ROLL NO. 102/03377

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	Predictive Analysis Assignment
100	Predictive Analysis Assignment Parameter Estimation
Q·1	Let (XI, X2) be a reandom sample of
)	size no taken yem a normal localation
	size n taken from a normal Population with parameters: mean = 01 & variance = 02.
	Find the maximum likelihood Estimates of these
	Turn 1040 motors.
* (. , \)	$-(2(i-u)^2/2)^2$
Sol:	$\frac{-(\pi i - \mu i)^2/2^{-2}}{\rho MF(\pi i)} = \frac{-(\pi i - \mu i)^2/2^{-2}}{\sqrt{2\pi\sigma^2}}$
	270-2
t	Leve 11 = 01
10	Avre $\mu = 01$ $\sigma^2 = 02$
*	
11- 4	$f(xi \theta_1,\theta_2) = \frac{-(xi-\theta_1)^2/2\theta_2}{\sqrt{2\pi\theta_1}}$
	$\sqrt{2\pi\theta}$
	1 1 1 2
	Now likelihood junction
	Now likelihood junction
	(Ni=1) (St ()) () ()
	$-(2i-01)^2/20$
	= 1 e (1) 202
	i=1 J270 1110 200
	$M_{1} = M_{2} = M_{2} = M_{3} = M_{3$
	$L(\theta_{1},\theta_{2}) = \pi(\theta)^{-1/2} \pi(2\pi)^{-1/2} \pi e^{-(x_{i}-\theta_{i})^{2}/2\theta_{2}}$ $L(\theta_{1},\theta_{2}) = \pi(\theta)^{-1/2} \pi(2\pi)^{-1/2} \pi e^{-(x_{i}-\theta_{i})^{2}/2\theta_{2}}$ $L(\theta_{1},\theta_{2}) = \pi(\theta)^{-1/2} \pi(2\pi)^{-1/2} \pi e^{-(x_{i}-\theta_{i})^{2}/2\theta_{2}}$
	i=1 $i=1$ $i=1$

$$L(\theta_1, \theta_2) = \left(\frac{\theta_1}{2}\right)^{-n/2} \left(2\pi\right)^{-n/2} e^{\left(\frac{\pi}{2}\right)^2 \left(2\theta_2\right)^2}$$

$$L(\theta_{1},\theta_{2}) = \frac{\theta_{2}^{-M_{2}}}{2} (2\pi)^{-M_{2}} e^{\frac{1}{2}\theta_{2}} \sum_{i=1}^{M} (\chi_{i} - \theta_{1})^{2}$$

taking log on both sides.

ln L
$$(\theta_1, \theta_2)$$
 = ln $\left[\frac{\theta_2^{-N/2}}{2}(2\pi)^{-N/2}e^{\frac{2}{2}\theta_2}i^2\right]$

$$= \ln \left(\theta_{2} \right)^{-n/2} + \ln \left(2\pi \right)^{-n/2} + \ln \left(e^{\frac{\pi}{2}} \right)^{-n/2}$$

$$\ln L(\theta_1, \theta_2) = -n \ln \theta_2 - n \ln 2\pi - 1 + (x_i - \theta_i)^2 - 1$$

now, offerentiating both sides w. s.t D.

$$\frac{\partial L(\theta_1, \theta_2)}{\partial \theta_1} = \frac{1}{\theta_2} \frac{\mathcal{E}(\chi_1 - \theta_1)}{i=1}$$

$$\partial \theta_1$$
 θ_2 $i=1$

now, $\frac{\partial L(0_1,0_2)}{\partial 0_1} = 0$ hence, $\frac{1}{0_2} \stackrel{\text{Z}}{i=1} (\chi_i - 0_1) = 0$

$$(|\theta_2)(2x_1-n\theta_1)=0$$

 $\frac{2}{2} x - n\theta = 0$

$$\theta_1 = \overline{\chi}_m$$

$$\theta_1 = \overline{\chi}_n$$

Difference tiating O w. r. t 2

 $\frac{\partial L(\theta_1, \theta_2)}{\partial \theta_2} = \frac{n}{2\theta_2} - \frac{1}{2(\theta_2)^2} = \frac{n}{i} \left(\frac{1}{2(\theta_1)^2}\right)^2$

Since 21(01,02) =0

 $\frac{-n-1}{3\theta_{2}} = \frac{n}{2\theta_{2}} \frac{1}{2\theta_{2}} = 0$

 $\frac{1}{2\theta^2} \stackrel{\text{Z}}{\stackrel{\text{Z}}{=}} \left(\frac{2i - \theta_1}{2} \right)^2 = -n$

 $\theta_2 = \frac{1}{2} \left(\frac{1}{2} \left(\frac{1}{2} - \frac{1}{2} \right)^2 \right)$

from 2: $0_2 = 1 \times (x_i - \overline{x}_n)^2$ MLE n = i = 1

0.2	Let X1 X2 Xn be a random sample from
	Let $X_1, X_2 X_n$ be a random sample from $B(m, \theta)$ distribution, where $\theta \in (0, 1)$ is unknown and 'm' is a known positive integer. Compute value of θ using MLE.
	unknowers and 'm' is a known topsitive
	items for the sales of Alding MIE.
	iniger. compare value of
101.	Profit in the distribution of the distribution
Sol.	$PMF(x_i) = {}^{n}C_{x_i} p^{x_i} (1-p)^{n-x_i}$
	\$
	here $n=m$, $p=0$
	$P(x_i m, \theta) = {}^{m}C_{\alpha_i} \theta^{\chi_i} (1-\theta)^{m-\chi_i}$
<u> </u>	for likelihood sunction
	for likelihood function,
	$L(l) = \pi P(x_i m, \theta)$
	1=1
	M
	$= \frac{\pi}{1} \left(\frac{mC}{2i} \frac{n^2i}{(1-0)^{m-1}i} \right)$
	$\lambda=1$ λ_i
	1
	m n di m m-di
	- 1 C 7 C 7 (1-0)
	131 CL 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	$n \in \mathcal{B}_{\mathcal{X}}$ $\in (m-\chi_i)$
	$= 7 \cdot (-9)^{1-1}$
	le l'i
	$n \in \mathcal{X}; nm - \in \mathcal{X};$
	$= \pi m_{C_{X}} = 0$ $i=1$ $(1-0)$ $i=1$
	i=1 /i
	1 4 6 2 - 1 - 1 - 1 - 1
	18 3 10 2 14

Taking ln on both sides, $n - 2 \times i$ $\ln L(l) = \ln \left(\frac{\pi}{l} \times i \right) = 1$ $\lim_{i \to l} \left(\frac{1-\theta}{l} \right)$ $= \ln \left(\frac{\pi}{1} \, m_{\alpha_i} \right) + \ln \left(0^{\frac{2}{i-1}} \right) + \ln \left(\frac{\pi}{1-0} \right)$ Differentiating w.r.t. 0 $\frac{\partial L(l)}{\partial \theta} = \int_{0}^{\infty} \frac{2}{i^{-1}} \chi_{i} + \left(-\frac{1}{1-\rho}\right) \left(nm - \frac{2}{2}\chi_{i}\right)$ $= 1 \leq 2i - 1 \quad (nm - \leq 2i)$ $= 1 \leq 2i - 1 \quad (nm - \leq 2i)$ $\frac{30}{1 \stackrel{?}{\approx} x_i - 1 (nm - 2 x_i) = 0}{1 - 0 \quad i = 1}$ $\int \frac{2}{2} x_i = \int \frac{nm - 2x_i}{1-A}$ 1-0 = nm - 2 xi

· \	_/_/
	nm -1=1-1
	7≥ χ. 0 i=1
	$i=1$ $Q = 22 \times 1$
17.5	$0 = \frac{2}{2} \times i$ $i=1 \text{ nm}$
1-0	A-17/1-12 (1 1 2 1) In the Contract of the Co
	$\theta = \overline{\chi}n$ m
(1) S =	$\theta \in (0,1) = \overline{\chi_n}$
	$MLE \qquad m$
	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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