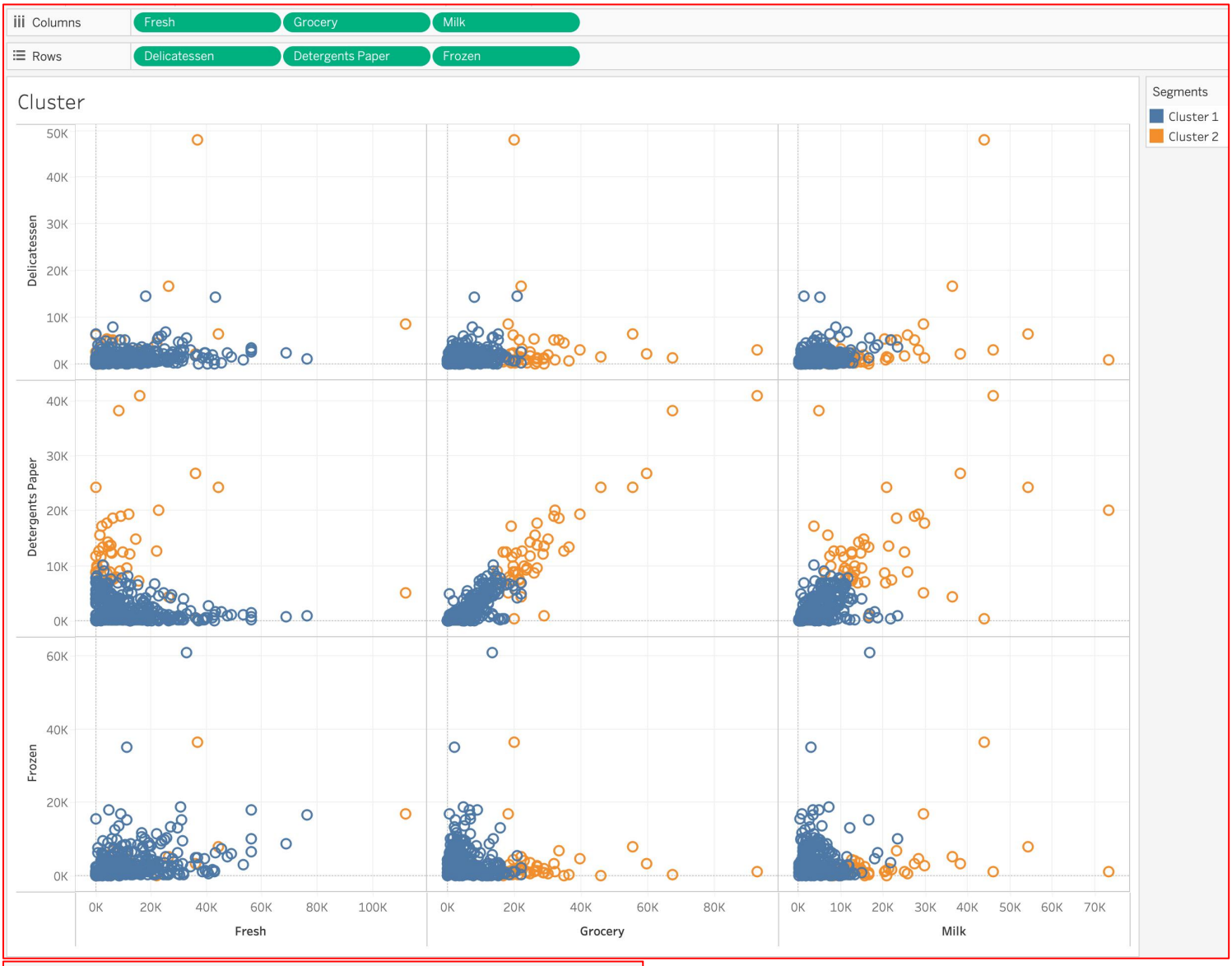
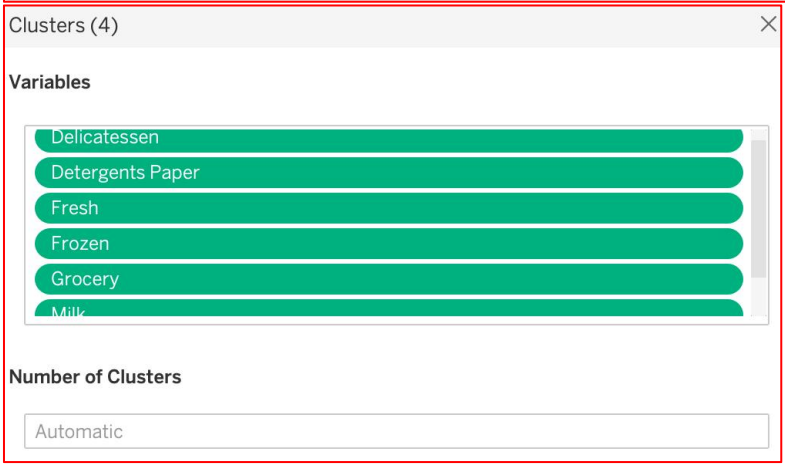
Homework Assignment 7
Segmentation and Profiling

Part 1)

a. How many segments/clusters are generated by Tableau automatically?

Once all 6 variables are used to create a scatter plot and then clustering is used then Tableau automatically creates 2 clusters in each scatter plot as there will be 9 (3 variables in rows and 3 variables in columns). Here Delicatessen, Detergents_Paper and Frozen are used in Rows and Fresh, Milk and Grocery are used in Columns to generate the scatter plot and create clusters.





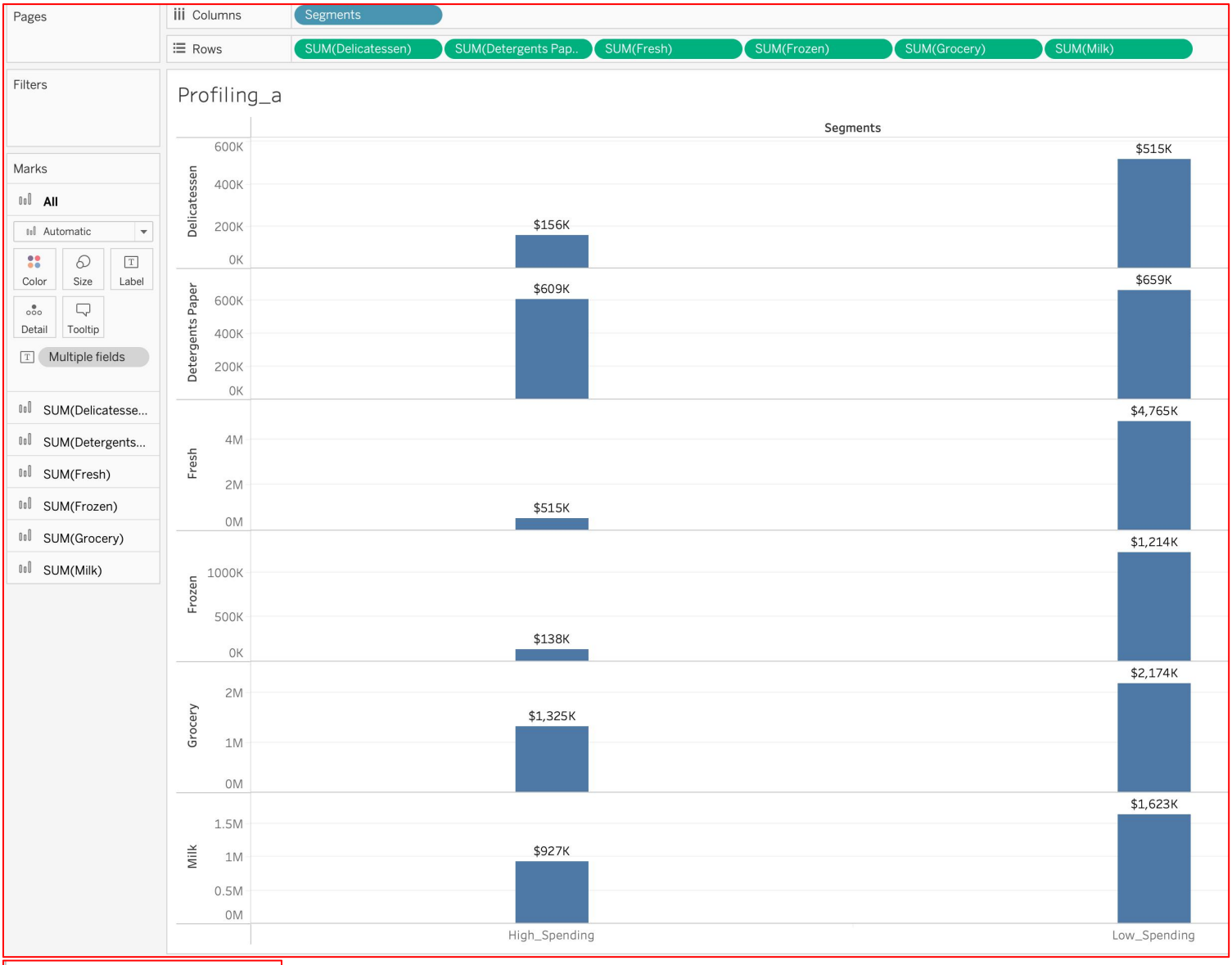
b. How many customers are in each segment/cluster?

There are two clusters namely High_Spending with 47 customers and Low_Spending with 393 customers.

Clusters	Number of Items
Cluster 1	393
Cluster 2	47
Not Clustered	0

a. How are the segments different in terms of the types and volumes of purchased products? (Hint: Use “Describe clusters” to compare and contrast the segments in terms of the six product types).

Wholesale customers da... Segments	Wholesale customers da... Delicatessen	Wholesale customers data Detergents Paper	Wholesale customers da... Fresh	Wholesale customers da... Frozen	Wholesale customers da... Grocery	Wholesale customers da... Milk
Low_Spending	514,723	658,898	4,764,645	1,214,084	2,173,982	1,623,372
High_Spending	156,220	608,959	515,486	137,566	1,324,580	926,985



Inputs for Clustering

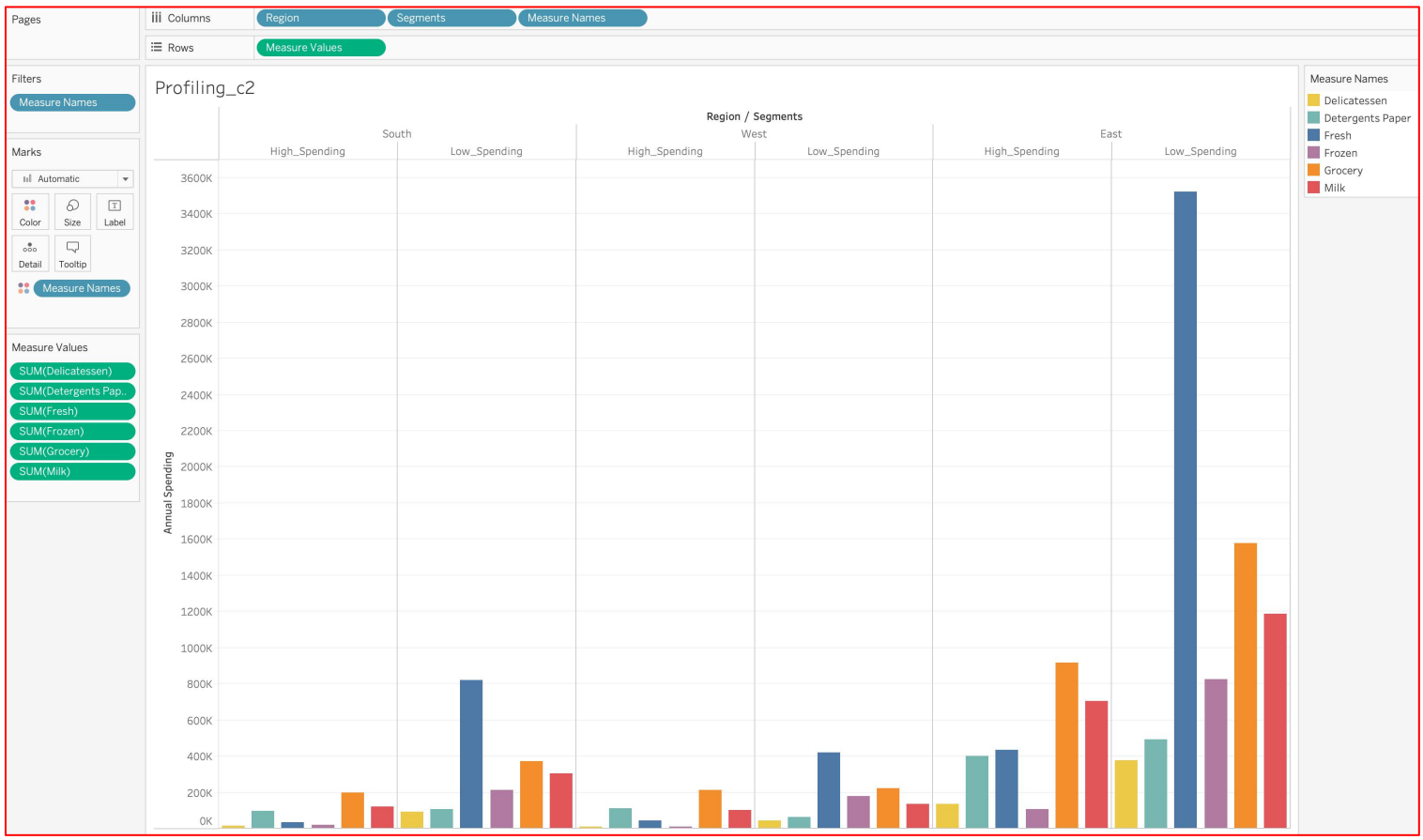
Variables:	Sum of Delicatessen
	Sum of Detergents Paper
	Sum of Fresh
	Sum of Frozen
	Sum of Grocery
	Sum of Milk
Level of Detail:	Not Aggregated
Scaling:	Normalized

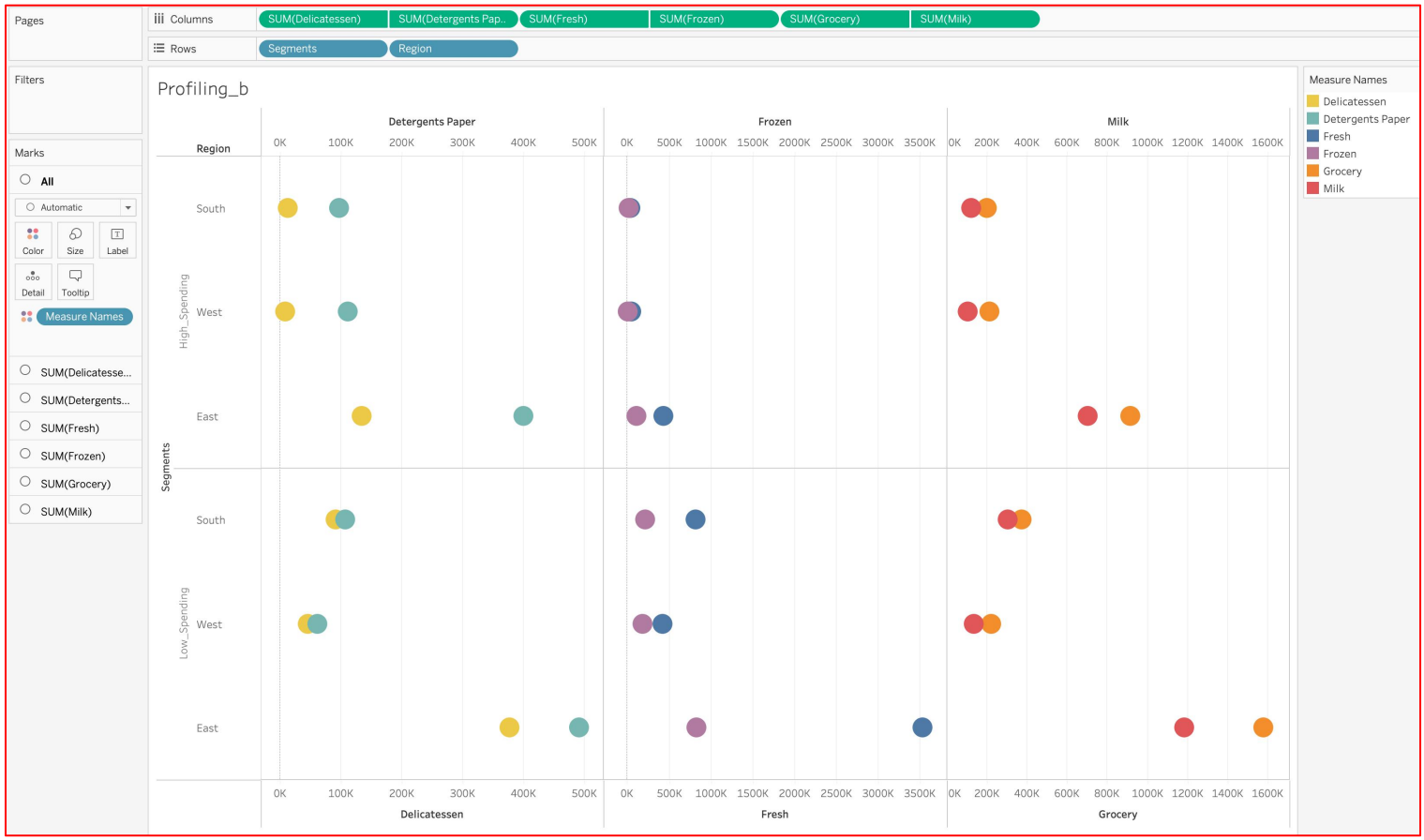
Summary Diagnostics

Number of Clusters:	2
Number of Points:	440
Between-group Sum of Squares:	7.6782
Within-group Sum of Squares:	17.246
Total Sum of Squares:	24.924

		Centers					
Clusters	**Number of Items**	**Sum of Delicatessen**	**Sum of Detergents Paper**	**Sum of Fresh**	**Sum of Frozen**	**Sum of Grocery**	**Sum of Milk**
Cluster 1	393	1309.7	1676.6	12124.0	3089.3	5531.8	4130.7
Cluster 2	47	3323.8	12957.0	10968.0	2926.9	28183.0	19723.0
Not Clustered	0						

b. How are the segments different in terms of regions? In other words, is there any significant association between specific regions and specific segments of customers?





There seems to be a significant association between regions and different segments of customers.

- ✓ For Low_Spending Segment in South Region:- The difference in annual spending between Delicatessen & Detergents_Paper and between Milk & Grocery is very similar. There exists a good difference in annual spending between Frozen & Fresh.

- ✓ For Low_Spending Segment in West Region:- There is not a very significant difference in annual spending between the 6 products.

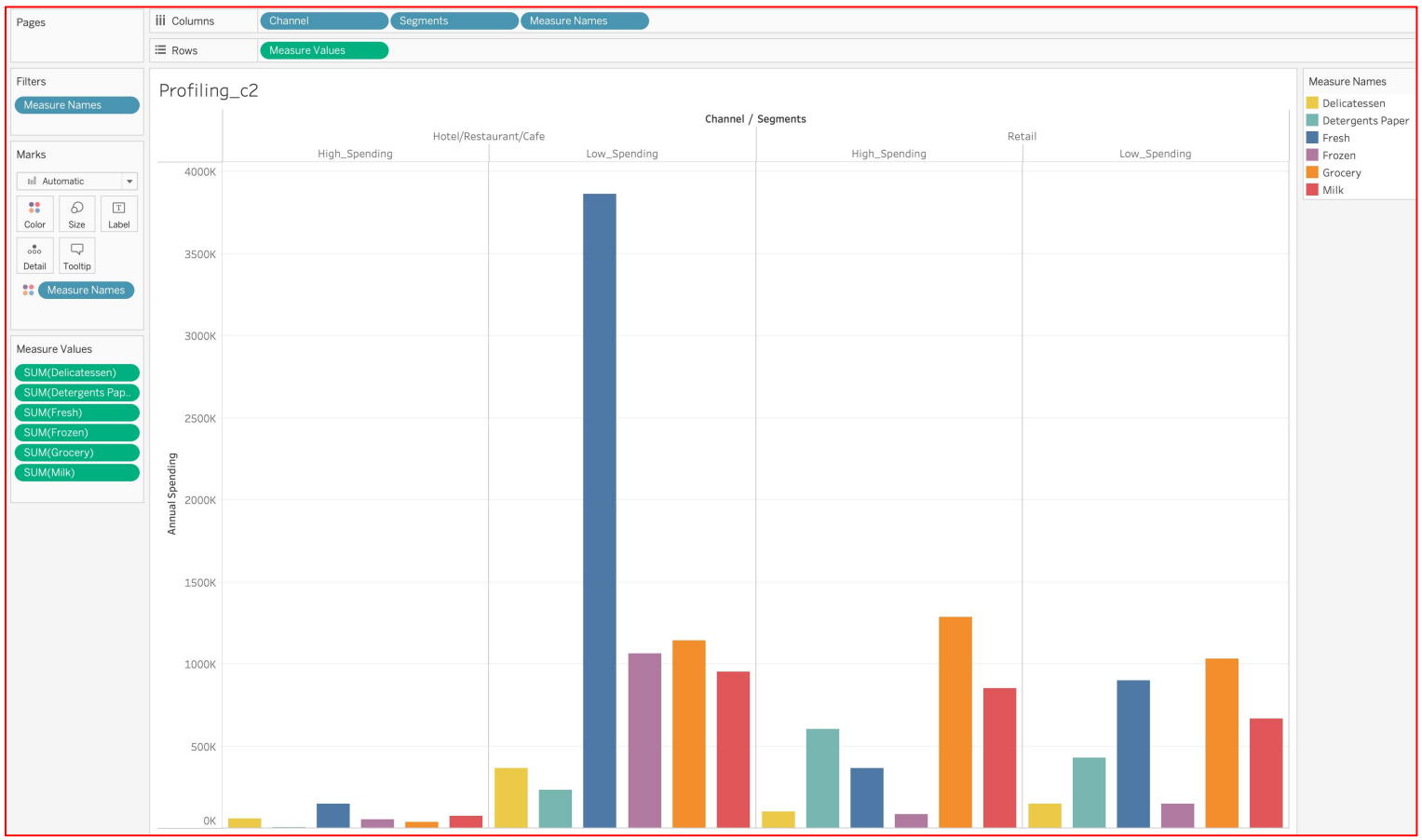
- ✓ For Low_Spending Segment in East Region:- There exists a very large significant difference between this group for Fresh and Frozen products. The difference is quite evident for the other two parties namely Delicatessen & Detergents_Paper and Milk & Grocery.

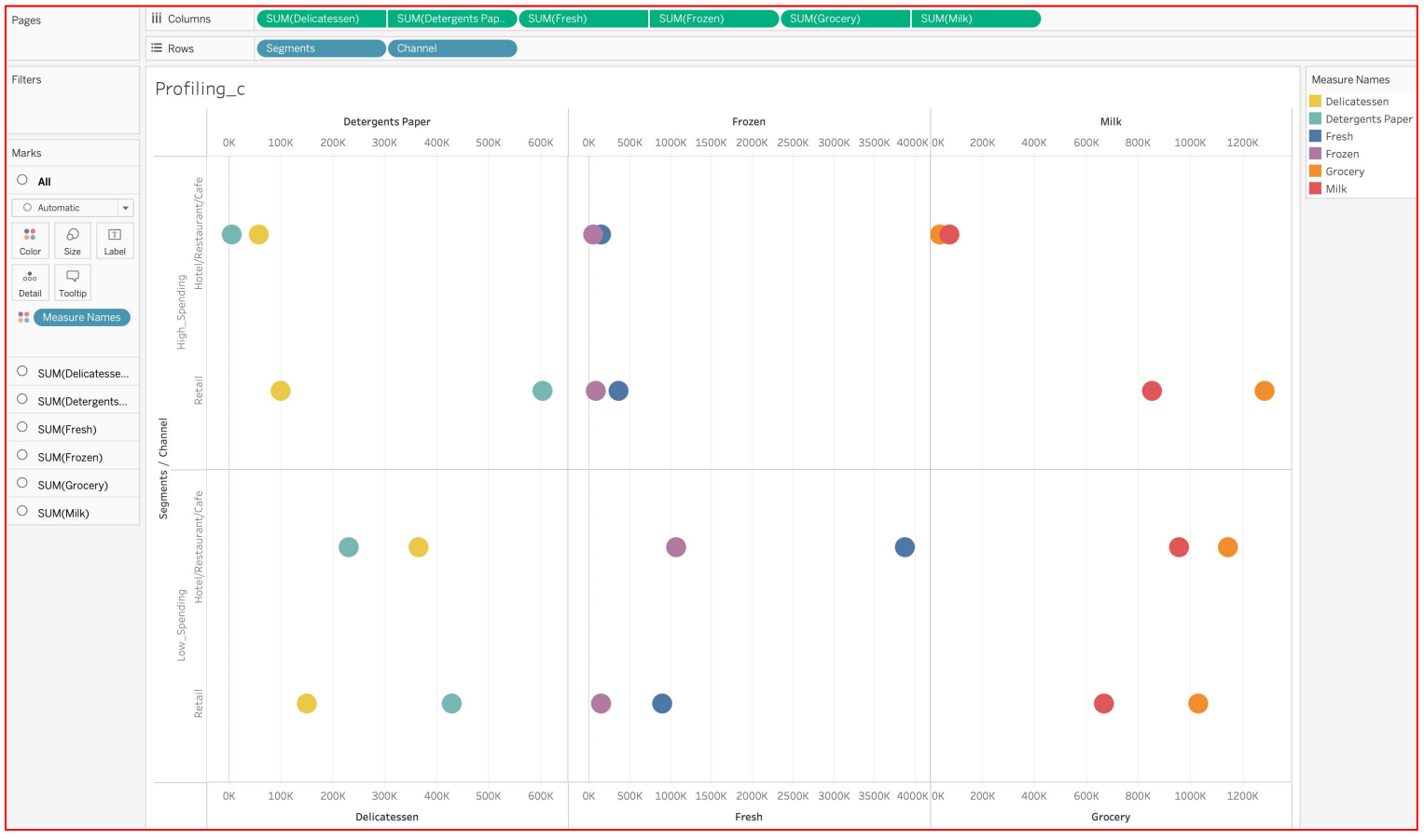
- ✓ For High_Spending Segment in South Region:- The difference in annual spending between Frozen & Fresh and between Milk & Grocery is very similar. There exists a good difference in annual spending between Delicatessen & Detergents_Paper.

- ✓ For High_Spending Segment in West Region:- The difference in how much customers spend annually on Frozen versus Fresh products is similar to the difference in spending on Milk compared to Grocery items. However, there's a noticeable contrast in spending between Delicatessen & Detergents_Paper products.

- ✓ For High_Spending Segment in East Region:- The difference in yearly spending on Frozen versus Fresh products is about the same and the difference between Milk and Grocery purchases is marginal and quite noticeable. However, there's a significant gap in spending between Delicatessen and Detergents_Paper items.

c. How are the segments different in terms of channels? In other words, is there any significant association between specific channels and specific segments of customers?





There seems to be a significant association between channels and different segments of customers.

- ✓ For High_Spending Segment in Hotel/Restaurant/Cafe Channel:- The variation in annual spending across the six products isn't very substantial.

- ✓ For Low_Spending Segment in Hotel/Restaurant/Cafe Channel:- The difference in yearly spending on Delicatessen versus Detergents_Paper products and the difference between Milk and Grocery purchases is marginal and quite noticeable. However, there's a significant gap in spending between Frozen & Fresh items.

- ✓ For High_Spending Segment in Retail Channel:- There's a significant difference in annual spending between Delicatessen and Detergents_Paper, a fair difference between Milk and Grocery, and a very slight difference between Frozen and Fresh.

- ✓ For Low_Spending Segment in Retail Channel:- The annual spending shows a large contrast between Delicatessen and Detergents_Paper, a moderate difference between Milk and Grocery, and a minimal difference between Frozen and Fresh.

Part 2)

- Number of potential customers: Amsterdam: 12,000 – Paris: 18,000
- Acquisition cost per customer (on average): Amsterdam: $15 – Paris: $20
- Annual profit each customer generates (on average): Amsterdam: $42 – Paris: $35
- Churn rate in both cities: 20%
- Also, it is determined that $40 in 2021 is equivalent to $42 in 2022 in both the Netherlands and France.

Based on the information above, calculate the total customer lifetime value for each of the two segments. Based on your results, which segment/city should Urban AdvenTours select for the first phase of the market expansion? Present the calculations and results.

The formula for Present Value Calculation is

$$\text{Present Value} = \frac{\text{FV}}{(1+r)^n}$$

where:
FV = Future Value
r = Rate of return
n = Number of periods
i = Discount Rate

Here FV = 42 and PV = 40 for both places.
$40 = 42 / (1 + i)^1$
$1 + i = 42 / 40$
$1 + i = 1.05$
$i = 1.05 - 1$
$i = 0.05$

Thus Discount Rate (i) = 5%

Average Customer Life Value

- Present Value (PV)
  - Annual discount rate (*i*)

$$PV = \sum_{t=1}^{\infty} \frac{FV_t}{(1+i)^{t-1}}$$

- CLV formula with time value

$$CLV = \sum_{t=1}^{\infty} \frac{m * RR^{t-1}}{(1+i)^{t-1}} - AC$$

$$CLV = m * \left(\frac{1+i}{1+i-RR} \right) - AC$$

where:
m = The annual profits the customer generates for the firm
RR = Retention Rate = 1 - Churn Rate = 1 - 0.20 (as churn rate is 20%) = 0.8
AC = The cost to acquire the customer
i = Discount Rate

For Amsterdam
Average CLV = { 42 * [(1 + 0.05) / (1 + 0.05 - 0.8)] } - 15
= { 42 * [1.05 / 0.25] } - 15
= { 42 * 4.2 } - 15
= 176.4 - 15
= 161.4

Thus Average CLV = **$161.4**

Total CLV for Amsterdam = Total No. of Customers * Average CLV for Amsterdam
= 12,000 * 161.4
= 1,936,800

Thus Total CLV for Amsterdam = **$1,936,800**

For Paris
Average CLV = { 35 * [(1 + 0.05) / (1 + 0.05 - 0.8)] } - 20
= { 35 * [1.05 / 0.25] } - 20
= { 35 * 4.2 } - 20
= 147 - 20
= 127

Thus Average CLV = **$127**

Total CLV for Paris = Total No. of Customers * Average CLV for Paris
= 18,000 * 127
= 2,286,000

Thus Total CLV for Paris = **$2,286,000**

Based on these calculations, Urban AdvenTours, which is based in Boston, should select **Paris** for the first phase of market expansion in Europe, as it has a higher total customer lifetime value compared to Amsterdam.