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1. Compute all pairwise Euclidean distances between customers.

2. Create a matrix that will contain all the distances.

	A	B	C	D	E	F	
A	0	10.0	45.3	60.4	50.8	25.2	
B	10.0	0	35.2	50.4	40.8	15.1	
C	45.3	35.2	0	15.1	6.4	20.1	
D	60.4	50.4	15.1	0	10.2	35.2	
E	50.8	40.8	6.4	10.2	0	25.7	
F	25.2	15.1	20.1	35.2	25.7	0	

$$= d(A, B) = \sqrt{(10 - 20)^2 + (1 - 2)^2} = d(B, C) = \sqrt{(20 - 55)^2 + (2 - 6)^2}$$

$$d(A, B) = \underline{10.0} \quad d(B, C) = 35.2278 \approx \underline{35.2}$$

$$= d(A, C) = \sqrt{(10 - 55)^2 + (1 - 6)^2} = d(B, D) = \sqrt{(20 - 70)^2 + (2 - 8)^2}$$

$$d(A, C) = 45.2769 \approx \underline{45.3} \quad d(B, D) = 50.3587 \approx \underline{50.4}$$

$$= d(A, D) = \sqrt{(10 - 70)^2 + (1 - 8)^2} = d(B, E) = \sqrt{(20 - 60)^2 + (2 - 10)^2}$$

$$\sqrt{A, D} = 60.4069 \approx \underline{60.4} \quad d(B, E) = 40.7921 \approx \underline{40.8}$$

$$= d(A, E) = \sqrt{(10 - 60)^2 + (1 - 10)^2} = d(B, F) = \sqrt{(20 - 35)^2 + (2 - 4)^2}$$

$$\sqrt{A, E} = 50.8035 \approx \underline{50.8} \quad d(B, F) = 15.1327 \approx \underline{15.1}$$

$$= d(A, F) = \sqrt{(10 - 35)^2 + (1 - 4)^2} = d(D, E) = \sqrt{(70 - 60)^2 + (8 - 10)^2}$$

$$\sqrt{A, F} = 25.1793 \approx \underline{25.2} \quad d(D, E) = 10.1980 \approx \underline{10.2}$$

$$= d(C, D) = \sqrt{(55 - 70)^2 + (6 - 8)^2} = d(D, F) = \sqrt{(70 - 35)^2 + (8 - 4)^2}$$

$$\sqrt{C, D} = 15.1327 \approx \underline{15.1} \quad d(D, F) = 35.2278 \approx \underline{35.2}$$

$$= d(C, E) = \sqrt{(55 - 60)^2 + (6 - 10)^2} = d(E, F) = \sqrt{(60 - 35)^2 + (10 - 4)^2}$$

$$\sqrt{C, E} = 6.4031 \approx \underline{6.4} \quad d(E, F) = 25.7099 \approx \underline{25.7}$$

$$= d(C, F) = \sqrt{(55 - 35)^2 + (6 - 4)^2}$$

$$d(C, F) = 20.0997 \approx \underline{20.1}$$

3. Using single linkage, determine the merging order step by step.

4. Record the distance at which each merge occurs.

$$C-E = 6.4$$

	F	E	C	D	B	A	
A - B = 10.0		8.28	8.03	8.00	6.27	0.01	0
<del>CE = 10.2</del>	<del>CE - D = 10.2</del>	<del>CED = 10.21</del>	<del>8.08</del>	<del>8.03</del>	<del>8.28</del>	<del>0</del>	<del>0.01</del>
<del>BAF = 15.1</del>	<del>AB - F = 15.1</del>	<del>ABF = 15.1</del>	<del>8.08</del>	<del>1.31</del>	<del>0</del>	<del>8.28</del>	<del>8.28</del>
<del>CF = 15.1</del>	<del>CF = 15.1</del>	<del>C - F = 20</del>	<del>1.31</del>	<del>CE + ABF = 20</del>	<del>AB + CED = 20</del>	<del>0.01</del>	<del>0</del>
5. Draw the corresponding dendrogram							

A

B

F

E

C

D

6. Interpret the clusters. What customer behaviors does each cluster represent?

Based on the dendrogram, there are two types of clusters of customers

- in the establishment, which are low betters having lower visits than
- customers that are high betters that visit the casino frequently. In a business insight the target customers are those who are low betters having low visits per month, the use of promos to entice them to spend more and visit more frequently, whilst for customers of high bets and more frequent visits, VIP perks can be used to encourage them to gamble more, while enjoying the luxury of being a VIP.