidate Looking Away from Screen
10:28 AM	Away from test window

10:29 AM	Candidate Looking Away from Screen
10:31 AM	Away from test window for 03 mins
10:32 AM	Candidate Looking Away from Screen
10:33 AM	Away from test window
10:33 AM	Away from test window
10:34 AM	Candidate Looking Away from Screen
10:35 AM	Candidate Looking Away from Screen
10:35 AM	Candidate Looking Away from Screen
10:36 AM	Candidate Looking Away from Screen
10:38 AM	Candidate Looking Away from Screen
10:42 AM	Candidate Looking Away from Screen
10:43 AM	Candidate Looking Away from Screen
10:45 AM	Candidate Looking Away from Screen
10:47 AM	Candidate Looking Away from Screen for 02 mins
10:51 AM	Additional person there
10:53 AM	Candidate Looking Away from Screen
10:54 AM	Away from test window for 10 mins
10:55 AM	Candidate Looking Away from Screen
10:56 AM	Away from test window
10:56 AM	Candidate Looking Away from Screen
10:57 AM	Away from test window
10:58 AM	Away from test window
10:58 AM	Away from test window
11:00 AM	Candidate Looking Away from Screen
11:01 AM	Candidate Looking Away from Screen
11:05 AM	Candidate Looking Away from Screen
11:06 AM	Candidate Looking Away from Screen
11:06 AM	Candidate Looking Away from Screen
11:07 AM	Candidate Looking Away from Screen
11:08 AM	Candidate Looking Away from Screen for 02 mins
11:11 AM	Candidate Looking Away from Screen
11:12 AM	Candidate Looking Away from Screen
11:13 AM	Candidate Looking Away from Screen
11:14 AM	Candidate Looking Away from Screen
11:15 AM	Candidate Looking Away from Screen for 01 min
11:17 AM	Candidate Looking Away from Screen
11:18 AM	Away from test window for 18 mins
11:18 AM	Candidate Looking Away from Screen

11:19 AM Away from test window for 01 min

11:20 AM Away from test window

11:20 AM Away from test window

11:21 AM Candidate Looking Away from Screen

11:23 AM Away from test window for 01 min

11:23 AM Candidate Looking Away from Screen

11:26 AM Candidate Looking Away from Screen for 01 min

11:28 AM Away from test window

11:28 AM Candidate Looking Away from Screen

11:29 AM Away from test window

11:31 AM Away from test window

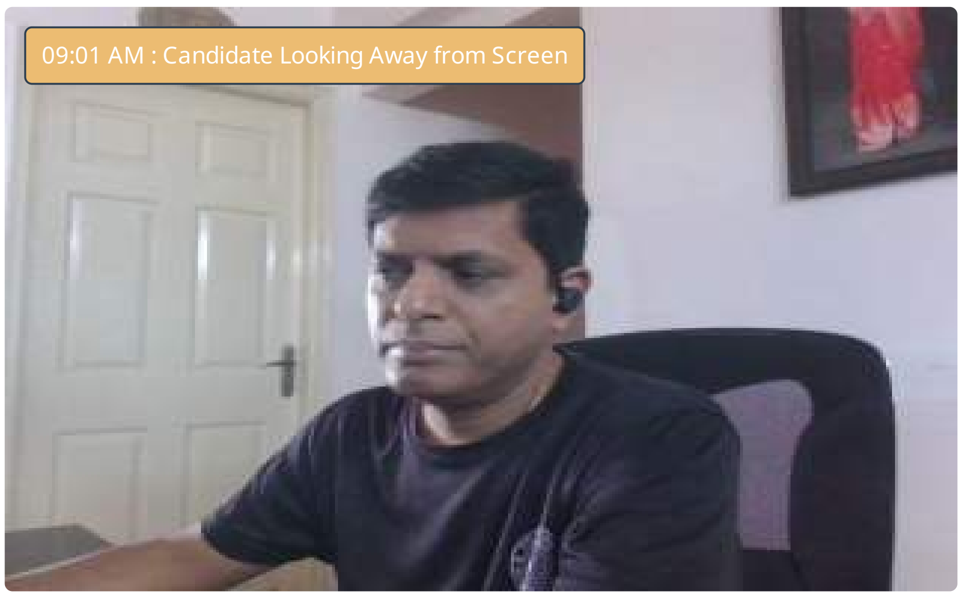
11:33 AM Finished the test

Credibility Index: LOW

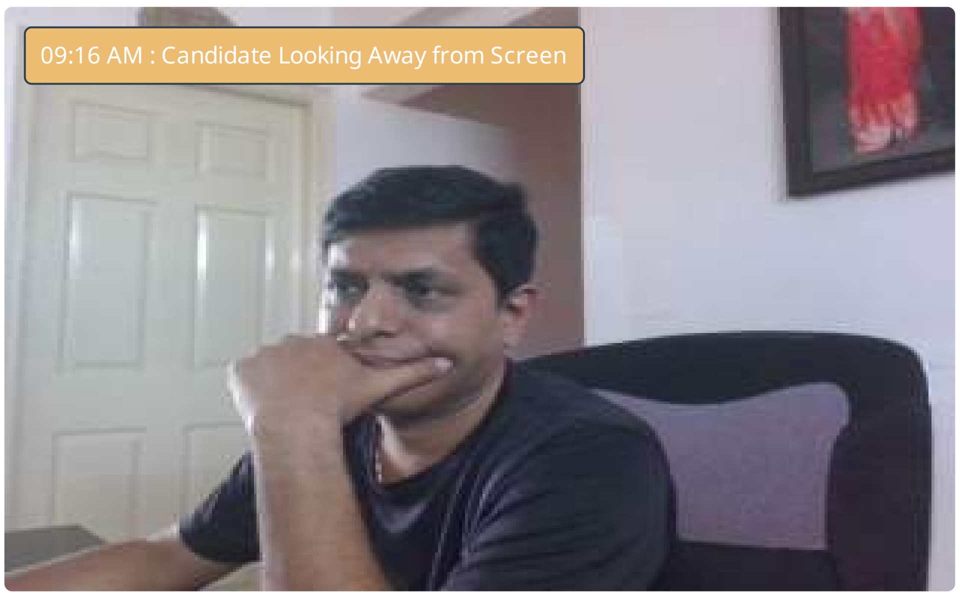
Profile Picture Snapshot

Identity Card Snapshot

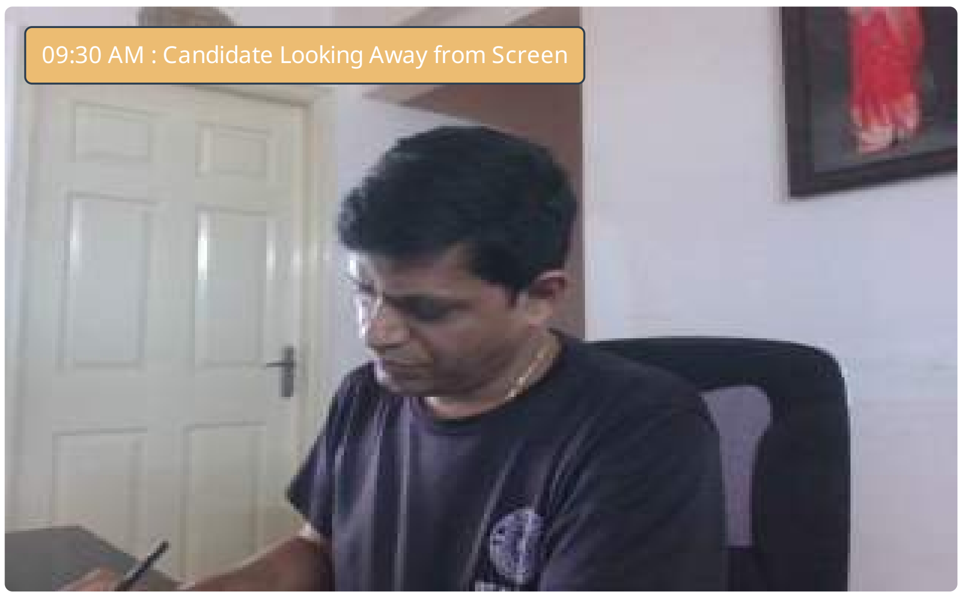
Images of Test-Taker

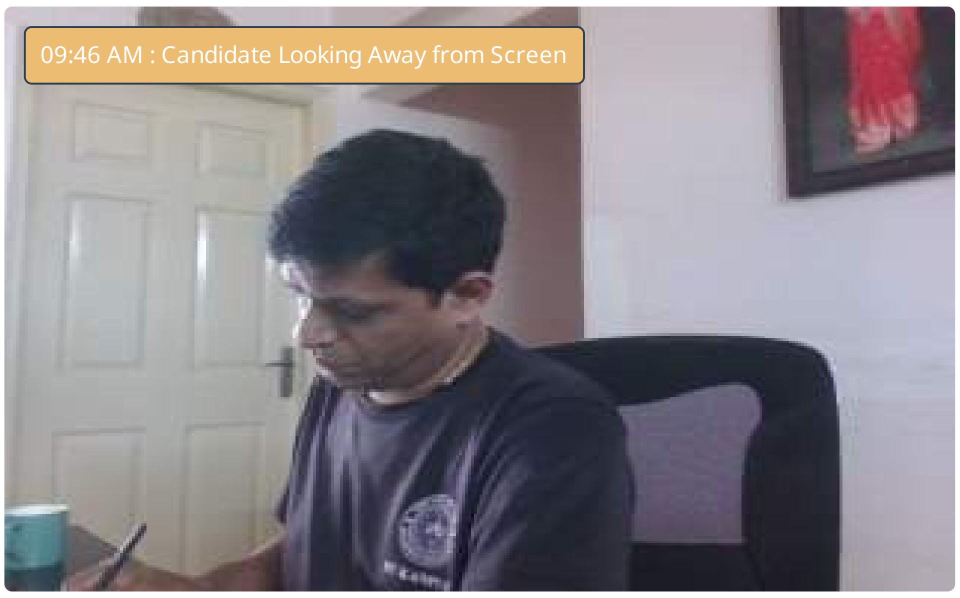


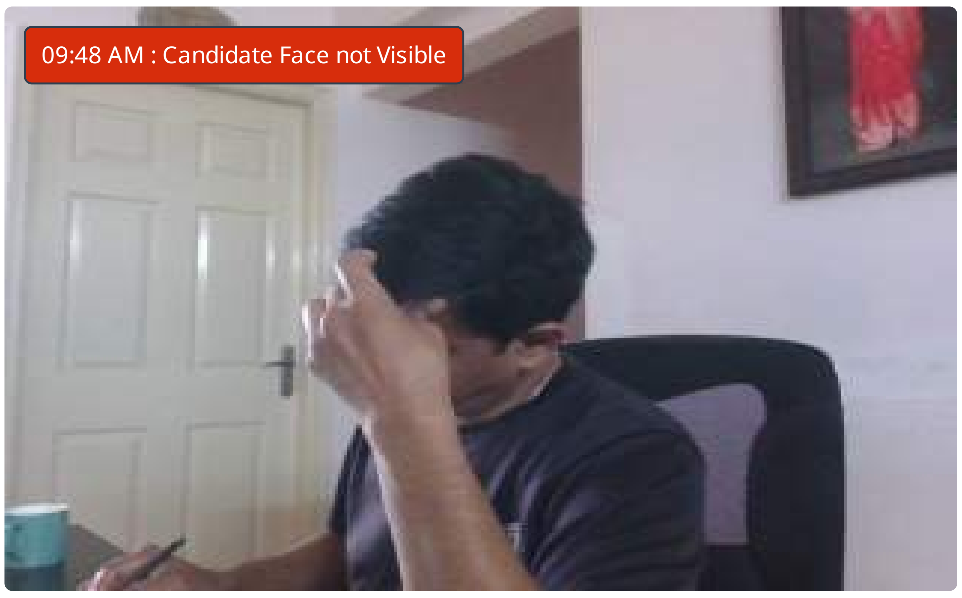
09:01 AM : Candidate Looking Away from Screen

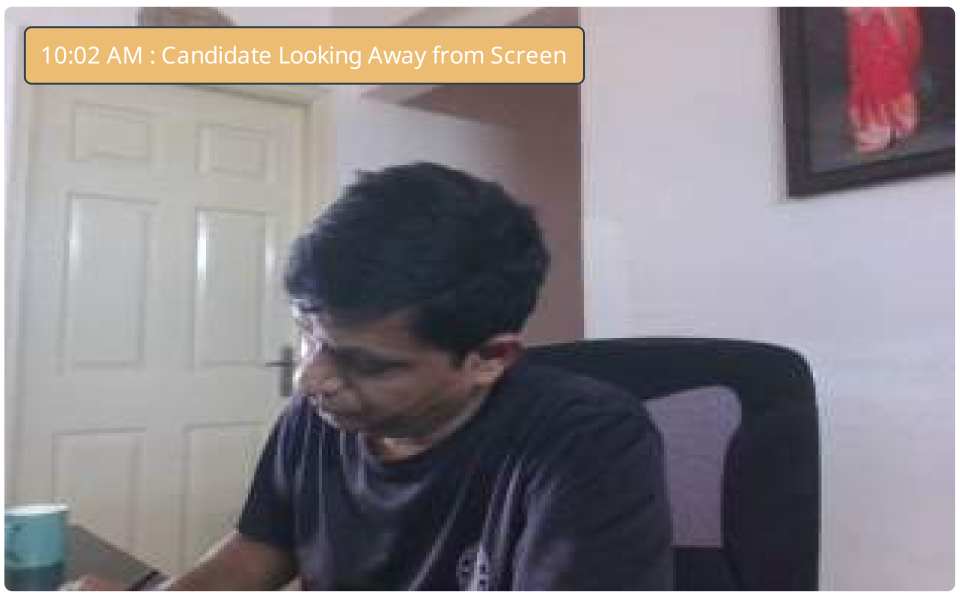


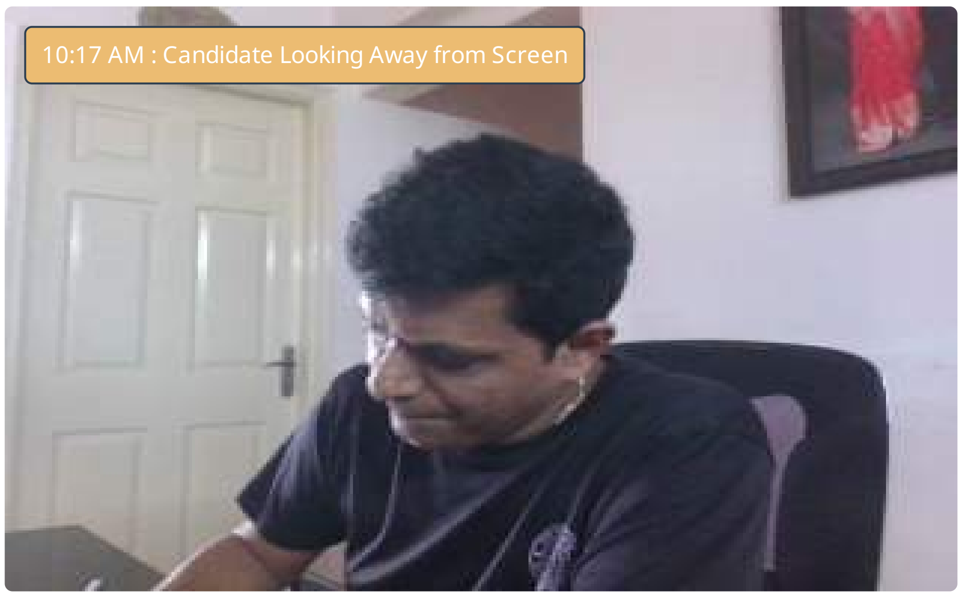
09:16 AM : Candidate Looking Away from Screen

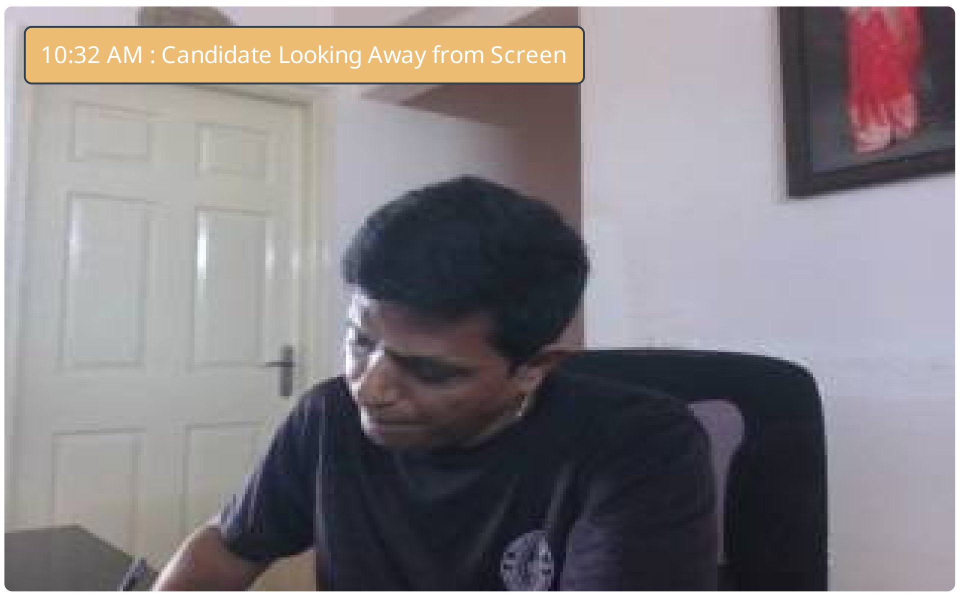

09:30 AM : Candidate Looking Away from Screen

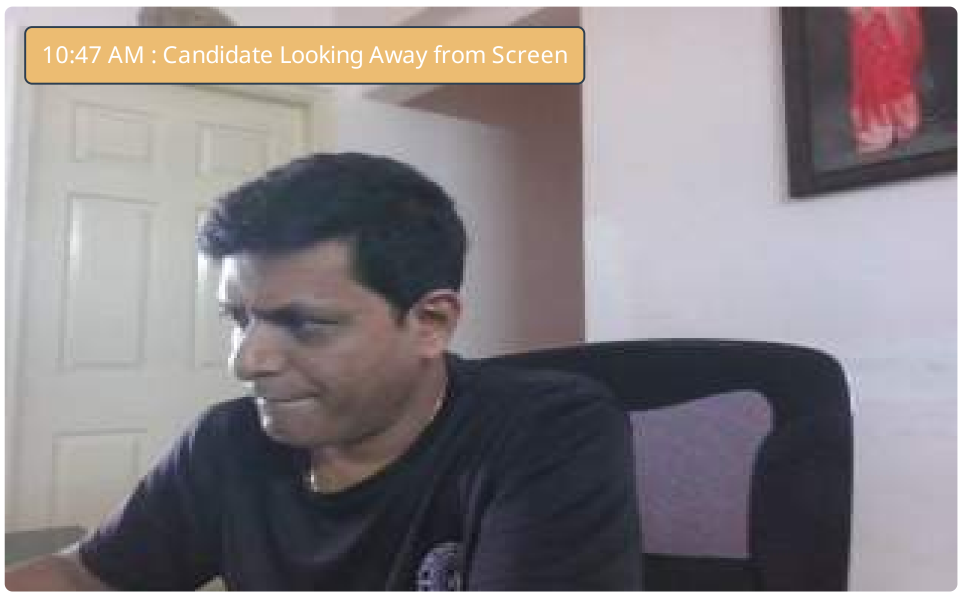

09:46 AM : Candidate Looking Away from Screen

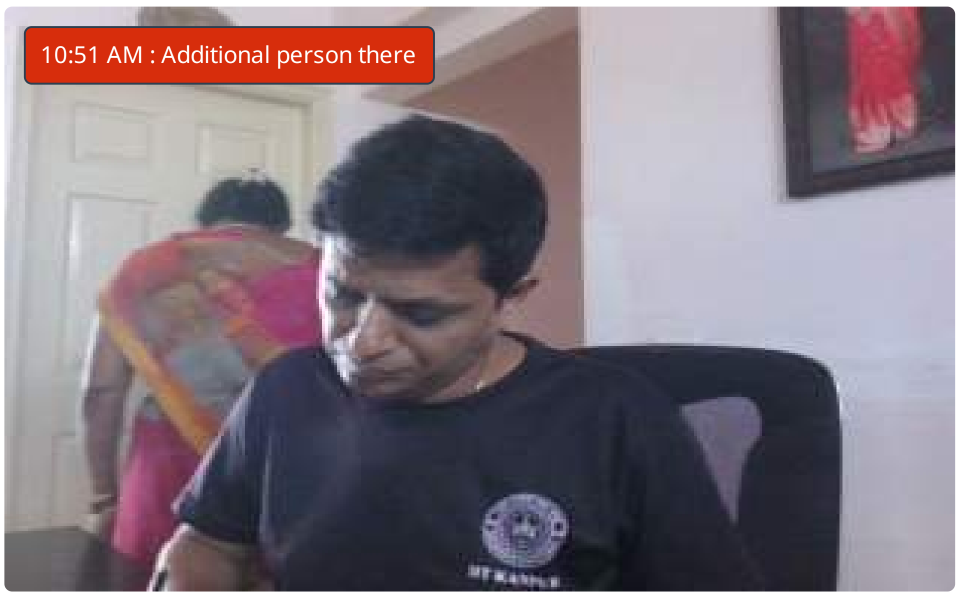

09:48 AM : Candidate Face not Visible

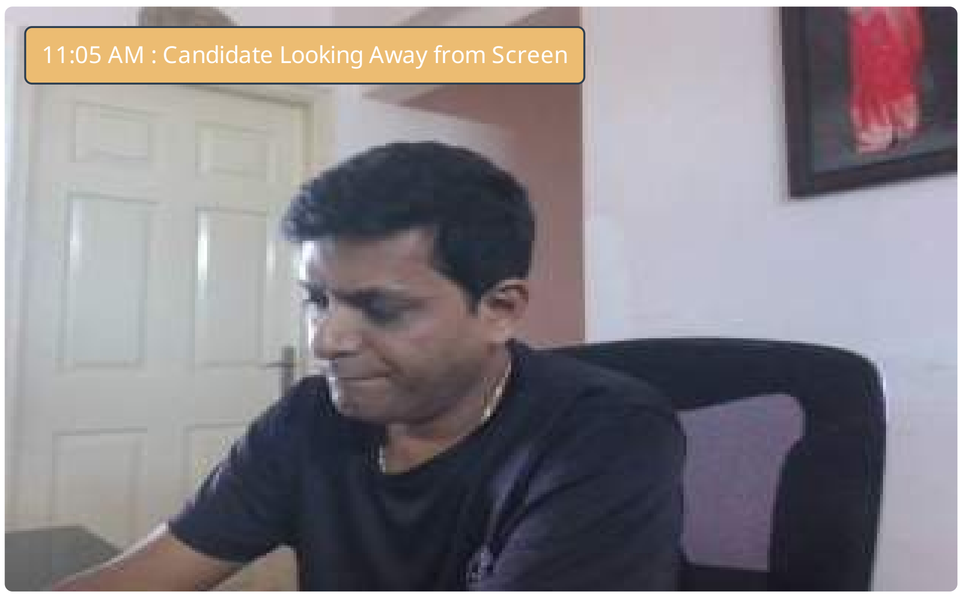

10:02 AM : Candidate Looking Away from Screen

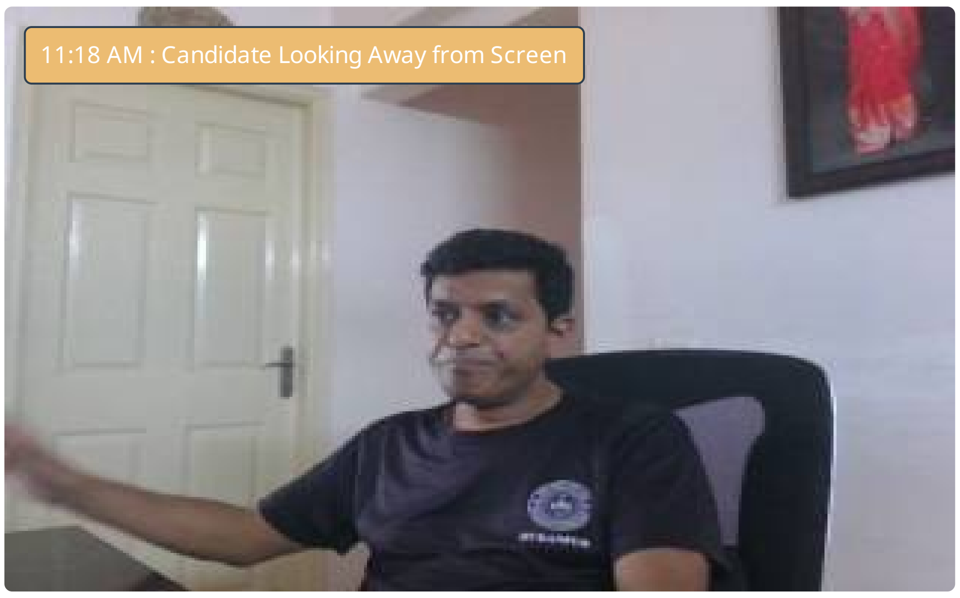

10:17 AM : Candidate Looking Away from Screen


10:32 AM : Candidate Looking Away from Screen


10:47 AM : Candidate Looking Away from Screen


10:51 AM : Additional person there


11:05 AM : Candidate Looking Away from Screen


11:18 AM : Candidate Looking Away from Screen

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