|22022010 Shrayank Mistry (T2)

| (3.1) | x | 1 | 2 | 3 | 4 | 5 |
| y | 1 | 5 | 3 | 4 | 2 |

mean (a) = (1+2+3+4+5)	5	15	5	2
mean (y) = (1+5+3+4+2)	5	15	5	2
mean (y) = (1+5+3+4+2)	5	15	5	2
mean vector (4) =				
$$\begin{bmatrix} 3 \\ 3 \end{bmatrix}$$

| Subtracting mean vector from features

| 1 | - 3 | = -2 | 4 | -3 | 2 |
| 1 | 2 | -2 | 2 | 3 | -1 |

| 2 | -3 | 2 | -2 | 3 | 2 |
| 5 | 3 | 2 | 2 | 3 | -1 |

| Covasiana matera

| m<sub>1</sub> =  $\begin{bmatrix} -2 \\ 2 \end{bmatrix} \times \begin{bmatrix} -1 \\ 2 \end{bmatrix} = \begin{bmatrix} 4 \\ 4 \end{bmatrix} \times \begin{bmatrix} 1 \\ 4 \end{bmatrix} = \begin{bmatrix} 1 \\ 4 \end{bmatrix}$ 

| m<sub>2</sub> =  $\begin{bmatrix} -1 \\ 2 \end{bmatrix} \times \begin{bmatrix} -1 \\ 2 \end{bmatrix} = \begin{bmatrix} 1 \\ 4 \end{bmatrix}$ 

| m<sub>3</sub> =  $\begin{bmatrix} 0 \\ 0 \end{bmatrix} \times \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ 

| m<sub>4</sub> =  $\begin{bmatrix} 0 \\ 0 \end{bmatrix} \times \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ 

| m<sub>4</sub> =  $\begin{bmatrix} 0 \\ 0 \end{bmatrix} \times \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ 

$$m_5 = \begin{bmatrix} 2 \\ -1 \end{bmatrix} \times \begin{bmatrix} 2 \\ -1 \end{bmatrix} = \begin{bmatrix} 4 \\ -2 \end{bmatrix}$$

## Calculate eigen value and eigen vectors

$$\begin{bmatrix} 2 & 0.2 \\ 0.2 & 2 \end{bmatrix} - \begin{vmatrix} \lambda & 0 \\ 0 & \lambda \end{vmatrix} = 0$$

$$2-\lambda$$
 0.2 = 0  $\frac{2-4\lambda+4=0.94}{1^2-4\lambda+3.96=0}$ 

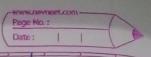
$$(2-1)^2 - (0.2)^2 = 0$$
 roots are  $(2.2, 1.8)$   
 $\lambda_1 = 2.2, \lambda_2 = 1.8$ 

## (eigen vector)

$$\begin{bmatrix} 2 & 0.2 \\ 0.2 & 2 \end{bmatrix} \begin{bmatrix} \chi_1 \\ \chi_2 \end{bmatrix} = 2.2 \begin{bmatrix} \chi_1 \\ \chi_2 \end{bmatrix}$$

$$2x_1 + 6.2x_2 = 2.2x_1 - (1)$$
  
 $0.2x_1 + 2x_2 = 2.2x_2 - (2)$ 

$$0.2\alpha_{2} = 0.2\alpha_{1}$$
  $\alpha_{1} = 0.2\alpha_{2}$   $\alpha_{1} = \alpha_{2}$   $\alpha_{2} = 1$ 



The second second											
(Q.2)	A	T	T	T	T	F	T	T	T	T	T
	B	T	T	F	SI	P	Ŧ	T	R	F	T
	Clars	+	+	-	+	_	-	_	_	+	+

AZT	A <sub>2</sub> F	1 01		B 2 T	B 2 F	
5	0	01+1	C	4		+
3	2	-			4	_

Entropy (orgi) = 
$$-0.5 | og 0.5 - 0.5 | og 0.5$$
  
 $2-0.5 \times -1.0 - 0.5 \times -1.0$   
 $20.5 + 0.5$ 

Information gain split on A

$$E_{A2T} = -(5/8)\log(5/8) - (3/8)\log(3/8)$$

$$= -0.625 \times -0.67 - (0.375) \times -1.41$$

$$= 0.41875 + 0.52875$$

$$= 0.9475$$

Gain<sub>A</sub>= 
$$1-(8|10)\times0.9475-(2|10)\times0$$
  
= 0.242

Information gain on B

$$EB = -(4/5) | og (4/5) - (1/5) | og (1/5)$$

$$= -0.8 \times -0.32 | -0.2 \times -2.32 |$$

$$= 20.2568 + 0.4642$$

$$= 20.72 |$$

$$E_{B=P} = -(1/5)\log(1/5) - (4/5)\log(4/5)$$

$$= 0.721$$

$$G_{A}=T=1-(5|8)^{2}-(3|8)^{2}=0.46875$$
 $G_{A}=P=1-(0/2)^{2}-(2|2)^{2}=0$