

4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

SEPTEMBER

THURSDAY

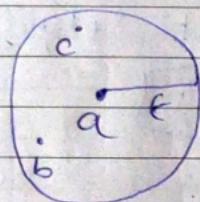
DBSCAN Clustering Algorithm

(Density Based Spatial clustering of Applications with noise)

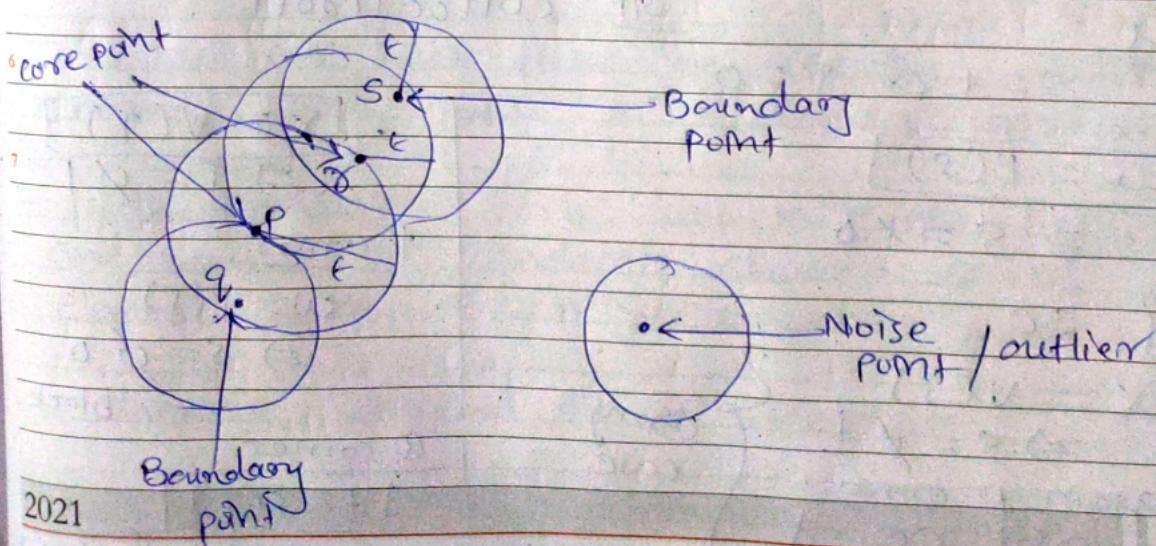
- 1. form cluster based on density
no. of points which are located in a given area
 \uparrow no. of points $\Rightarrow \uparrow$ density

- 2. major input :- ϵ (circum radius)

$\underbrace{\text{minpoints}}_3 = 3$



\downarrow
if $\text{minpoints} = 3$ then
a data point is considered as
 \downarrow
core point



2021

WEDNESDAY

12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Boundary point conditions

1) S point is neighbour of core point

↓

Yes (core point σ)

2) q point is neighbour of core point

↓

Yes (core point p)

⇒ Noise point / outlier (Not a core point / Boundary point)
Advan₂

Robust / identify outliers

↓

if identify then not to include in cluster

⇒ Directly density reachable

q is directly density reachable from point p

1) q must be neighbour of point p \Rightarrow Yes

2) point p must be core point \Rightarrow Yes

1	12	13	14	15	16	17
11	19	20	21	22	23	24
18	26	27	28	29	30	31
2						

SEPTEMBER

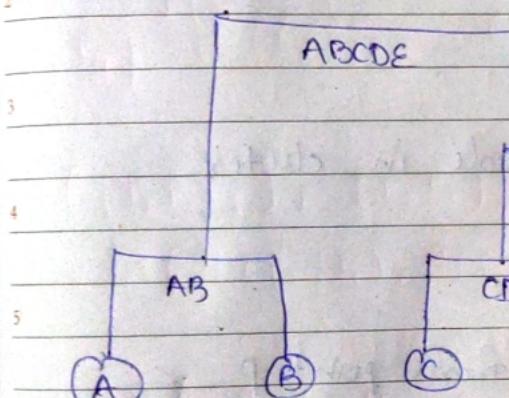
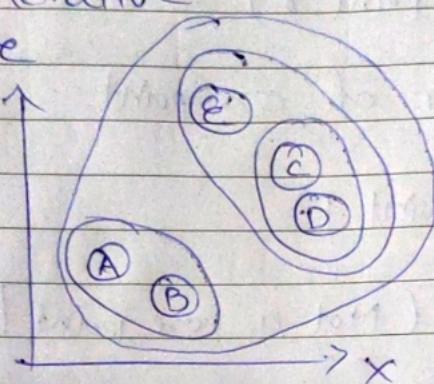
TUESDAY

Hierarchical Clustering

If we want to build hierarchy of cluster

→ Agglomerative

→ Divisive



build hierarchy of cluster

Agglomerative

- starts with individual data items
- then start to build cluster
- Approach: Bottom to Top

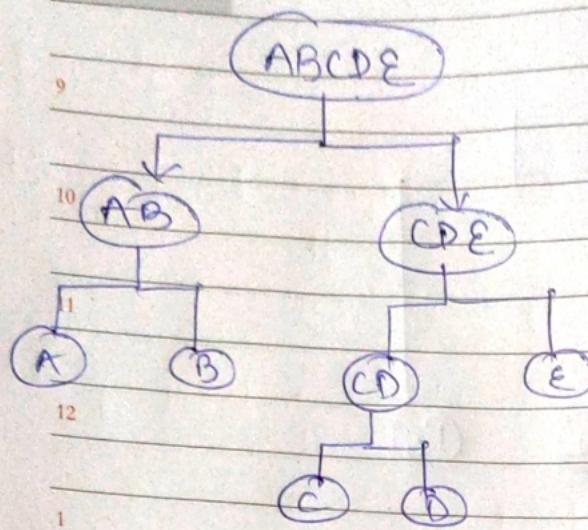
represent with (Dendrogram)

Divisive

Top to Down Approach follow

- starts with one cluster & that cluster is going to consists of all clusters
- then divide it into no. of clusters

2021



→ Agglomerative clustering (single linkage) $\xrightarrow{\text{min}}$
 distance metric \leftarrow if complete linkage then max

	P ₁	P ₂	P ₃	P ₄	P ₅
P ₁	0				
P ₂	9	0			
P ₃	3	7	0		
P ₄	6	5	9	0	
P ₅	11	10	2	8	0

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

$$d(P_1, [P_3, P_5])$$

$$\Rightarrow \min(d(P_1, P_3), d(P_1, P_5))$$

$$\Rightarrow \min(3, 11) \Rightarrow 3$$

$$d(P_2, [P_3, P_5])$$

$$\Rightarrow \min(d(P_2, P_3), d(P_2, P_5))$$

$$\Rightarrow \min(7, 10) \Rightarrow 7$$

$$d(P_4, [P_3, P_5])$$

$$\Rightarrow \min(d(P_4, P_3), d(P_4, P_5))$$

$$\Rightarrow \min(9, 8) \Rightarrow 8$$



	[P ₁ , P ₃ , P ₅]	P ₂	P ₄
(P ₁ , P ₃ , P ₅)	0		
P ₂	7		
P ₄	6	5	0

$$d(P_2, [P_1, P_3, P_5])$$

$$\Rightarrow \min((d(P_2, P_1), d(P_2, P_3), d(P_2, P_5)))$$

$$\Rightarrow \min(9, 7, 10)$$

2021

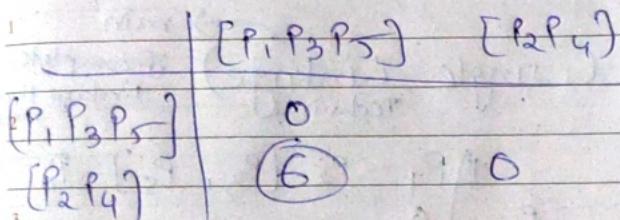
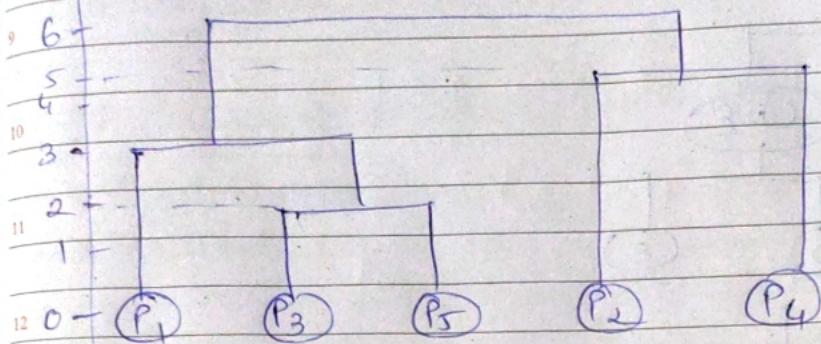
M	5	6	7	1	2	3
4				8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

SEPTEMBER

26

SATURDAY

form dendrogram
cluster through



$$d([P_1, P_3, P_5], [P_2, P_4])$$

$$\Rightarrow \min(d(P_2, P_1), d(P_2, P_3), d(P_2, P_5), d(P_4, P_1), d(P_4, P_3), d(P_4, P_5)) = 6$$

$$\Rightarrow \min(9, 7, 10, 6, 9, 8)$$

SUNDAY

6

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