

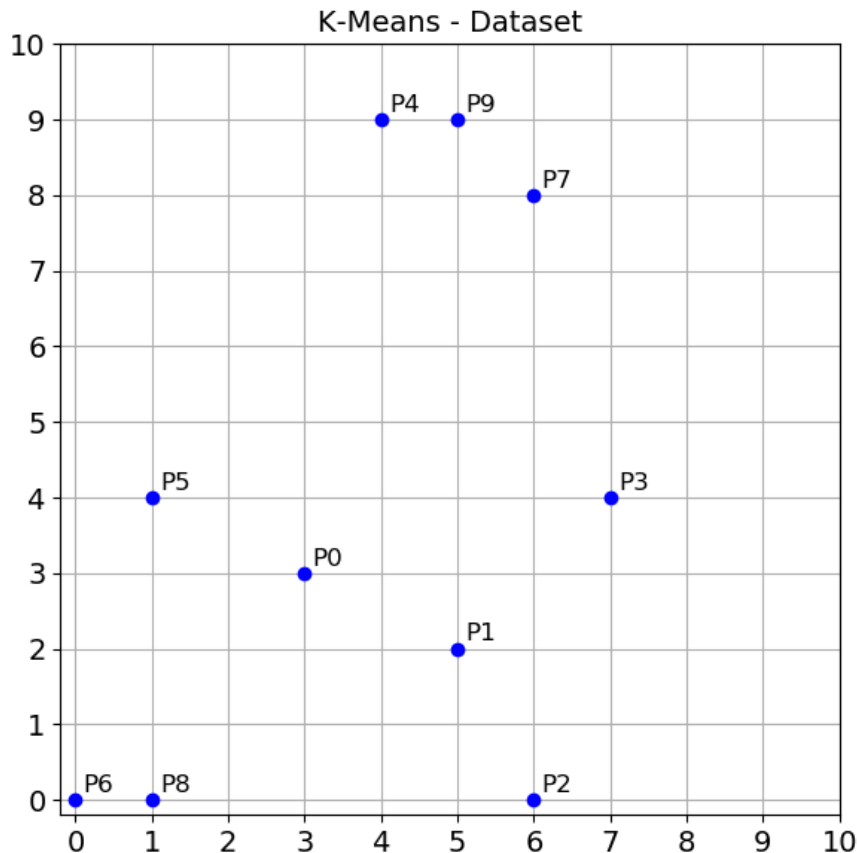
Ex. Clustering

K-means simulation

Initial centroids:

C1 = P1=(5,2)

C2 = P5=(1,4)



Solution: Identify the Bisecting lines dividing the plane between pairs of centroids

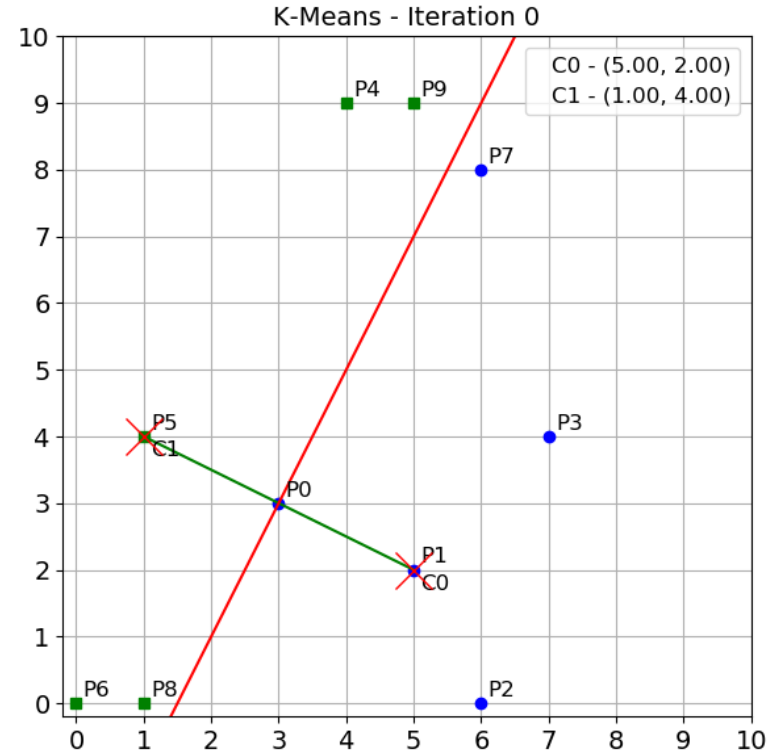
Cluster 1: P0,P1,P2,P3,P7

Cluster 2: P5,P4,P6,P8,P9

Centrod1:

C1= (5.40, 3.40)

C2= (2.20, 4.40)



Solution: Identify the Bisecting lines dividing the plane between pairs of centroids

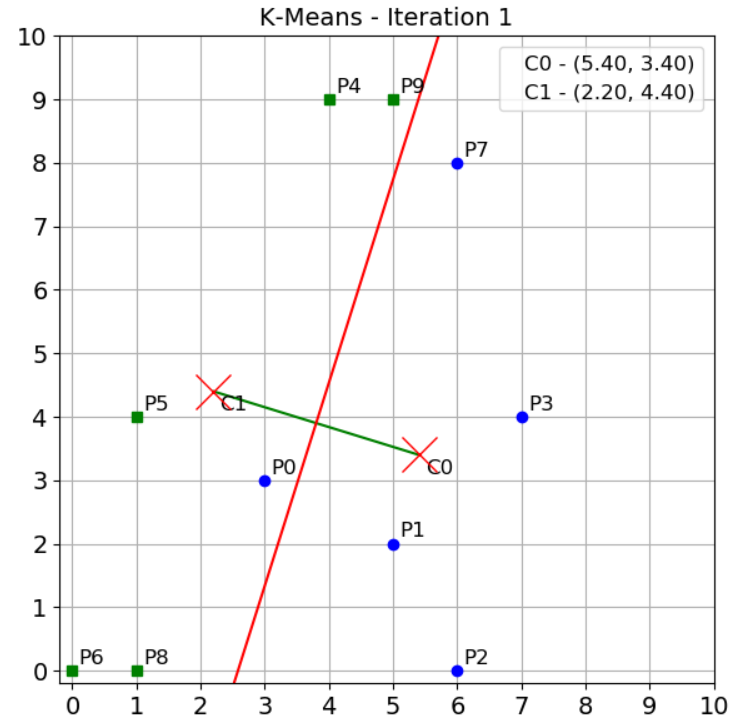
Cluster 1: P1,P2,P3,P7

Cluster 2: P5,P4,P6,P8,P9,P0

Centrod1:

C1= (6.00, 3.50)

C2= (2.33, 4.17)

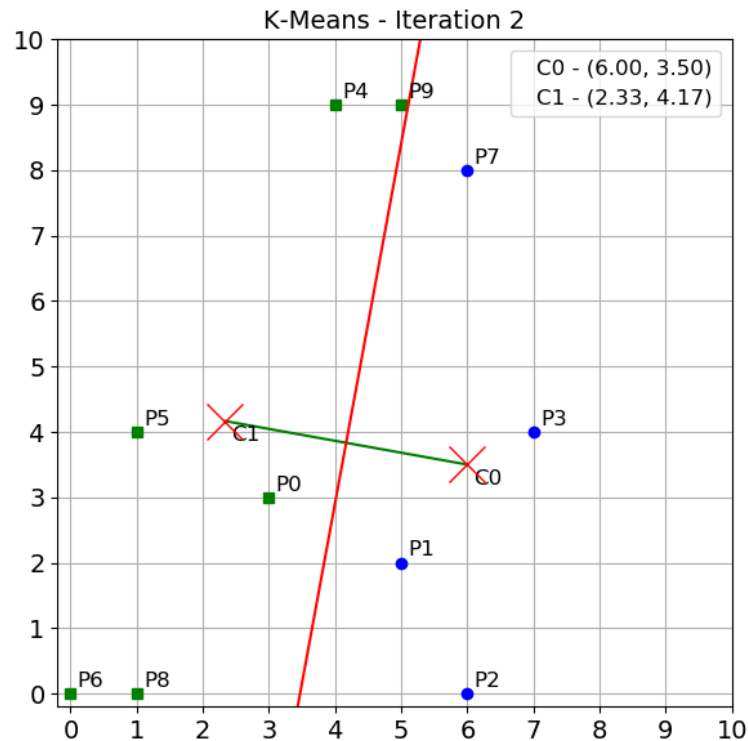


Solution: Identify the Bisecting lines dividing the plane between pairs of centroids

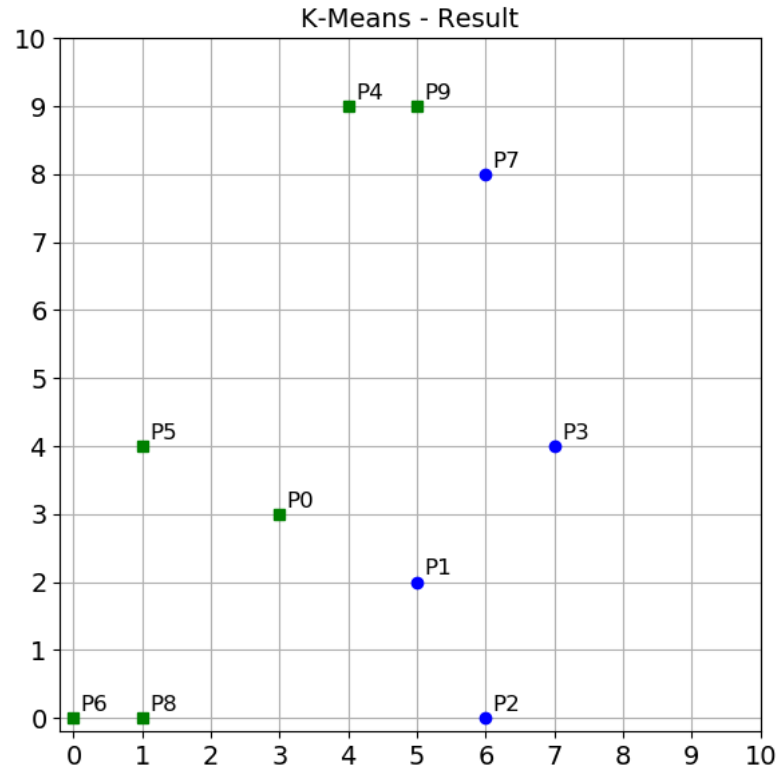
Cluster 1: P1,P2,P3,P7

Cluster 2: P5,P4,P6,P8,P9,P0

**The cluster composition does not change,
so K-means stops**



K-means result

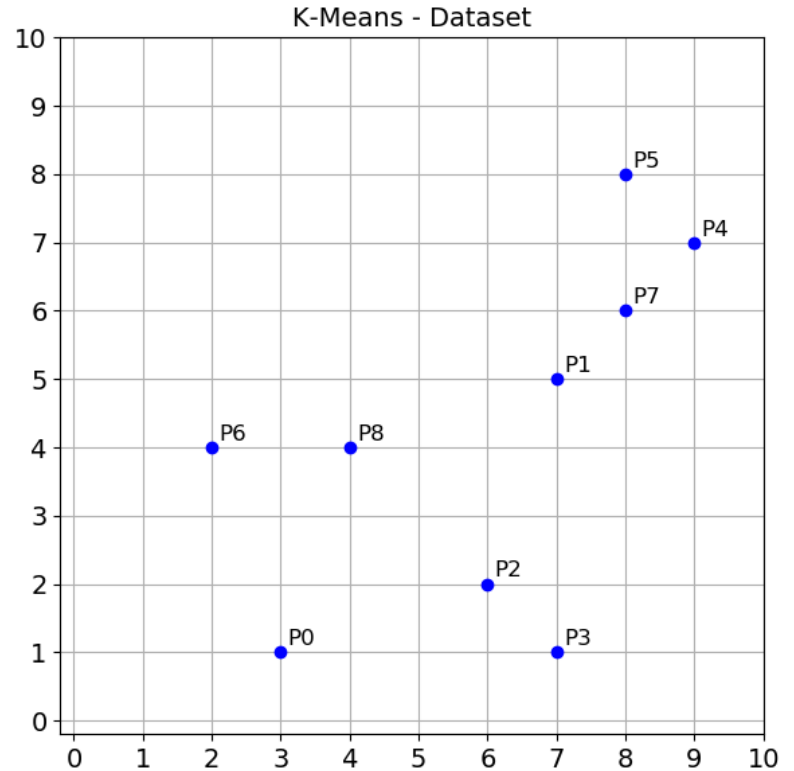


K-means simulation

Initial centroids:

C1 = P2=(6,2)

C2 = P1=(7,5)



Solution: Identify the Bisecting lines dividing the plane between pairs of centroids

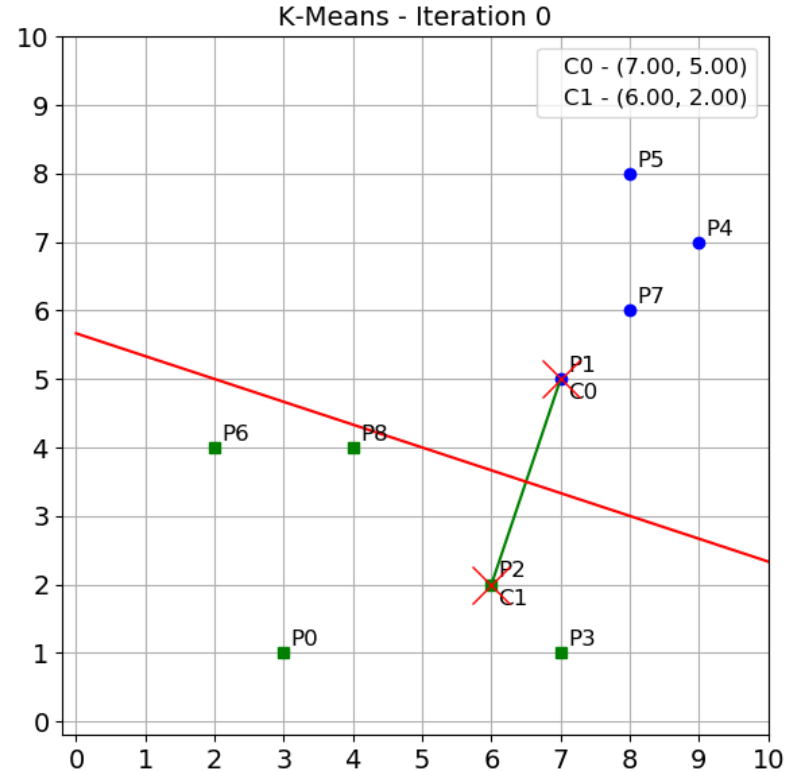
Cluster 1: P0,P2,P3,P6,P8

Cluster 2: P1,P4,P5,P7

Centrod1:

$$X1=(2+3+4+6+7)/5=4.4 \quad Y1=(4+1+4+2+1)/5=2.4$$

$$X2=(6+8+8+9)/4=8 \quad Y2=(5+6+8+7)/4=6.5$$

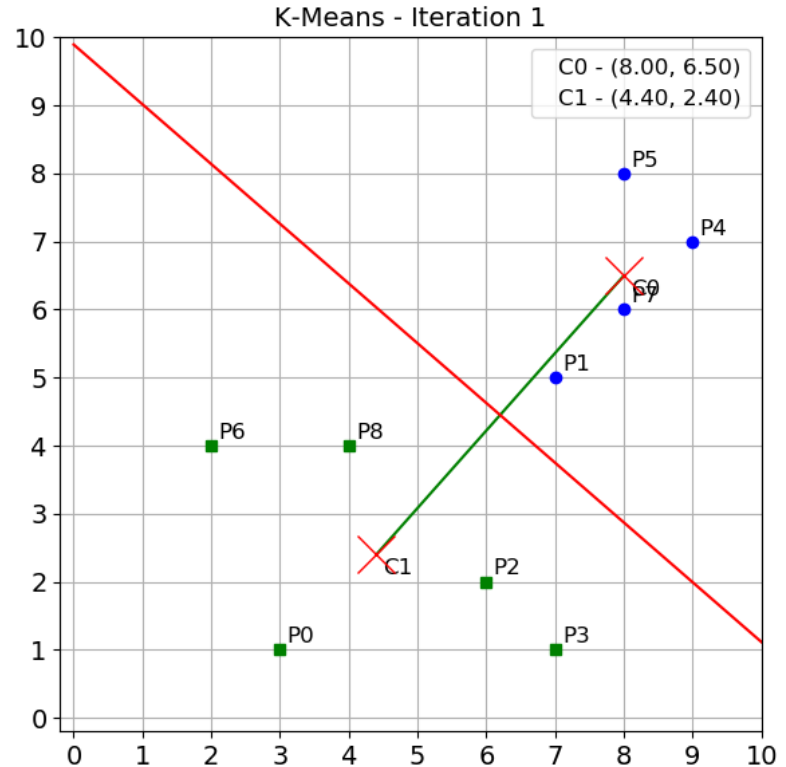


Solution: Identify the Bisecting lines dividing the plane between pairs of centroids

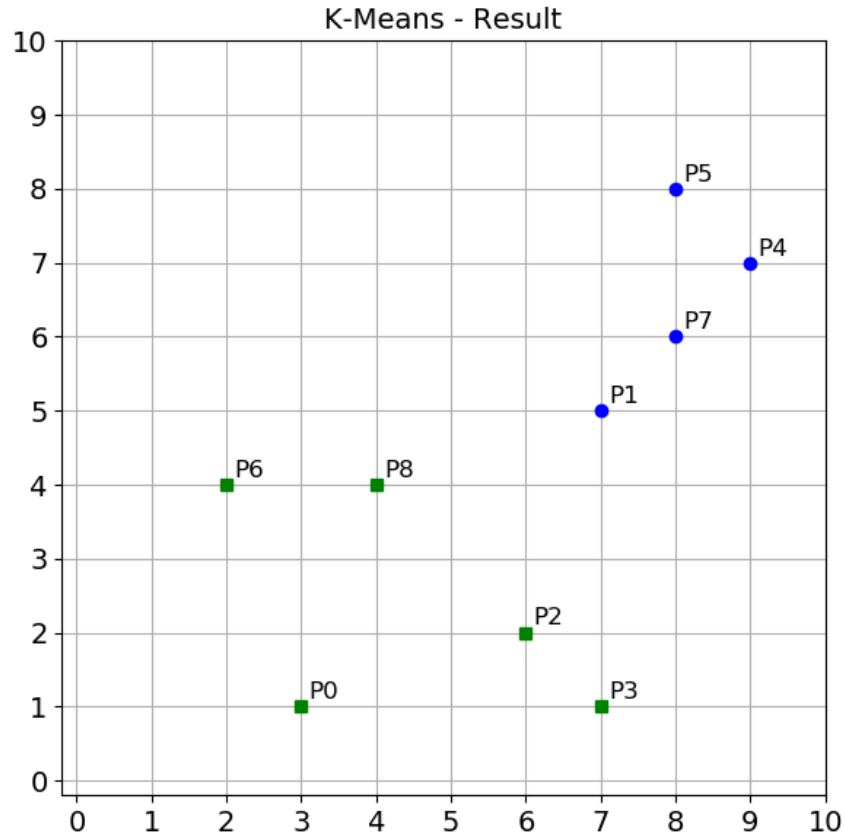
Cluster 1: P0,P2,P3,P6,P8

Cluster 2: P1,P4,P5,P7

**The cluster composition does not change,
so K-means stops**



K-means result



Hierarchical: Single-LINK

Euclidean Distance

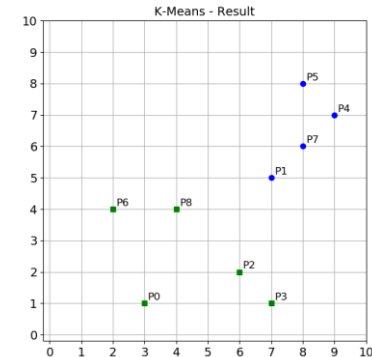
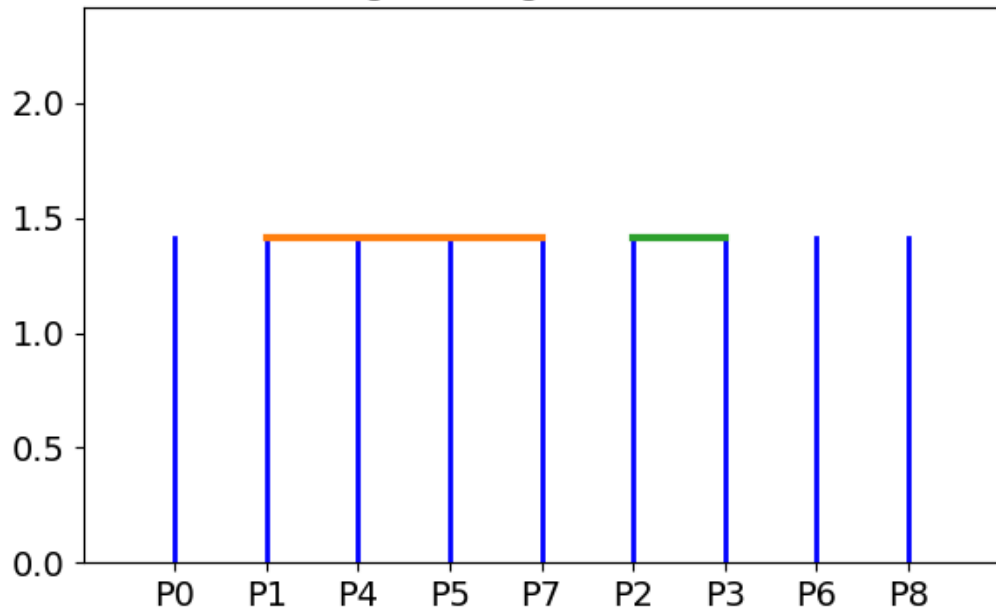
0	5.66	3.16	4	8.49	8.6	3.16	7.07	3.16
5.66	0	3.16	4	2.83	3.16	5.1	1.41	3.16
3.16	3.16	0	1.41	5.83	6.32	4.47	4.47	2.83
4	4	1.41	0	6.32	7.07	5.83	5.1	4.24
8.49	2.83	5.83	6.32	0	1.41	7.62	1.41	5.83
8.6	3.16	6.32	7.07	1.41	0	7.21	2	5.66
3.16	5.1	4.47	5.83	7.62	7.21	0	6.32	2
7.07	1.41	4.47	5.1	1.41	2	6.32	0	4.47
3.16	3.16	2.83	4.24	5.83	5.66	2	4.47	0

distance merge 1.41

Min
Distance



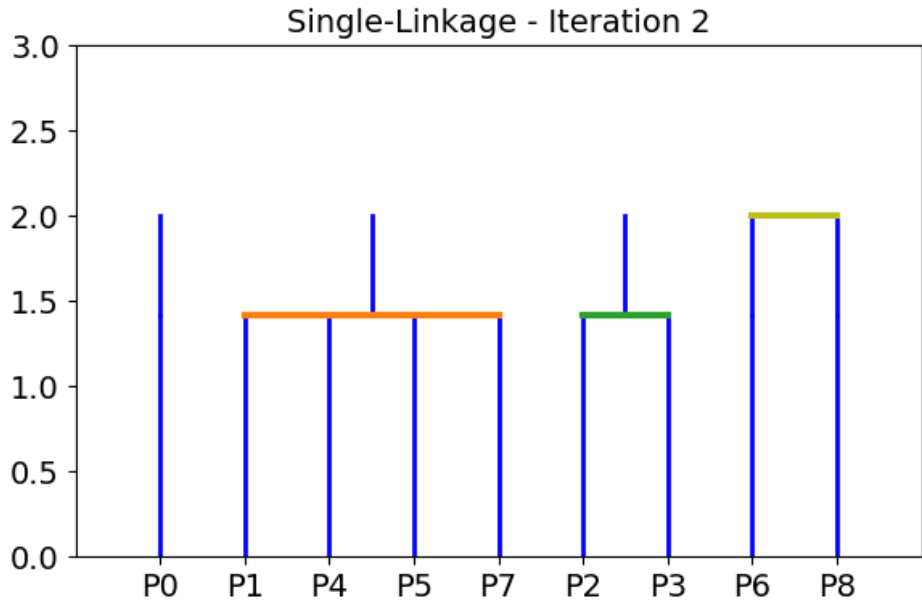
Single-Linkage - Iteration 1



Hierarchical: **Single-LINK**- Euclidean Distance

[(0,)	(1,4,5,7)	(2, 3),	(6,)	(8,)]
[0.	5.66	3.16	3.16	3.16]
[5.66	0.	3.16	5.1	3.16]
[3.16	3.16	0.	4.47	2.83]
[3.16	5.1	4.47	0.	2.]
[3.16	3.16	2.83	2.	0.]

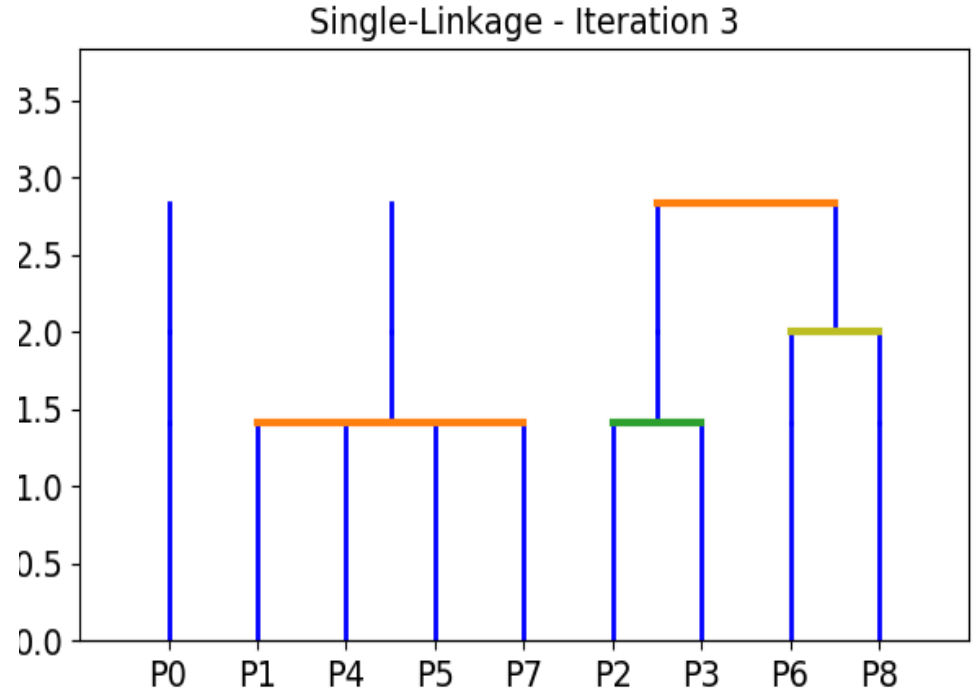
distance merge 2.00



Hierarchical: Single-LINK- Euclidean Distance

[(0,),	(1,4,5,7)	(2, 3),	(6, 8)]
[0.	5.66	3.16	3.16]
[5.66	0.	3.16	3.16]
[3.16	3.16	0.	2.83]
[3.16	3.16	2.83	0.]

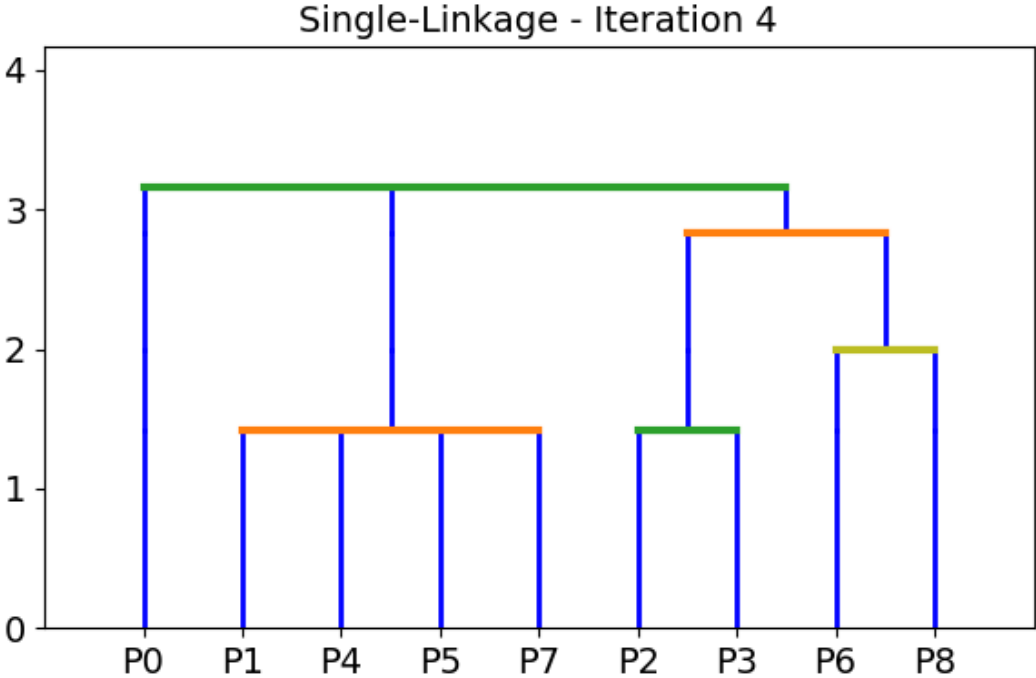
distance merge 2.83



Hierarchical: Single-LINK- Euclidean Distance

[(0,)	(1,4,5,7)	(2,3,6,8)]
[0.	5.66	3.16]
[5.66	0.	3.16]
[3.16	3.16	0.]

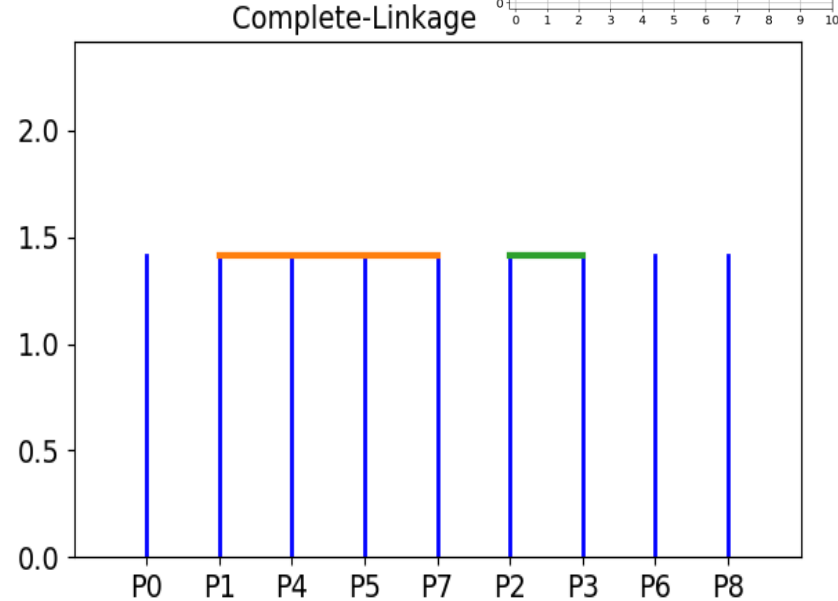
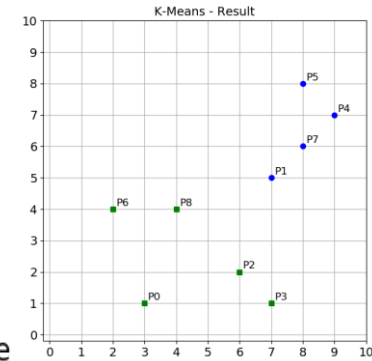
distance merge 3.16



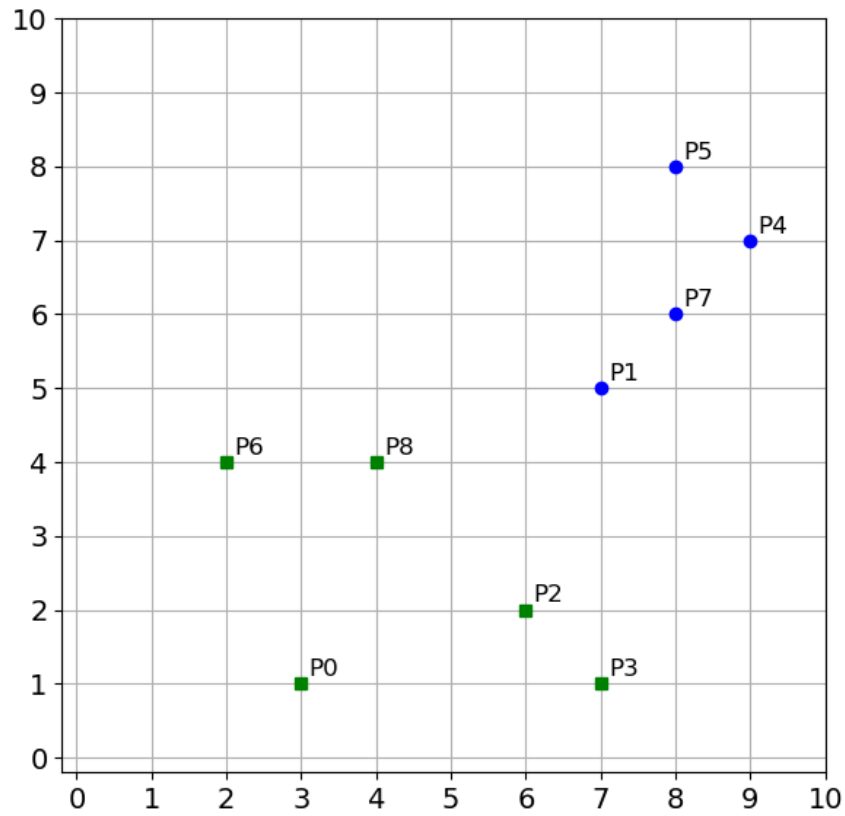
Hierarchical: Complete-LINK

Euclidean Distance

0	5.66	3.16	4	8.49	8.6	3.16	7.07	3.16
5.66	0	3.16	4	2.83	3.16	5.1	1.41	3.16
3.16	3.16	0	1.41	5.83	6.32	4.47	4.47	2.83
4	4	1.41	0	6.32	7.07	5.83	5.1	4.24
8.49	2.83	5.83	6.32	0	1.41	7.62	1.41	5.83
8.6	3.16	6.32	7.07	1.41	0	7.21	2	5.66
3.16	5.1	4.47	5.83	7.62	7.21	0	6.32	2
7.07	1.41	4.47	5.1	1.41	2	6.32	0	4.47
3.16	3.16	2.83	4.24	5.83	5.66	2	4.47	0



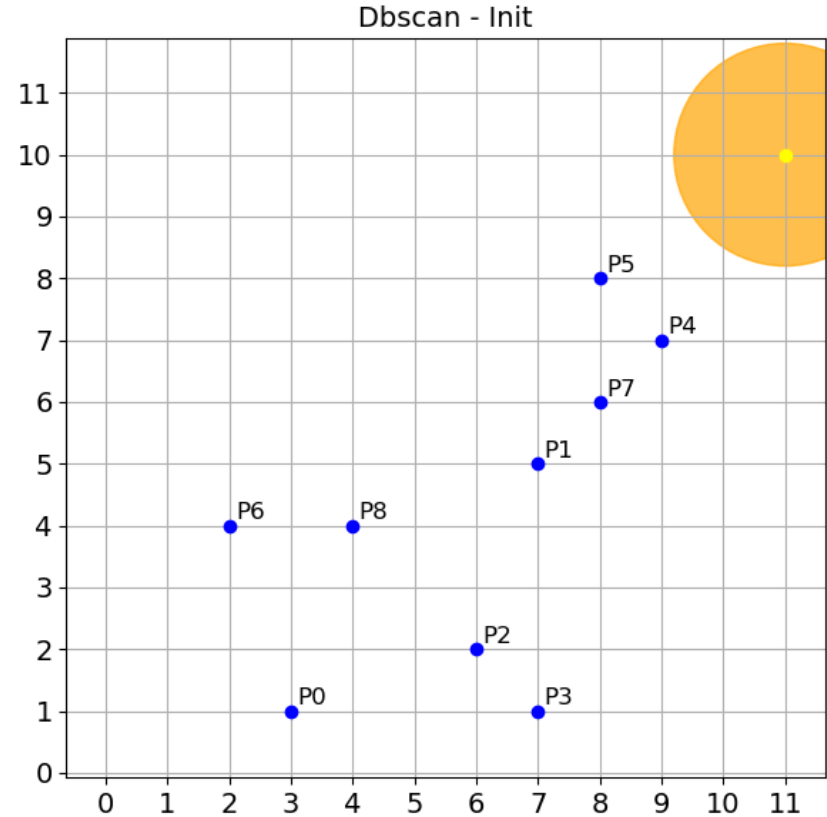
Where is the “mistake” ????



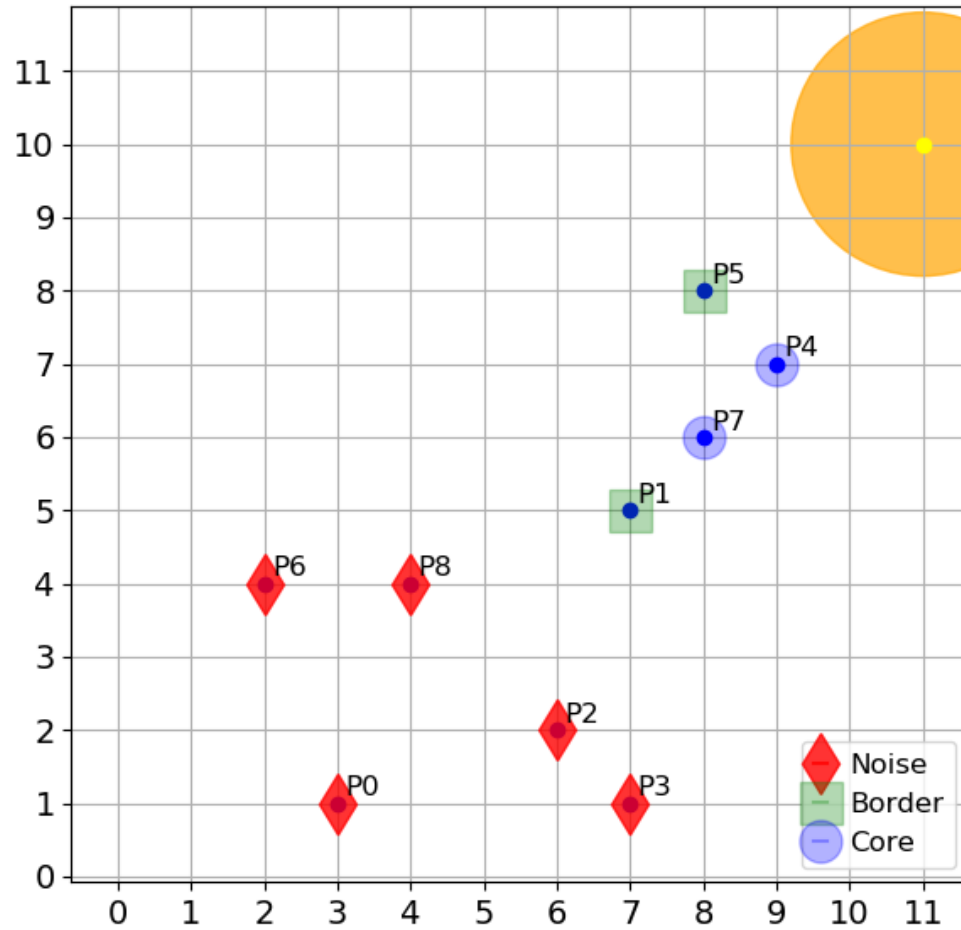
Exercise 2

DBSCAN simulation

- Eps=1.8
- MinPoints=3 (included the point)

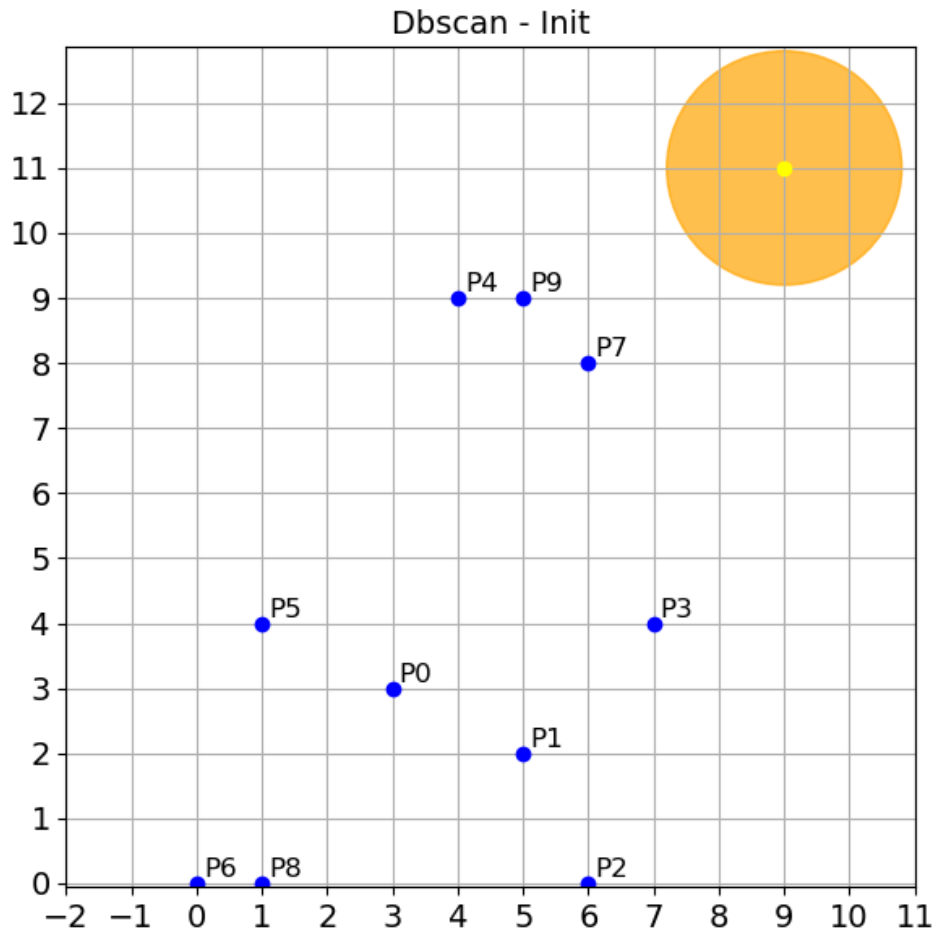


Dbscan - Noise Points

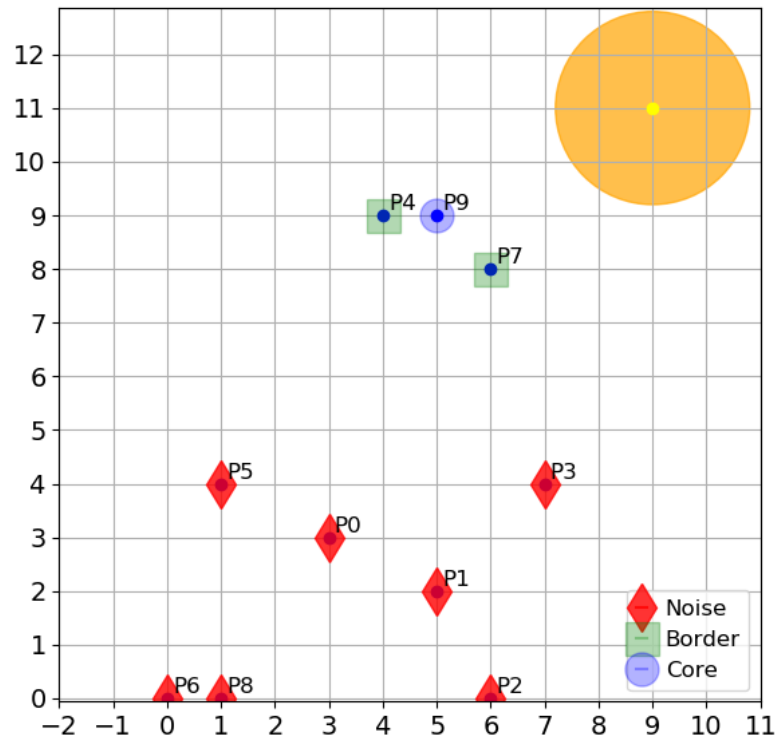


DBSCAN simulation

- Eps=1.8
- MinPoints=3 (included the point)



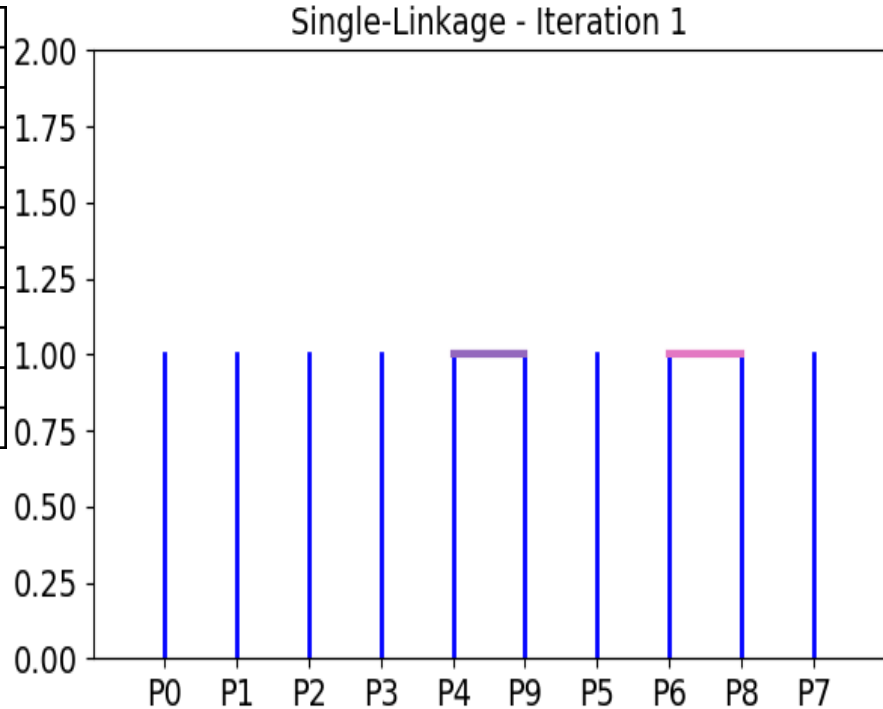
Dbscan - Noise Points



Hierarchical: Single-LINK- Euclidean Distance

(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0.	2.24	4.24	4.12	6.08	2.24	4.24	5.83	3.61	6.32
2.24	0.	2.24	2.83	7.07	4.47	5.39	6.08	4.47	7.
4.24	2.24	0.	4.12	9.22	6.4	6.	8.	5.	9.06
4.12	2.83	4.12	0.	5.83	6.	8.06	4.12	7.21	5.39
6.08	7.07	9.22	5.83	0.	5.83	9.85	2.24	9.49	1.
2.24	4.47	6.4	6.	5.83	0.	4.12	6.4	4.	6.4
4.24	5.39	6.	8.06	9.85	4.12	0.	10.	1.	10.3
5.83	6.08	8.	4.12	2.24	6.4	10.	0.	9.43	1.41
3.61	4.47	5.	7.21	9.49	4.	1.	9.43	0.	9.85
6.32	7.	9.06	5.39	1.	6.4	10.3	1.41	9.85	0.

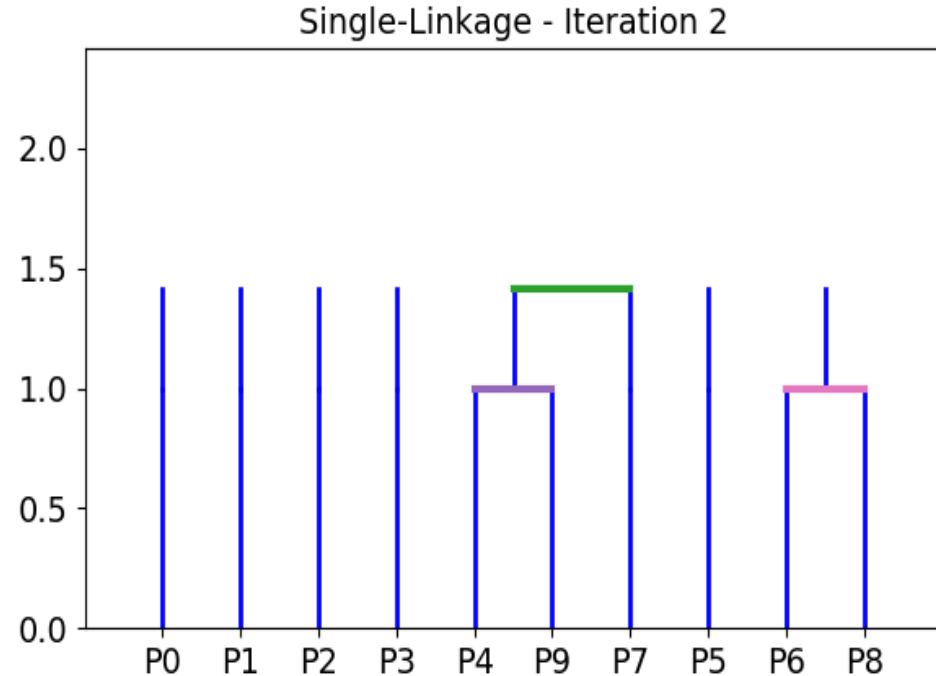
distance merge 1.00



Hierarchical: Single-LINK- Euclidean Distance

(0)	(1)	(2)	(3)	(4,9)	(5)	(6,8)	(7)
[0.	2.24	4.24	4.12	6.08	2.24	3.61	5.83]
[2.24	0.	2.24	2.83	7.	4.47	4.47	6.08]
[4.24	2.24	0.	4.12	9.06	6.4	5.	8.]
[4.12	2.83	4.12	0.	5.39	6.	7.21	4.12]
[6.08	7.	9.06	5.39	0.	5.83	9.49	1.41]
[2.24	4.47	6.4	6.	5.83	0.	4.	6.4]
[3.61	4.47	5.	7.21	9.49	4.	0.	9.43]
[5.83	6.08	8.	4.12	1.41	6.4	9.43	0.]

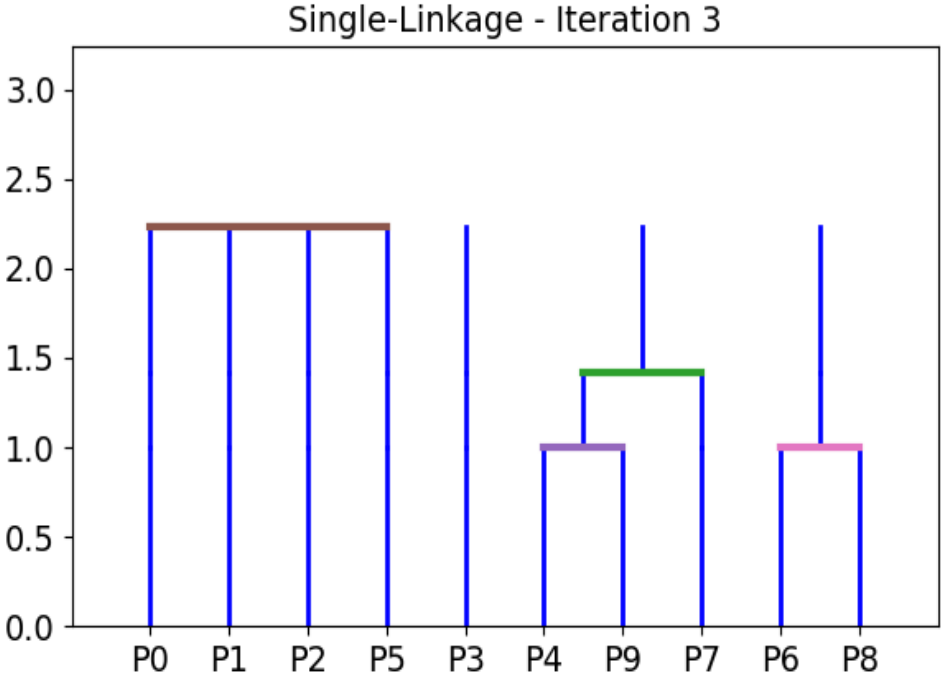
distance merge 1.41



Hierarchical: Single-LINK- Euclidean Distance

(0)	(1)	(2)	(3)	(4,7,9)	(5)	(6,8)
[0.	2.24	4.24	4.12	5.83	2.24	3.61]
[2.24	0.	2.24	2.83	6.08	4.47	4.47]
[4.24	2.24	0.	4.12	8.	6.4	5.]
[4.12	2.83	4.12	0.	4.12	6.	7.21]
[5.83	6.08	8.	4.12	0.	5.83	9.43]
[2.24	4.47	6.4	6.	5.83	0.	4.]
[3.61	4.47	5.	7.21	9.43	4.	0.]

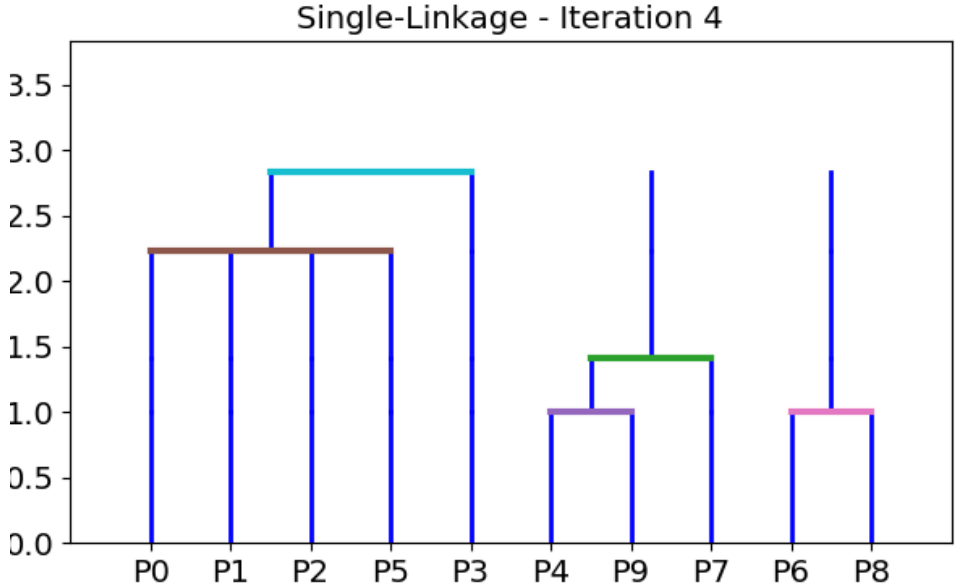
distance merge 2.24



Hierarchical: Single-LINK- Euclidean Distance

(0,1,2,5)	(3)	(4,7,9)	(6,8)
[[0.	2.83	5.83	3.61]
[2.83	0.	4.12	7.21]
[5.83	4.12	0.	9.43]
[3.61	7.21	9.43	0.]

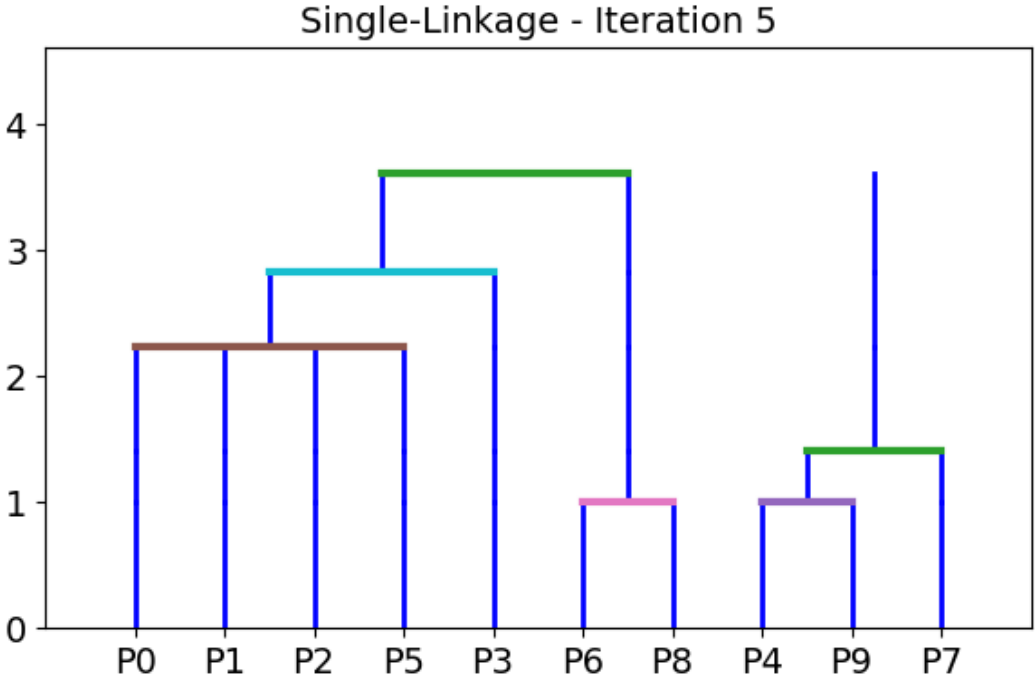
distance merge 2.83



Hierarchical: Single-LINK- Euclidean Distance

(0,1,2,3,5)	(4,7,9)	(6,8)
[0.	4.12	3.61]
[4.12	0.	9.43]
[3.61	9.43	0.]

distance merge 3.61



Hierarchical: Single-LINK- Euclidean Distance

(0,1,2,3,5,6,8	(4,7,9)
[0.	4.12]
[4.12	0.]

