University of Asia Pacific

Admit Card

Mid-Term Examination of Spring, 2021

Financial Clearance	PAID

Registration No : 18101064

Student Name : Md. Sohanuzzaman Soad

Program : Bachelor of Science in Computer Science and Engineering

SI.NO.	COURSE CODE	COURSE TITLE	CR.HR.	EXAM. SCHEDULE
1	CSE 400	Project / Thesis	3.00	
2	CSE 401	Mathematics for computer Science	3.00	
3	CSE 403	Artificial Intelligence and Expert Systems	3.00	
4	CSE 404	Artificial Intelligence and Expert Systems Lab	1.50	
5	CSE 405	Operating Systems	3.00	
6	CSE 406	Operating Systems Lab	1.50	
7	CSE 407	ICTLaw, Policy and Ethics	2.00	
8	CSE 410	Software Development	1.50	
9	CSE 427	Topics of Current Interest	3.00	

Total Credit: 21.50

1. Examinees are not allowed to enter the examination hall after 30 minutes of commencement of examination for mid semester examinations and 60 minutes for semester final examinations.

2. No examinees shall be allowed to submit their answer scripts before 50% of the allocated time of examination has elapsed.

3. No examinees would be allowed to go to washroom within the first 60 minutes of final examinations.

4. No student will be allowed to carry any books, bags, extra paper or cellular phone or objectionable items/incriminating paper in the examination hall.
Violators will be subjects to disciplinary action.

This is a system generated Admit Card. No signature is required.

UNIVERSITY OF ASIA PACIFIC

Department of Computer Science & Engineering

Mid-Term Examination
Spring-2021

Student Name	:	Md. Sohanuzzaman Soad
Student ID	:	18101064
Section	:	B
Year	:	4th
Semester	:	1st
Course Code	:	CSE 401
Course Title	:	Mathematics for Computer Science
Date	:	13-Septempber-2021

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Ans to the Que No: 1(a)

Where,

$A = 4+1 = 5$

$f(x,y,z) = x+y+2z \rightarrow$ objective function

$g(x,y,z) = x^2+y^2+z^2-5 \rightarrow$ Constraint

Lagrange Multiplier Method,

$\nabla f(x,y,z) = \lambda * g(x,y,z)$

$f(x,y,z) - \lambda * g(x,y,z) = 0$ [$\lambda \sim$ Slack variable]

$\Rightarrow x+y+2z - \lambda * (x^2+y^2+z^2-5) = 0$

$\Rightarrow x+y+2z - x^2\lambda - y^2\lambda - z^2\lambda + 5\lambda = 0$ ——— (1)

Now derivating eqn (1) ~~part~~ partially by x,

$1+0+0-2x\lambda - 0 - 0 + 0 = 0$

$\Rightarrow 1 - 2x\lambda = 0$

$\Rightarrow 2x\lambda = 1$

$\Rightarrow x = \dfrac{1}{2\lambda}$

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Now, Partially derivate by y,

$0+1+0-0-2y\lambda-0+0=0$

$\Rightarrow 2y\lambda = 1$

$\Rightarrow y = \frac{1}{2\lambda}$

$\Rightarrow y = \frac{1}{2\lambda}$

Now, Partially Derivate by z,

$0+0+2-0-0-2z\lambda+0=0$

$\Rightarrow 2z\lambda = 2$

$\Rightarrow z = \frac{1}{\lambda}$

Now, $x^2+y^2+z^2=5$

$\Rightarrow \left(\frac{1}{2\lambda}\right)^2+\left(\frac{1}{2\lambda}\right)^2+\left(\frac{1}{\lambda}\right)^2=5$

$\Rightarrow \frac{1}{4\lambda^2}+\frac{1}{4\lambda^2}+\frac{1}{\lambda^2}=5$

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$$\Rightarrow \frac{1+1+4}{4\lambda^2} = 5$$

$$\Rightarrow \frac{6}{4\lambda^2} = 5$$

$$\Rightarrow 20\lambda^2 = 6$$

$$\Rightarrow \lambda^2 = \frac{6}{20}$$

$$\Rightarrow \lambda = \pm\sqrt{\frac{6}{20}}$$

$$= \pm 0.54$$

When, $\lambda = 0.54$

$$x = \frac{1}{2\times 0.54}$$

$$= 0.92$$

$$y = \frac{1}{2\times 0.54}$$

$$= 0.92$$

$$z = \frac{1}{0.54}$$

$$= 1.85$$

When, $\lambda = -0.54$

$$x = \frac{1}{2\times(-0.54)}$$

$$= -0.92$$

$$y = \frac{1}{2\times(-0.54)}$$

$$= -0.92$$

$$z = \frac{1}{-0.54}$$

$$= -1.85$$

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Now,

$(x,y,z) = (0.92, 0.92, 1.85)$

$f(x,y,z) = 0.92 + 0.92 + 2(1.85)$

$= 5.54$ (Max)

and,

$(x,y,z) = (-0.92, -0.92, -1.85)$

$f(x,y,z) = (-0.92) + (-0.92) + 2(-1.85)$

$= -5.54$

So, the maximum value for $f(x,y,z) =$

5.54 (Max)

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Ans to the Que. No: 1(b)

Naive Bayes General Equation :

$$P(A|B) = \frac{P(B|A) * P(A)}{P(B)}$$

Here,

$P(A|B)$ = Posterior Probablity of class (a, target) given predictor (b, attributes)

$P(B)$ = $P(B)$ is the prior probablity of predictor.

$P(A)$ = $P(A)$ is the prior probablity of class

$P(B|A)$ = $P(B|A)$ is the likelihood which is the probablity of predictor given class.

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Ans to the Que. No: 2(a)

$$A(m,n) = \begin{cases} n+1, & \text{where } m=0 \\ A(m-1,1), & \text{where } n=0 \\ A(m-1, A(m,n-1)), & \text{otherwise} \end{cases}$$

here $n = 0+2 = 2$

$A(1,2) = A(1-1, A(1,2-1))$

$= A(0, A(1,1))$

$= A(0,3)$

$= 3+1$

$= 4$

$A(1,1) = A(1-1, A(1,1-1))$

$= A(0, A(1,0))$

$= A(0,2)$

$= 2+1$

$= 3$

$$A(1,0)$$
$$= A(1-1, 1)$$
$$= A(0, 1)$$
$$= 1+1$$
$$= 2$$

Ans to the Que. No: 2(b)

Expected value of getting "HEAD" from first coin toss.

$$E(H) = \frac{1}{2} \times 1 + \frac{1}{2}\left(E(H)+1\right)$$

$$\Rightarrow E(H) = \frac{1}{2} + \frac{1}{2}E(H) + \frac{1}{2}$$

$$\Rightarrow \frac{1}{2}E(H) = 1$$

$$\Rightarrow E(H) = 2$$

So, Expect Value is 2

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Ans to the Que. No: 4(a)

$$P(TTHT) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$$

$$E(TTHT) = \frac{1}{16} \times 4 + \frac{1}{16}(E(TTHT)+4) +$$

$$\frac{1}{8}(E(TTHT)+3) + \frac{1}{4}(E(TTHT)+2) +$$

$$\frac{1}{2}(E(TTHT)+1)$$

$$\Rightarrow E(TTHT) = \frac{1}{4} + \frac{E(TTHT)}{16} + \frac{1}{4} + \frac{E(TTHT)}{8}$$

$$+ \frac{3}{8} + \frac{E(TTHT)}{4} + \frac{1}{2} + \frac{E(TTHT)}{2} + \frac{1}{2}$$

$$\Rightarrow E(TTHT) = \frac{1}{4} + \frac{1}{4} + \frac{3}{8} + \frac{1}{2} + \frac{1}{2} + \frac{E(TTHT)}{16}$$

$$+ \frac{E(TTHT)}{8} + \frac{E(TTHT)}{4} + \frac{E(TTHT))}{2}$$

$$\Rightarrow E(TTHT) = \frac{2+2+3+4+4}{8} + \frac{E(TTHT) + 2E(TTHT) + 4E(TTHT) + 8E(TTHT)}{16}$$

$$\Rightarrow E(TTHT) = \frac{15}{8} + \frac{15\,E(TTHT)}{16}$$

$$\Rightarrow E(TTHT) - \frac{15E(TTHT)}{16} = \frac{15}{8}$$

$$\Rightarrow \frac{E(TTHT)}{16} = \frac{15}{8}$$

$$\Rightarrow E(TTHT) = 30$$

So, Expected value of $E(TTHT) = 30$

Ans to the Que No: 4(b)

Probablity measures how certain we are are a particular event will happen in a specific instance and Expected value represents the average outcome of a series of random events with identical adds being repeated over a long period of time. Expected valee give us the expected returns on a single event. and cannot related with ~~serveral~~ several events. Probablity of event can change, expected value also change.