Comp 9318 assignment 1

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Q1

(1)

	Location	Time	Item	Quantity
0	Sydney	2005	PS2	1400
1	Sydney	2005	ALL	1400
2	Sydney	2006	PS2	1500
3	Sydney	2006	Wii	500
4	Sydney	2006	ALL	2000
5	Sydney	ALL	PS2	2900
6	Sydney	ALL	Wii	500
7	Sydney	ALL	ALL	3400
8	Melbourne	2005	XBox 360	1700
9	Melbourne	ALL	XBox 360	1700
10	Melbourne	2005	ALL	1700
11	Melbourne	ALL	ALL	1700
12	ALL	2005	PS2	1400
13	ALL	2005	XBox 360	1700
14	ALL	2005	ALL	3100
15	ALL	2006	PS2	1500
16	ALL	2006	Wii	500
17	ALL	2006	ALL	2000
18	ALL	ALL	PS2	2900
19	ALL	ALL	Wii	500
20	ALL	ALL	XBox 360	1700
21	ALL	ALL	ALL	5100

(2)

```
SELECT Location, Time, Item, SUM(Quantity)
From Sales
Group by Location, Time, Item
UNION ALL
SELECT Location, Time, ALL, SUM(Quantity)
From Sales
```

Group by Location, Time
UNION ALL
SELECT Location, ALL, Item, SUM(Quantity)
From Sales
Group by Location, Item
UNION ALL
SELECT ALL, Time, Item, SUM(Quantity)
From Sales
Group by Time, Item
UNION ALL
SELECT Location, ALL, ALL SUM(Quantity)
From Sales
Group by Location
UNION ALL
SELECT ALL, Time, ALL, SUM(Quantity)
From Sales
Group by Time
UNION ALL
SELECT ALL, ALL, Item, SUM(Quantity)
From Sales
Group by Item
UNION ALL
SELECT ALL, ALL, ALL, SUM(Quantity)
From Sales;

(3)

	Location	Time	Item	Quantity
0	Sydney	2006	ALL	2000
1	Sydney	ALL	PS2	2900
2	Sydney	ALL	ALL	3400
3	ALL	2005	ALL	3100
4	ALL	2006	ALL	2000
5	ALL	ALL	PS2	2900
6	ALL	ALL	ALL	5100

(4)

Index = Item(index) + 4*Time(index) + 4*3* Location(index)

index	Quantity
17	1400
16	1400
21	1500
23	500
20	2000
13	2900

15	500
12	3400
30	1700
26	1700
28	1700
24	1700
5	1400
6	1700
4	3100
9	1500
11	500
8	2000
1	2900
3	500
2	1700
0	5100

Q2

	P1	P2	P3	P4	P5
P1	1.00	0.1	0.41	0.55	0.35
P2	0.1	1.00	0.64	0.47	0.98
P3	0.41	0.64	1.00	0.44	0.85
P4	0.55	0.47	0.44	1.00	0.76
P5	0.35	0.98	0.85	0.76	1.00

Max = p25 = 0.98

Update the table

	P1	P25	P3	P4
P1	1.00	0.476	0.41	0.55
P25	0.476	1.00	0.823	0.736
P3	0.41	0.823	1.00	0.44
P4	0.55	0.736	0.44	1.00

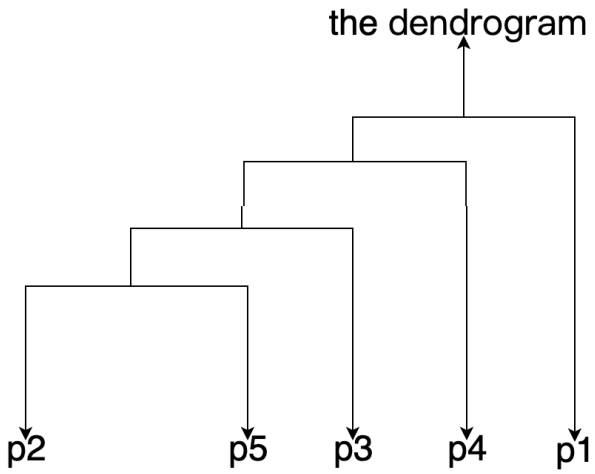
Max = p253 = 0.823

Update the table

	P1	P253	P4
P1	1.00	0.555	0.55
P253	0.555	1.00	0.69
P4	0.55	0.69	1.00

Max = p2534 = 0.69

Last dot is p1,then link p1



Q3

(1)

Initialize k centers C = [c_1, c_2, . . . , c_k];
canStop ← false;
while canStop = false do

Initialize k empty clusters G = [g_1, g_2, . . . , g_k]; for each data point p ∈ D do

c_x ← NearestCenter(p, C);

gc_x .append(p);

count = 0

for each group g ∈ G do

origal_ci = gci

ci ← ComputeCenter(g);

if ci == origal_ci ;

count += 1

if count == k ;

canStop ← Ture

return G;

according the change of the center to compare the group have change or not ,if all the groups has no change means the group will not change and we get the answer.

(2)

The cost of k clusters would not increase, because in each iteration ,the cost is decrease or not change ,so the total cost is decrease or not change.

In the first iteration, each dot will get into a new group whose center is closer to the dot than the dot's group before, so every dot will get a smaller $dis^2(p, c_i)$, so in this iteration total cost is decrease or not change.

In the second iteration, all the dot in the group will computer a new center, the new center will balance the distance with all the dot, because the new center will have the smallest total distance with all the dot than rest of dot to be the center. so the total $dis^2(p, c_i)$ in the group will decrease or not change.

So the cost of k cluster at the end in the iteration will never increase.

(3)

because after each iteration, the total cost is decrease, and the cost would not decrease infinitly, because the distance between dots will not change. So it will always converges to a local minima. it would not change between two situation, because it will always choose the smaller cost one, and if two situation is the same, it will chose one and this will not influence the total cost.

When the iteration would not change the dot in the groups, it converges to the minima Which is the best group split suit the original input condition.