TUTORIAL - 3
DMWA

Shashank A
19104018, B-11

Q.1 no of elements : 24

Size of each bin = 24/4 = 6

Bin 1 : { 11, 13, 13, 15, 15, 16 }

Bin 2 : { 19, 20, 20, 20, 21, 21, ~~22~~ }

Bin 3 : { 23, 24, 30, 40, 45, ~~45~~ 22 45 }

Bin 4 : { 45, 45, 71, 72, 73, 75, }

> Smoothing by Bin means:

mean(Bin 1) = 13.83

Bin 1 : { 13.83, 13.83, 13.83, 13.83, 13.83, 13.83 }

mean (Bin 2) = 20.167

mean (Bin 3) = 30.67

mean (Bin 4) = 63.5

> ~~Equi depth method~~ bin boundary

Bin 1 : { 11, 11, 11, 16, 16, 16 }

Bin 2 : { 19, 19, 19, 19, 21, 21 }

Bin 3 : { 22, 22, 22, 22, 45, 45 }

Bin 4 : { 45, 45, 75, 75, 75, 75 }

Q.2

60	25	14	99
66	32	9	107
127	40	8	175
253	97	31	381

~~ii)~~ expected table :

~~65.53~~, ~~15.59~~
~~18.53~~
~~58.23~~

65.74	25.2	8.05
71.05	27.24	8.70
116.20	44.55	14.23

$$\chi^2 = \frac{(60-65.75)^2}{65.75} + \frac{(25-25.2)^2}{25.2} + \cdots$$

$$= \frac{(5.74)^2}{65.74} + \frac{(0.2)^2}{25.2} + \frac{(5.95)^2}{8.05} +$$

$$\frac{(5.05)^2}{71.05} + \frac{(4.76)^2}{27.24} + \frac{(0.3)^2}{8.7} +$$

$$\frac{(10.8)^2}{116.2} + \frac{(4.55)^2}{44.55} + \frac{(6.23)^2}{14.23}$$

$$= 0.476 + 0.002 + 4.398 +$$

$$0.359 + 0.832 + 0.010 +$$

$$1.004 + 0.465 + 2.728.$$

$$= \boxed{10.274}$$

10.274 > 9.488 (H_0) hypothesis is rejected.

$\therefore$ $H_0 \rightarrow$ independent, H_1 is accepted $\therefore$ corelation exists.

Q3 Threshold = 0.9

	A	B	C	$A-\bar{A}$	$B-\bar{B}$	$C-\bar{C}$
	0	2	2	-6	-3.4	-4.6
	14	6	11	8	0.6	5.6
	1	8	3	-5	2.6	-3.6
	10	5	13	4	-0.4	7.6
	5	6	4	-1	0.6	-2.6
Mean	6	5.4	6.6			

$$r_{AC} = \frac{\Sigma (x-\bar{x})(y-\bar{y})}{\left(\Sigma (x-\bar{x})^2 \Sigma (y-\bar{y})^2\right)^{1/2}} = \frac{123.4}{(142 \times 130)^{1/2}} = 0.91$$

$$r_{BC} = \frac{\Sigma (B-\bar{B})(C-\bar{C})}{\left(\Sigma (B-\bar{B})^2 \Sigma (C-\bar{C})^2\right)^{1/2}} = \frac{5.04}{(19.2 \times 130)^{1/2}} = 0.1$$

$$r_{AB} = \frac{\Sigma (A-\bar{A})(B-\bar{B})}{\left(\Sigma (B-\bar{B})^2 \Sigma (C-\bar{C})^2\right)^{1/2}} = \frac{10}{(19.2 \times 142)^{1/2}} = 0.19$$

5. 200, 400, 800, 1000, 2000, 2200

(a) $V' = \frac{200-200}{2200-200}(100-0) + 0 = 0$

(b) $\mu = 1100$ $\quad \sigma = \left(\frac{1}{5}\left(900^2 + 700^2 + 300^2 + 100^2 + 900^2 + 100^2\right)\right)^{1/2}$

$= (68400)^{1/2} = 827.04$

$$V' = \frac{200-1100}{827.04} = -1.088$$

(c) $V' = \frac{200}{10000} = 0.02$

6 $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$

$A - \lambda I = 0$

$\begin{bmatrix} -\lambda & 1 \\ -2 & -3-\lambda \end{bmatrix} = 0$

$\Rightarrow \lambda^2 + 3\lambda + 2 = 0$

$\Rightarrow \lambda = -1, -2$

for $\lambda = -1$, $\begin{bmatrix} 1 & 1 \\ -2 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$

$\left.\begin{aligned} &\Rightarrow x + y = 0 \\ &\Rightarrow -2x - 2y = 0 \end{aligned}\right\} x = -y$

So, Eigen Vector $= \begin{bmatrix} 1 \\ -1 \end{bmatrix}$

for $\lambda = -2$,

$\begin{bmatrix} 2 & 1 \\ -2 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = 0$

$\left.\begin{aligned} \Rightarrow 2x + y &= 0 \\ -2x - y &= 0 \end{aligned}\right\} x = -y/2$

Eigen Vector $= \begin{bmatrix} 1 \\ -1/2 \end{bmatrix}$