Names: Ian Chen

Group Average

Proximity between two clusters is the average pairwise distance between all pairs of points in the two clusters

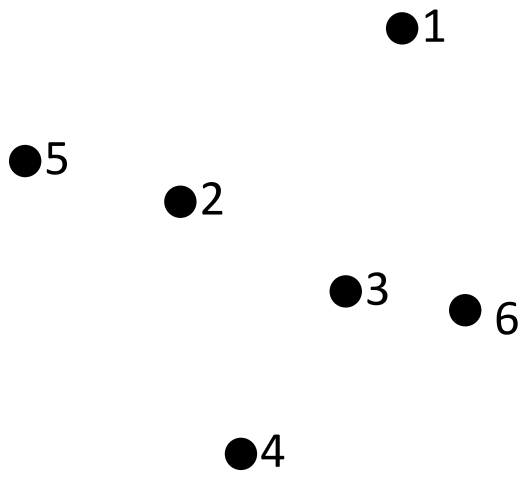
Point	x Coordinate	y Coordinate
p1	0.40	0.53
p2	0.22	0.38
p3	0.35	0.32
p4	0.26	0.19
p5	0.08	0.41
p6	0.45	0.30

Table 8.3. xy coordinates of 6 points.

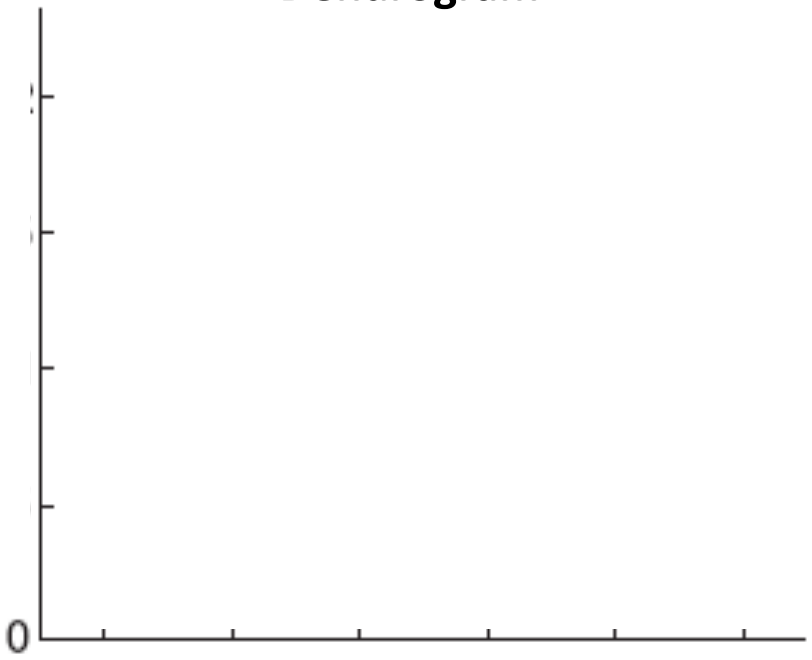
	p1	p2	p3	p4	p5	p6
p1	0.00	0.24	0.22	0.37	0.34	0.23
p2	0.24	0.00	0.15	0.20	0.14	0.25
p3	0.22	0.15	0.00	0.15	0.28	0.11
p4	0.37	0.20	0.15	0.00	0.29	0.22
p5	0.34	0.14	0.28	0.29	0.00	0.39
p6	0.23	0.25	0.11	0.22	0.39	0.00

Table 8.4. Euclidean distance matrix for 6 points.

Nested cluster diagram



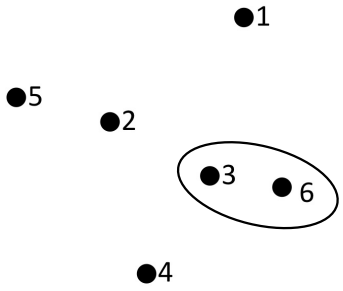
Dendrogram



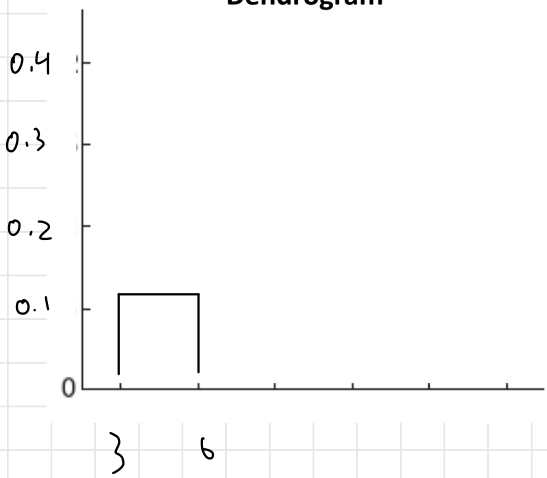
	p1	p2	p3	p4	p5	p6
p1	0	0.24	0.22	0.37	0.34	0.23
p2		0	0.15	0.20	0.14	0.25
p3			0	0.15	0.28	0.11
p4				0	0.29	0.22
p5					0	0.39
p6						0

p3-p6 is the closest with distance 0.11

Nested cluster diagram



Dendrogram



	p1	p2	{p3,p6}	p4	p5
p1	0	0.24	0.225	0.37	0.34
p2		0	0.20	0.20	0.14
{p3,p6}			0	0.185	0.335
p4				0	0.29
p5					0

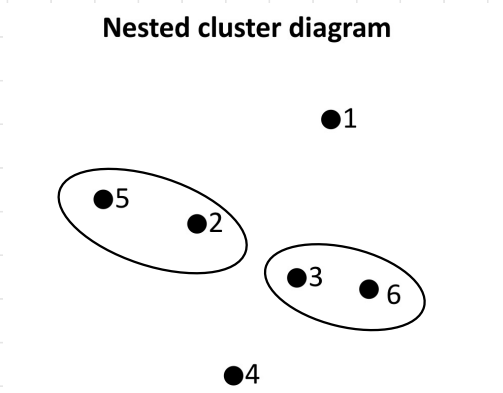
$((p1-p3)+(p1-p6))/2$
$=(0.22+0.23)/2=0.225$

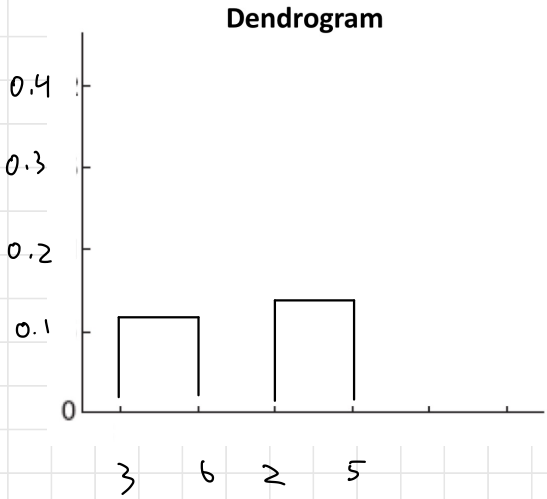
$((p2-p3)+(p2-p6))/2$
$=(0.15+0.25)/2=0.2$

$((p4-p3)+(p4-p6))/2$
$=(0.15+0.22)/2=0.185$

$((p5-p3)+(p5-p6))/2$
$=(0.28+0.39)/2=0.335$

Closest is p2 – p5 with distance 0.14





	p1	{p2,p5}	{p3,p6}	p4
p1	0	0.24	0.22	0.37
{p2,p5}		0	0.15	0.20
{p3,p6}			0	0.15
p4				0

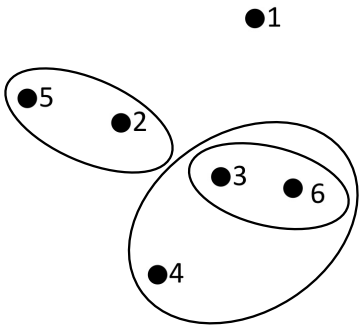
$((p1-p2)+(p1-p5))/2$
$=(0.24+0.34)/2=0.29$

$((p2-p3)+(p2-p6)+(p5-p3)+(p5-p6))/4$
$=(0.15+0.25+0.28+0.39)/4=0.2675$

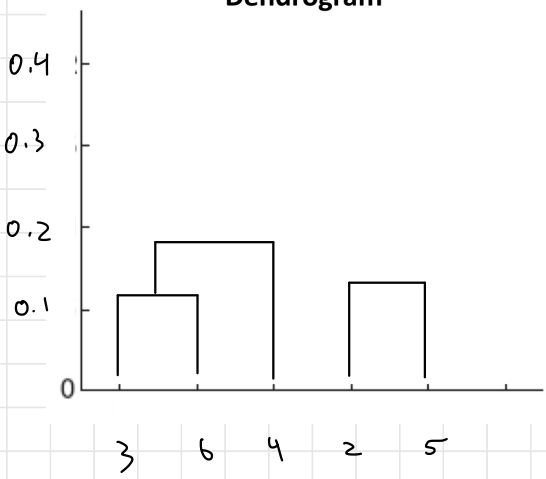
$((p4-p2)+(p4-p5))/2$
$=(0.20+0.29)/2=0.245$

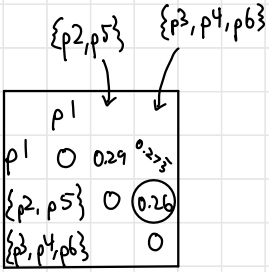
Closest is $\{p3,p6\}-p4$
with distance 0.185

Nested cluster diagram

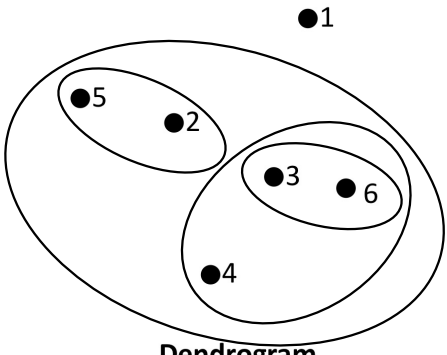


Dendrogram

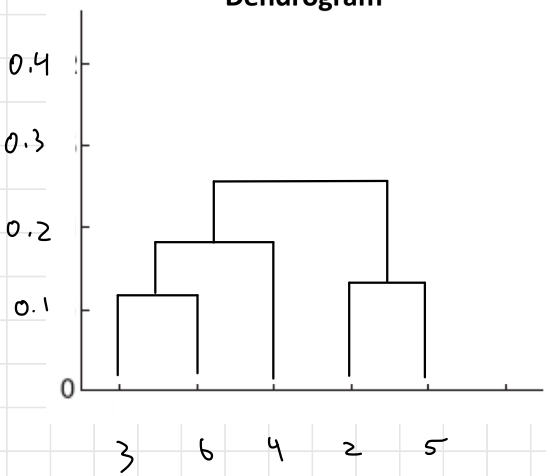




Nested cluster diagram



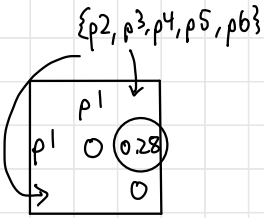
Dendrogram

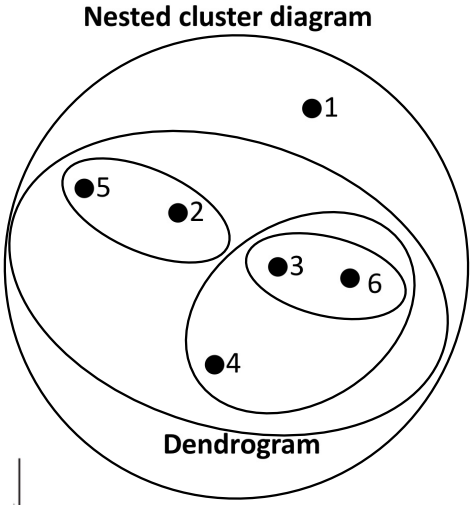


$((p1-p3)+(p1-p4)+(p1-p6))/3$
$=(0.22+0.37+0.23)/3=0.27\bar{3}$

$((p2-p3)+(p2-p4)+(p2-p6)+(p5-p3)+$
$(p5-p4)+(p5-p6))/6$
$=(0.15+0.20+0.25+0.28+0.29+0.39)/6=0.26$

Closest is $\{p2,p5\}-\{p3,p4,p6\}$
with distance 0.26

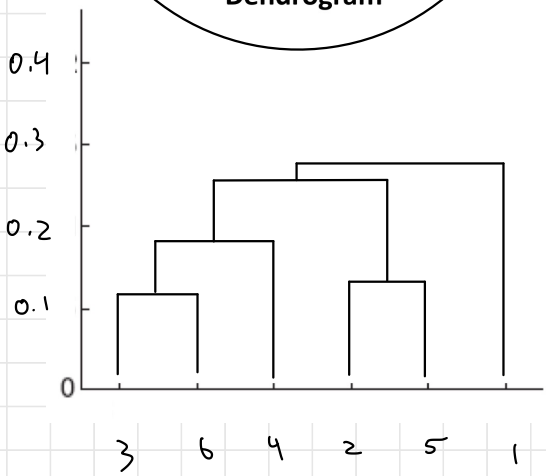




$$((p1-p2)+(p1-p3)+(p1-p4)+(p1-p5)+(p1-p6))/5$$
$$=(0.24+0.22+0.37+0.34+0.23)/5 = 0.28$$

Closest is $p1 - \{p2, p3, p4, p5, p6\}$

with distance 0.28



Names: Ian Chen

Centroid Method

Proximity between two clusters is the distance between their centroids

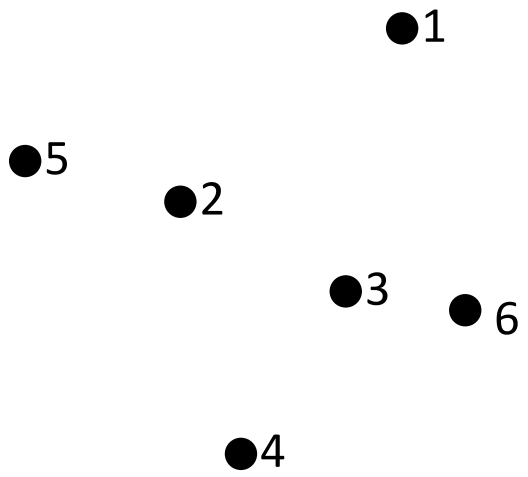
Point	x Coordinate	y Coordinate
p1	0.40	0.53
p2	0.22	0.38
p3	0.35	0.32
p4	0.26	0.19
p5	0.08	0.41
p6	0.45	0.30

Table 8.3. xy coordinates of 6 points.

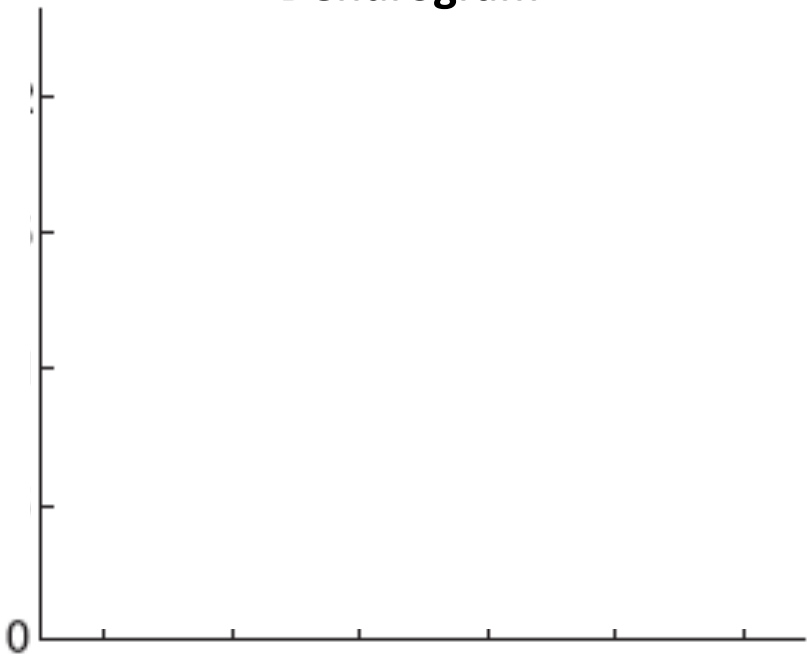
	p1	p2	p3	p4	p5	p6
p1	0.00	0.24	0.22	0.37	0.34	0.23
p2	0.24	0.00	0.15	0.20	0.14	0.25
p3	0.22	0.15	0.00	0.15	0.28	0.11
p4	0.37	0.20	0.15	0.00	0.29	0.22
p5	0.34	0.14	0.28	0.29	0.00	0.39
p6	0.23	0.25	0.11	0.22	0.39	0.00

Table 8.4. Euclidean distance matrix for 6 points.

Nested cluster diagram



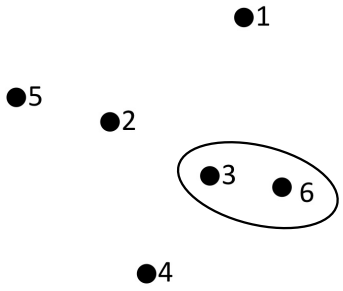
Dendrogram



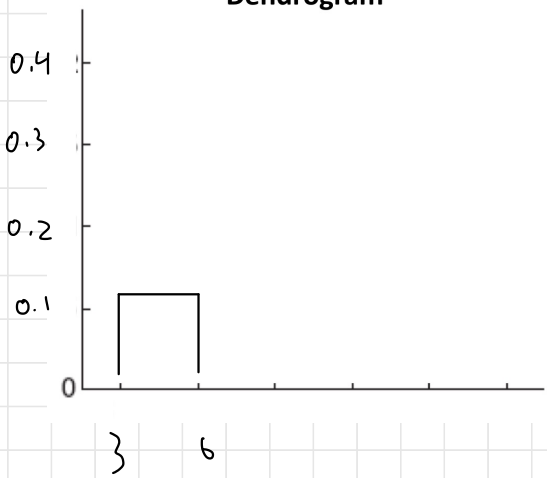
	p1	p2	p3	p4	p5	p6
p1	0	0.24	0.22	0.37	0.34	0.23
p2		0	0.15	0.20	0.14	0.25
p3			0	0.15	0.28	0.11
p4				0	0.29	0.22
p5					0	0.39
p6						0

p3-p6 is the closest with distance 0.11

Nested cluster diagram



Dendrogram



$\{p3, p6\}: \frac{p3+p6}{2} = \frac{(0.35+0.45, 0.32+0.30)}{2}$

$= (0.40, 0.31)$

	p1	p2	p4	p5
p1	0	0.24	0.22	0.34
p2		0	0.19	0.20
{p3, p6}			0.18	0.34
p4			0	0.29
p5				0

$\sqrt{(p1-\{p3,p6\})^2}$

$\Rightarrow \sqrt{(0.40-0.40)^2 + (0.53-0.31)^2} = 0.22$

$\sqrt{(p2-\{p3,p6\})^2}$

$\Rightarrow \sqrt{(0.22-0.40)^2 + (0.38-0.31)^2} = 0.19$

$\sqrt{(p4-\{p3,p6\})^2}$

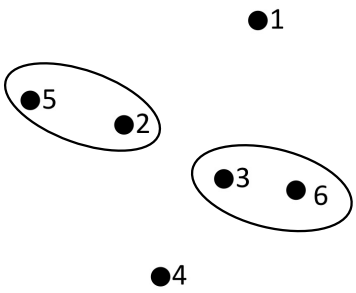
$\Rightarrow \sqrt{(0.26-0.40)^2 + (0.19-0.31)^2} = 0.18$

$\sqrt{(p5-\{p3,p6\})^2}$

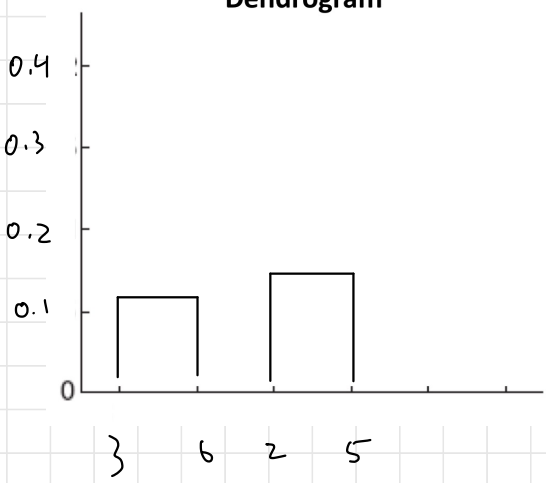
$\Rightarrow \sqrt{(0.08-0.40)^2 + (0.41-0.31)^2} = 0.34$

p2 - p5 is the closest with distance 0.14

Nested cluster diagram



Dendrogram



$\{p2,p5\}$ $\{p3,p6\}$: (0.40, 0.31)

	p1		p4
p1	0	0.28	0.22	0.37
$\{p2,p5\}$	0	0.26	0.23
$\{p3,p6\}$		0	(0.18)
p4			0

$\{p2,p5\}$: $\frac{p2+p5}{2}$

$\frac{(0.22+0.08,\ 0.38+0.41)}{2}$

$= (0.15, 0.395)$

$\sqrt{(p1-\{p2,p5\})^2}$

$\Rightarrow \sqrt{(0.40-0.15)^2 + (0.53-0.395)^2} = 0.28$

$\sqrt{(\{p3,p6\}-\{p2,p5\})^2}$

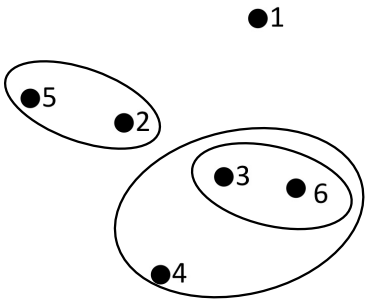
$\Rightarrow \sqrt{(0.40-0.15)^2 + (0.31-0.395)^2} = 0.26$

$\sqrt{(p4-\{p2,p5\})^2}$

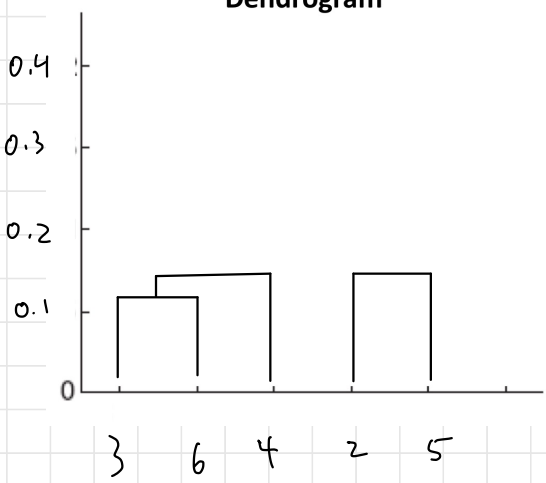
$\Rightarrow \sqrt{(0.26-0.15)^2 + (0.19-0.395)^2} = 0.23$

p4 – {p3, p6} is the closest with distance 0.18

Nested cluster diagram



Dendrogram



$\{p2,p5\}$: (0.15, 0.395)

$\{p3,p4,p6\}$:

$$\frac{(0.35+0.26+0.45,\ 0.32+0.19+0.30)}{3}$$

$$= (0.35\overline{3}, 0.27)$$

	p1	$\{p2,p5\}$	$\{p3,p4,p6\}$
p1	0	0.28	0.26
$\{p2,p5\}$	0	0.24	
$\{p3,p4,p6\}$	0		

$$\sqrt{(p1-\{p3,p4,p6\})^2}$$

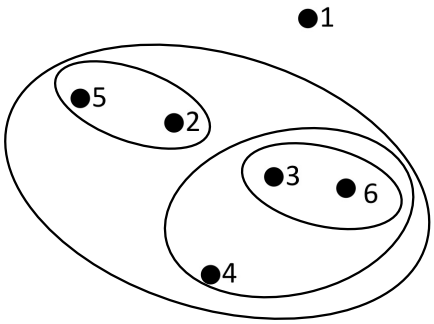
$$\Rightarrow \sqrt{(0.40-0.35\overline{3})^2+(0.53-0.27)^2} = 0.26$$

$$\sqrt{(\{p2,p5\}-\{p3,p4,p6\})^2}$$

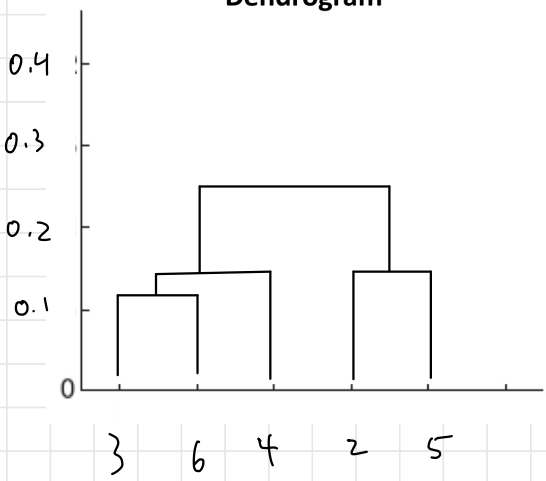
$$\Rightarrow \sqrt{(0.15-0.35\overline{3})^2+(0.395-0.27)^2} = 0.24$$

$\{p2,p5\}$ – $\{p3,p4,p6\}$ is the closest with distance 0.24

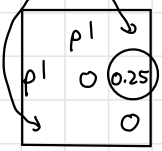
Nested cluster diagram



Dendrogram



$\{p^2, p^3, p^4, p^5, p^6\}$:



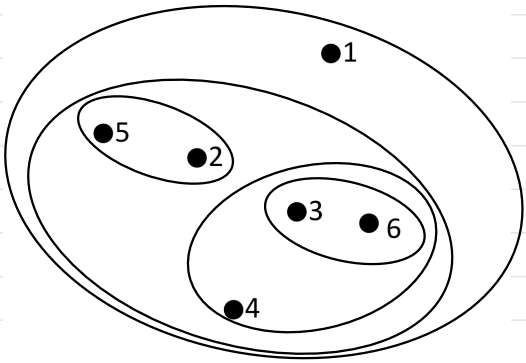
$(0.22+0.35+0.26+0.08+0.45,$
$0.38+0.32+0.19+0.41+0.30)$
$\frac{}{5}$
$= (0.272, 0.32)$

$\sqrt{(p1-\{p2,p3,p4,p5,p6\})^2}$

$\Rightarrow \sqrt{(0.40-0.272)^2+(0.53-0.32)^2} = 0.25$

$p1 - \{p2, p3, p4, p5, p6\}$ is the closest with distance 0.25

Nested cluster diagram



Dendrogram