Question:-

You are data-Scientist working for a retail Company, and you want your Customer base to better target marketing. You've Collected Some data on Customer Spending habits. Specifically their Averag monthly Spending on Groceries and Clothing in (USD)

DATA:

Customer ID	Groceries (USD)	Clothing (USD)
1	100	50
2	120	60
3	90	40
4	250	150
5	230	140
6	270	160
7	80	30
8	110	55
9	260	170
10	220	130

Solution:- Initial Centroids

$C_1 = (100, 50)$ ID1, ID2, ID3, ID7, ID8

$C_2 = (250, 150)$ ID4, ID5, ID6, ID9, ID10

$C_1 = (110, 55)$, ID_3

$C_1 = (100, 47.5)$, ID7

$C_2 = (240, 145)$, ID_6, ID9

$C_2 = (255, 152.5)$

$C_1 = (90, 38.75)$, ID_8

$C_1 = (100, 46.875)$

$C_2 = (257.5, 237.5)$

Updated Centroids Calculation

$\frac{50+60}{2} = \frac{110}{2}$

$\frac{100+120}{2} = \frac{220}{2}$

$\frac{110}{2} = 55$

$\frac{110+90}{2} = \frac{200}{2} = 100$

$\frac{55+40}{2} = \frac{95}{2} = 47.5$

Solution:-

ID2 :- $\sqrt{(120-100)^2+(60-50)^2} = 22.36$

$\sqrt{(120-250)^2+(50-150)^2} = 158.1138$

$ID_2 = 22.36 \Rightarrow C_1$

ID_3 :- $\sqrt{(90-110)^2+(40-55)^2} = 25$

$\sqrt{(90-250)^2+(40-150)^2} = 194.16$

$ID_3 = C_1$

ID_5 :- $\sqrt{(230-100)^2+(140-47.5)^2} = 159.55$

$\sqrt{(230-250)^2+(140-150)^2} = 22.36$

$ID_5 = C_2$

ID 6 :- $\sqrt{(270-100)^2+(160-47.5)^2} = 203.854$

$\sqrt{(270-240)^2+(160-145)^2} = 33.54$

ID 7 :- $\sqrt{(80-100)^2+(30-47.5)^2} = 26.575$

$\sqrt{(80-225)^2+(30-152.5)} =$

$\sqrt{(80-225)^2+(30-152.5)} = 144.577$

ID7 => C_1

ID8 :- $\sqrt{(110-90)^2+(55-38.75)^2} = 25.769$

$\sqrt{(110-255)^2+(55-152.5)^2} = 174.732$

ID8 = C_1

ID9 :-

$\sqrt{(260-100)^2-(170+46.875)^2} = 146.402\,i$

C_1 $\sqrt{(260-255)^2-(170-152.5)^2} = 16.77\,i$

ID9 = C_2

ID10:-

$$\sqrt{(220-100)^2+(130-46.875)^2} = 146.0009$$

$$\sqrt{(220-257.5)^2+(130-237.5)^2} = 113.8538$$

ID10 $\Rightarrow C_2$.