Agglomerative hierarchical clustering: calculation example

id	x_1	x_2
d1	2	1
d2	-3	8
d3	0	10
d4	3	2
d5	-2	8
d6	3	0
d7	4	0
d8	-2	6
d9	-3	9
d10	6	1

Step1: Create each datapoint as a single cluster.

	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10
d1		8.60	9.21	1.41	8.06	1.41	2.23	6.40	9.43	4
d2			3.60	8.48	1	10	10.63	2.23	1	11.40
d3				8.54	2.82	10.44	10.77	4.47	3.16	10.81
d4					7.81	2	2.23	6.64	9.21	3.16
d5						9.43	10	2	1.41	10.6
d6							1	7.81	10.81	3.16
d7								8.48	11.40	2.23
d8									3.16	9.43
d9										12.04
d10										

Step3: Repeat Step2 until only one cluster left.

Step2 (ครั้งที่1): Take 2 closet datapoints or clusters and merge them to form one cluster.

Apply single linkage $\Rightarrow$ distance = 1

$\{d_2, d_5\}$

Step2 (ครั้งที่2): Take 2 closet datapoints or clusters and merge them to form one cluster.

Apply single linkage $\Rightarrow$ distance = 1

$$\{\{d_2, d_5\}, d_9\}$$

Step2 (ครั้งที่3): Take 2 closet datapoints or clusters and merge them to form one cluster.

Apply single linkage $\Rightarrow$ distance = 1

$$\{d_6, d_7\}$$

Step2 (ครั้งที่4): Take 2 closet datapoints or clusters and merge them to form one cluster.

Apply single linkage $\Rightarrow$ distance = 1.41

$$\{d_1, d_4\}$$

Step2 (ครั้งที่5): Take 2 closet datapoints or clusters and merge them to form one cluster.

Apply single linkage $\Rightarrow$ distance = 1.41

$$\{\{d_1, d_4\}, \{d_6, d_7\}\}$$

Step2 (ครั้งที่6): Take 2 closet datapoints or clusters and merge them to form one cluster.

Apply single linkage $\Rightarrow$ distance = 2

$$\{\{\{d_2, d_5\}, d_9\}, d_8\}$$

Step2 (ครั้งที่7): Take 2 closet datapoints or clusters and merge them to form one cluster.

Apply single linkage $\Rightarrow$ distance = 2.23

$$\{\{\{d_1, d_4\}, \{d_6, d_7\}\}, d_{10}\}$$

Step2 (ครั้งที่8): Take 2 closet datapoints or clusters and merge them to form one cluster.

Apply single linkage $\Rightarrow$ distance = 2.82

$$\{\{\{\{d_2, d_5\}, d_9\}, d_8\}, d_5\}$$

Step2 (ครั้งที่9): Take 2 closet datapoints or clusters and merge them to form one cluster.

Apply single linkage $\Rightarrow$ distance = 6.40

"one cluster"

Step4: Develop the dendrogram to divide the clusters เหมือน/ต่าง

Hierarchical Clustering Dendrogram