7117 IBA

BUSINESS INTELLIGENCE SYSTEMS

Shehryar Mallick

s5328488

TABLE OF CONTENTS

SUMMARY

This report contains the descriptive and creative analysis performed on two tables namely "TRANSACTIONS" and "State_Lookup" to answer a total of six question. This report contains answers, support for those answers in the form of visualizations and totaled tables, findings and implications on the company.

This report also contains a technical specification section which contains descriptive steps performed to reach the solutions of various questions, and a how to section which elaborates the the Power BI dashboard and how to interact with it.

INTRODUCTION

PROBLEM STATEMENT:

The TRANSACTIONS table contains a sample of sales that took place over a period of various weeks, after all transactions have been posted. The transaction information includes not only date and time, but also demographic, geographic and product information.
You are asked to use any BI tool you are familiar with, including Excel to analyse the TRANSACTIONS, and provide information and insights to management.

QUESTIONS OVERVIEW:

The questions that need to be answered have been divided into two distinct categories called descriptive analysis and creative analysis having five and one question(s) respectively.

DESCRIPTION OF DATASET:

The data provided for the analysis comprises of two files. Namely:
Transactions: This file contains all the data regarding the transactions that occurred.
State Lookup: This file contains the information of the states i.e. state name and it's corresponding code.

BI TOOL USED:

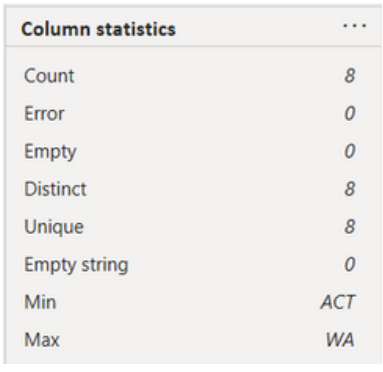
The BI tool of choice for this analysis is **Power BI** with relevant data preprocessing conducted on **Power Query**.

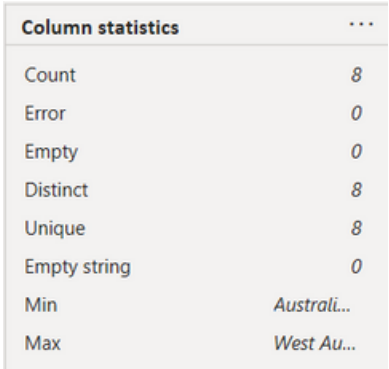
EXPLORATORY DATA ANALYSIS

In this step, I will conduct the exploratory analysis to get a sense of the data that we have been given and perform the necessary pre-processing steps (where necessary).

STATE LOOK UP FILE:

Attributes:	The data set comprises of only two attributes
Columns needing pre-processing:	None
Remarks:	The data set is complete and hence does not require any preprocessing.

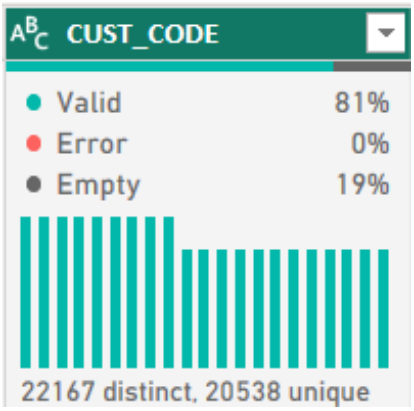


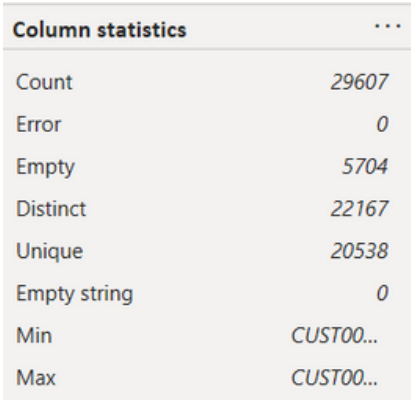


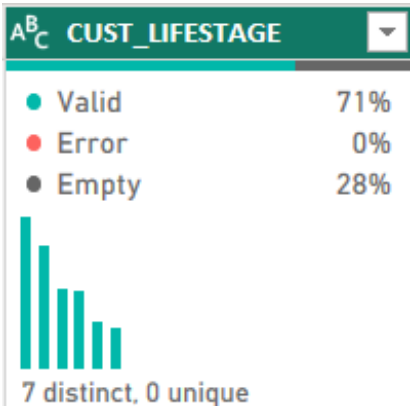
	STATE_CODE	STATE_NAME
	Valid 100% Error 0% Empty 0% 8 distinct, 8 unique	Valid 100% Error 0% Empty 0% 8 distinct, 8 unique
1	NSW	New South Wales
2	ACT	Australian Capital Territory
3	VIC	Victoria
4	QLD	Queensland
5	WA	West Australia
6	SA	South Australia
7	NT	North Territory
8	TAS	Tasmania

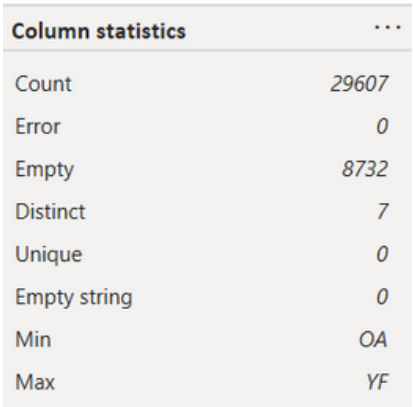
TRANSACTIONAL FILE:

Attributes:	The transaction file contains a total of twenty-three attributes.
Columns needing pre-processing:	• CUST_CODE (contains 5704 missing values) • CUST_LIFESTAGE (contains 8732 missing values)
Remarks:	Since transaction did occur thereupon dropping these rows would result in inaccurate representation of the total sales hence we will keep these rows in our analysis.









USING DASHBOARD

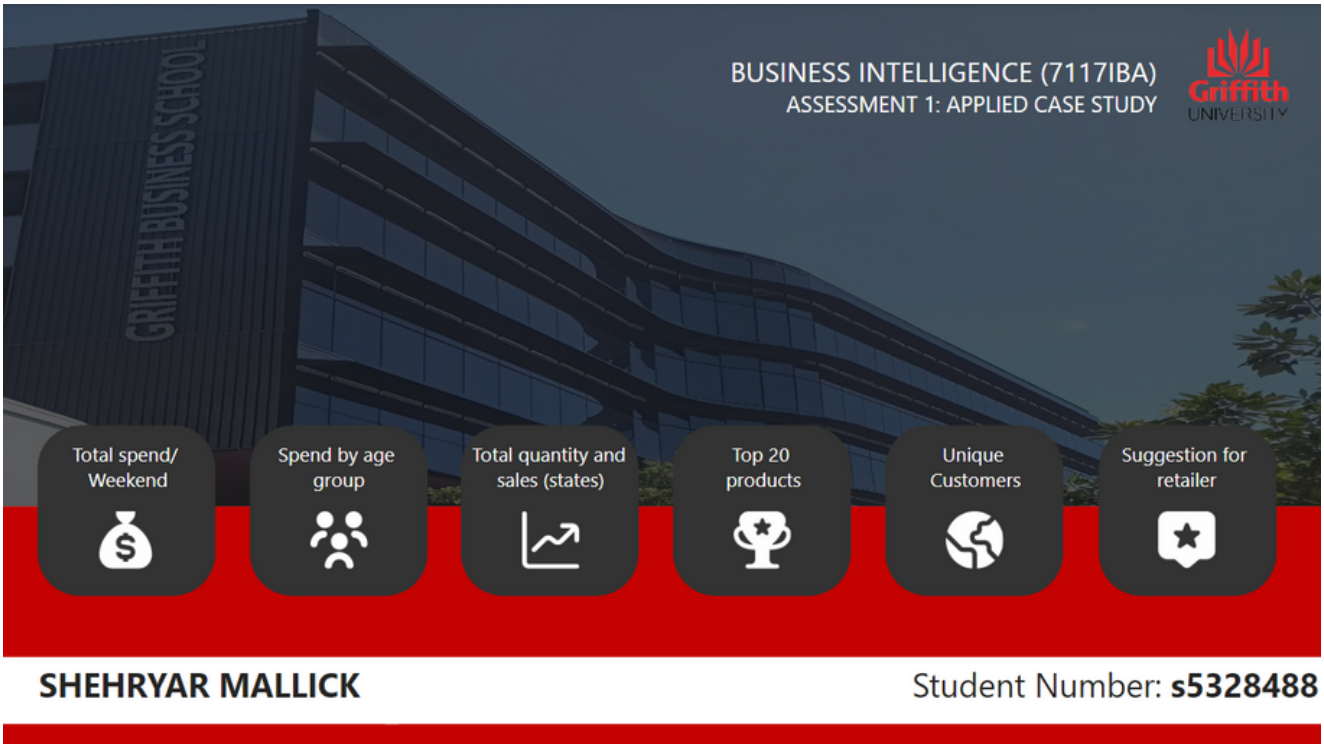
IMPORTANT: Please access the dashboard on your local computer by running the .pbix file provided.

HOME PAGE:

This is the home page of my dashboard, from here you can access all of the relevant pages. Each page gives answer to a single question asked in the BI assignment.

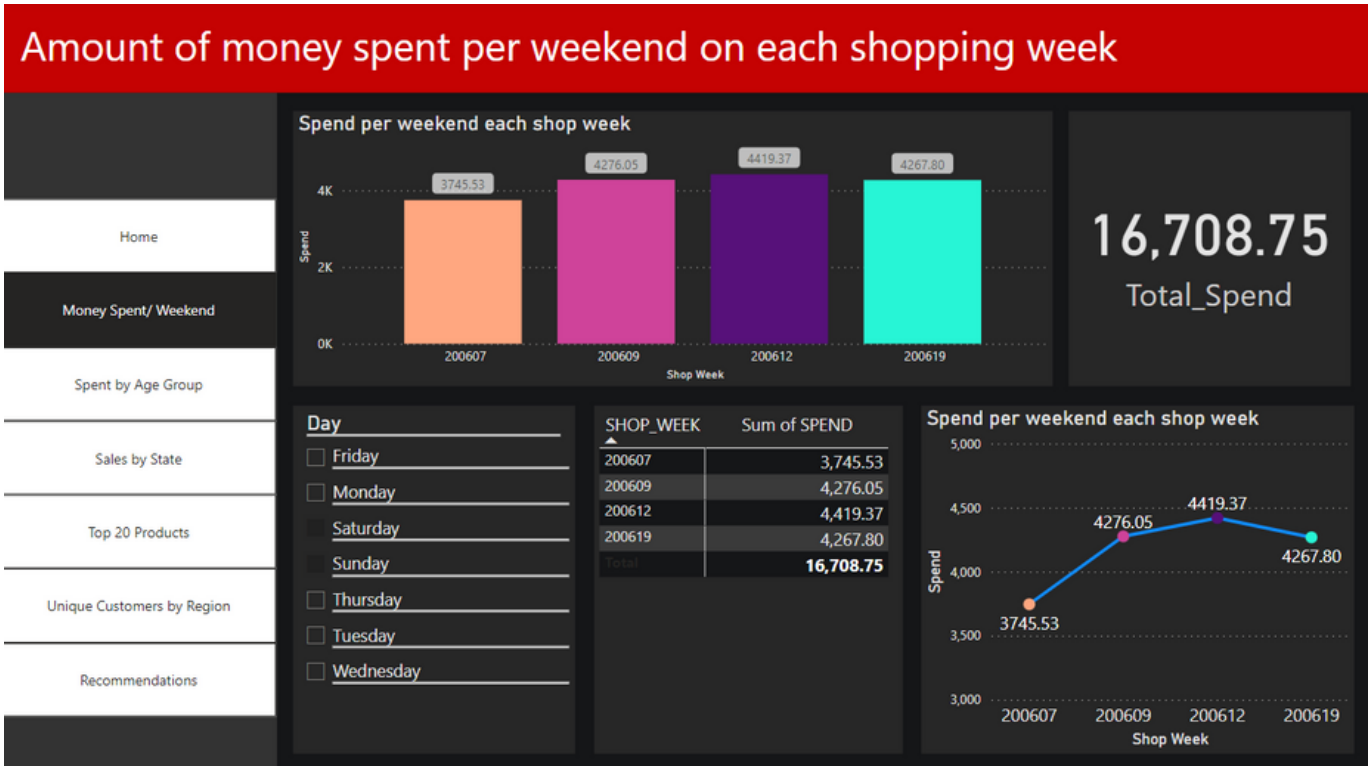
The last page that you can access contains the shorter version of suggestions for the retailer as asked in question number 6.

In order to navigate just click on any of the six available icons on the buttons.



PAGE LAYOUT:

Following image depicts how all the pages have been structured, it is important to note that some pages may not contain the explicit filter.



Each page has a navigation side bar, the highlighted pane reflects the page that you are currently on. On top of each page you will find a heading that describes the purpose and answer that a particular page answers.

Now for the crucial elements of every page, **visualizations**. Each page contains a set of visualization that help in painting the bigger picture and answering the question, for instance this page contains 4 different visualizations

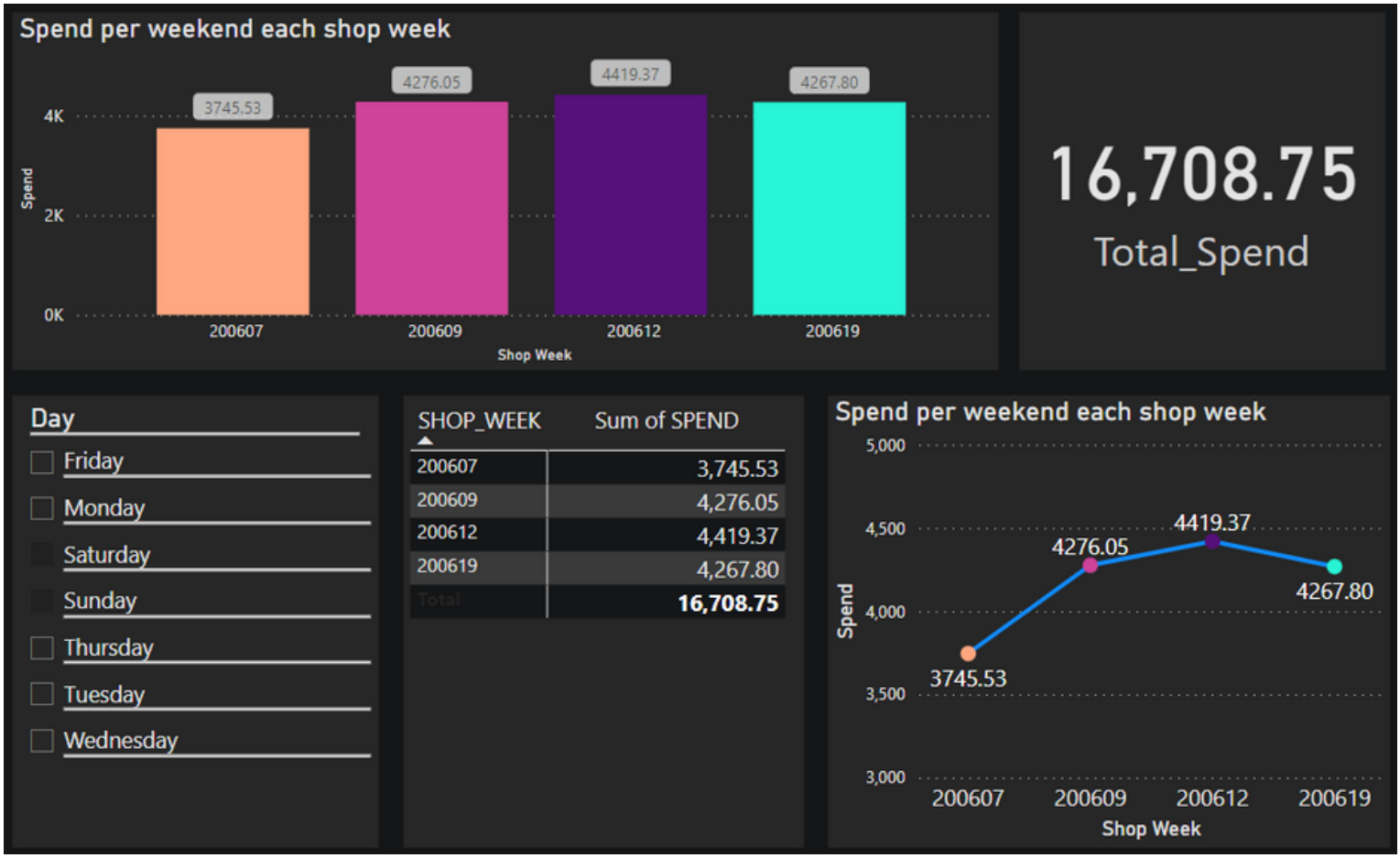
Finally some pages may contain explicit filter as shown in the above picture. These filter not only help in answering the questions asked but also provide support to perform variety of other analysis, for instance using the filter I can also check the total sales on weekdays.

IMPORTANT: The steps for the creation of graphs and relevant measures can be found in the **Technical Specification** section of the report.

REPORT Q1:

Total amount of money spent per weekend on each shopping week?

ABC Retail Company
Transactions: 10/04/2006 - 09/07/2006
Total Sales Transactions Per Weekend Analysis



The above dashboard page helps in answering the question 1 that is how much money was spent on weekend of each week.

We start of by setting the filters to Saturday and Sunday in order to see how much was spent per shopping week on weekends. The total spend card visualization tells you the total amount that was spent on all weekends of all the shopping weeks which comes to **16708.75$**

An overview shows that the most successful week in which the most money was spent on weekend are **200612** followed by **200609** and finally **200619.**

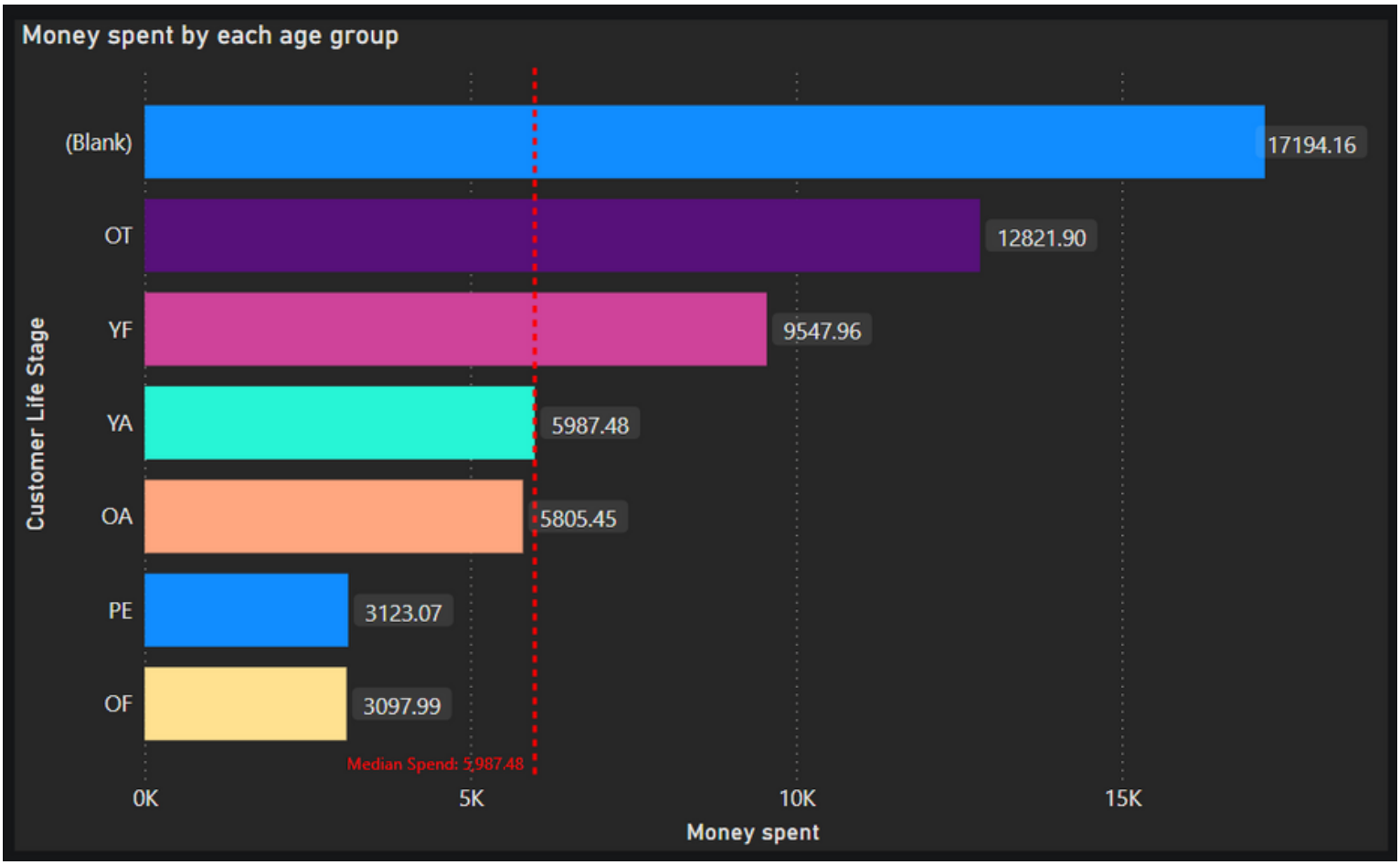
From the bar chart, table or line chart you can see that there was a gradual increase till week 200612 and then a sudden decrease of around **152$**. And important point to note that the spend of the most recent week were lower than both weeks 200612 and 200609.

This is an indication that fewer people are going to shopping in the recent week, upon further investigation it was revealed that this solely was due to decrease of sales on **Sundays** and not Saturdays which was revealed by setting the filter to Sunday and Saturday individually, showing a decrease of **299.23$** in spent on Sundays.

REPORT Q2:

Money was spent by each age group

ABC Retail Company
Transactions: 10/04/2006 - 09/07/2006
Total Sales By Age Group Analysis



The dashboard page answers the question of how much money was spent by each individual belonging to various groups. Before we proceed any further a disclaimer that the **(Blank)** represents the individuals who's life stage was not available.

In-order to understand the significance of difference in spend we have calculated the median spent of each available category as a threshold. The **median** value comes to **5978.48$**.

After that we plot the spend of different groups and notice the individuals who identify as **OT(Other)** and **YF(Young Families)** are in the green zone as they are way above the threshold line having a spend of **12821.90$** and **9547.96$** respectively.

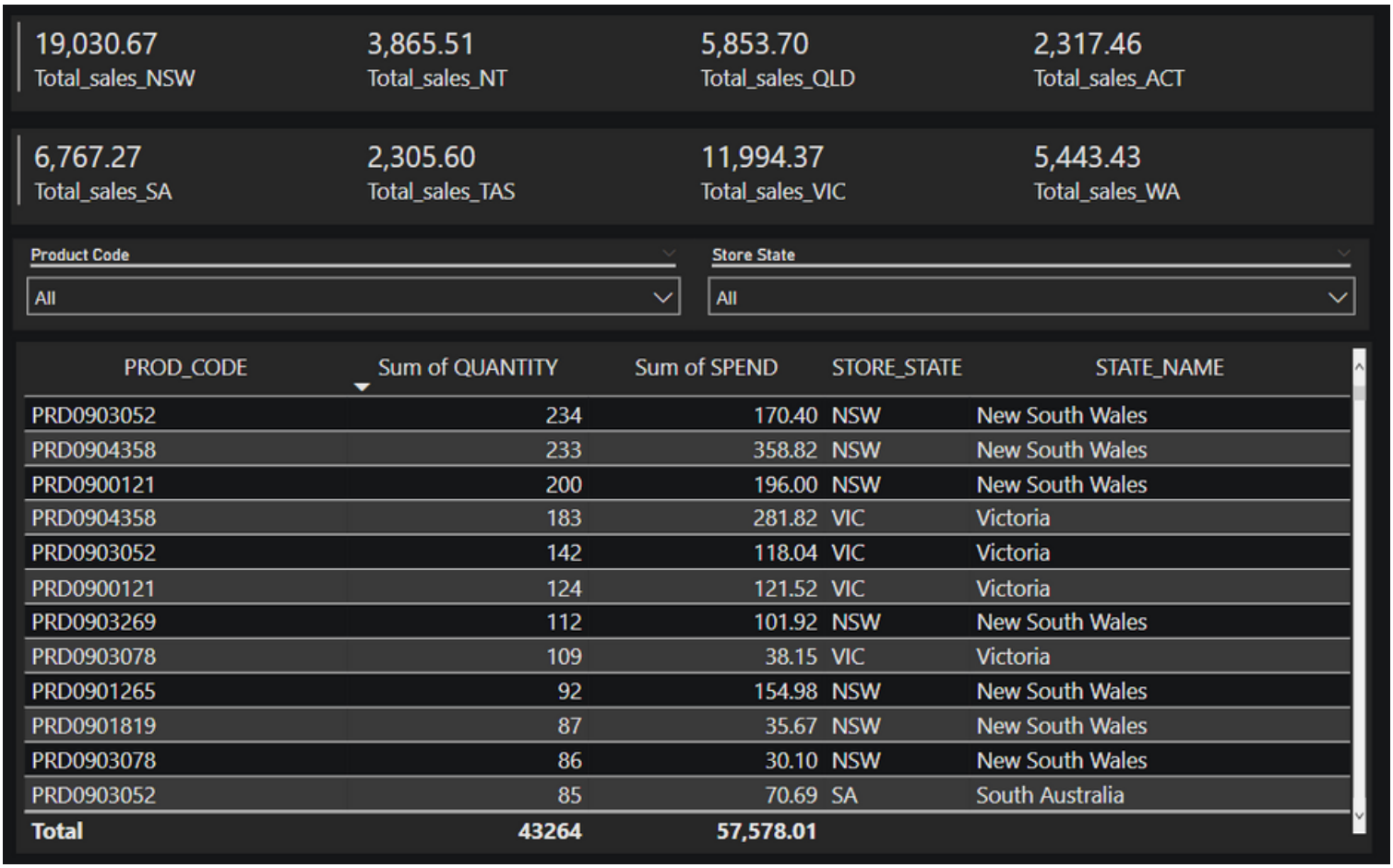
While the individuals of **YA(Young Adults)** and **OA(Older Adults)** are just near the threshold line, we can regard it as individuals that may need to be looked into by the retailer but are not a priority hence can be regarded as yellow zone customers.

However the individuals of the **PE(Pensioners)** and **OF(Older Families)** group are way below the median line and need urgent attention. These are the customers that for some reason are reluctant to spend having a spend of **3123.07$** and **3097.99$** respectively which in turn suggests to further look into their needs and the problems they face that could be solved by the retailer in-order to encourage them to spend more.

REPORT Q3:

Total quantity sold and total amount of sales of each product in each state?

ABC Retail Company
Transactions: 10/04/2006 - 09/07/2006
Product Sales And Revenue By State Analysis



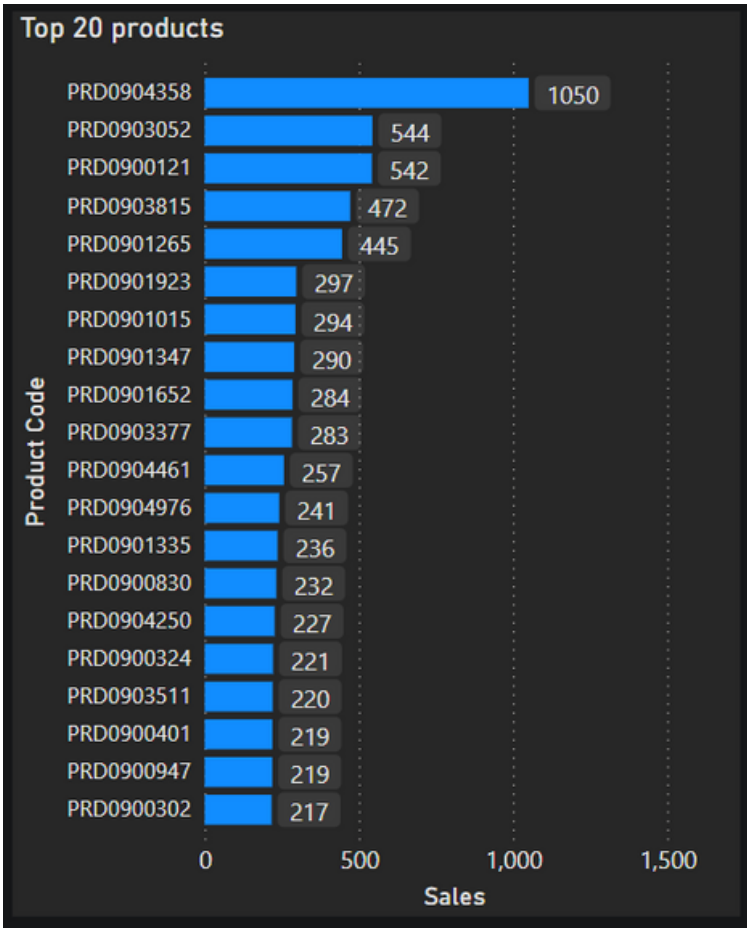
PROD_CODE	Sum of QUANTITY	Sum of SPEND	STORE_STATE	STATE_NAME
PRD0903052	234	170.40	NSW	New South Wales
PRD0904358	233	358.82	NSW	New South Wales
PRD0900121	200	196.00	NSW	New South Wales
PRD0904358	183	281.82	VIC	Victoria
PRD0903052	142	118.04	VIC	Victoria
PRD0900121	124	121.52	VIC	Victoria
PRD0903269	112	101.92	NSW	New South Wales
PRD0903078	109	38.15	VIC	Victoria
PRD0901265	92	154.98	NSW	New South Wales
PRD0901819	87	35.67	NSW	New South Wales
PRD0903078	86	30.10	NSW	New South Wales
PRD0903052	85	70.69	SA	South Australia
Total	**43264**	**57,578.01**		

The above table has two multi cards that tells us about the contribution of total sales from each state.
If you look at the cards you can see that **New South Whales** had the highest spend that amounted to **19030.67$** followed by **Victoria** and **South Australia** having sales equal to **11994.37$** and **6767.27$** respectively.
Moreover this dashboard question particularly answers the question 3 that is the total quantity sold and sales of each product in each state.
There are two filters also available for user's ease incase they want to specifically look for a product or want to look into the stats on a particular state.
The table depicts each product, the quantity it sold and the revenue it generated in each state.
The analysis reveals that there are products that only sold 1 item during the complete shopping week cycle for instance **PRD0900003** only sold a single item in ACT and item **PRD0900005** a single one in SA, while on the other hand there were items that are frequently sold for instance **item PRD0903052** which is in **top 3 in all states** and the **most bought item in four out of eight states**.
This significance of the PRD0903052 is that it's a popular product having a total **sales** of **710** and total revenue generated of **543.79$** (total of all states)

REPORT Q4:

20 products have the highest sales in value where more than 1 item was sold

ABC Retail Company
Transactions: 10/04/2006 - 09/07/2006
Top 20 Product Sales And Revenue Analysis



PROD_CODE	Sum of SPEND	Sum of QUANTITY
PRD0904358	1,050.28	682
PRD0903052	543.79	710
PRD0900121	541.94	553
PRD0903815	471.54	87
PRD0901265	445.01	271
PRD0901923	296.64	32
PRD0901015	294.14	191
PRD0901347	290.03	97
PRD0901652	284.40	79
PRD0903377	282.75	75
PRD0904461	256.62	141
PRD0904976	241.38	162
PRD0901335	236.00	19
PRD0900830	231.83	239
PRD0904250	226.59	91
PRD0900324	221.46	33
PRD0903511	220.35	65
PRD0900401	219.42	18
PRD0900947	218.96	184
PRD0900302	216.82	176
Total	**6,789.95**	**3905**

This dashboard is created to answer of the question 4 by listing the top 20 products, followed by their quantity sold and the revenue they generated having quantity sold more than 1.

The bar chart reveals the top 20 products by the revenue that they generate while the table shows the not only the revenue generated by each product but also the amount of quantity sold of each product.

Moreover upon some further calculation it is revealed that these 20 products are responsible for **approximately 12%** total revenue that is generated.

(Note: total sales = 57578.01 {see page 1 of dashboard without filter})

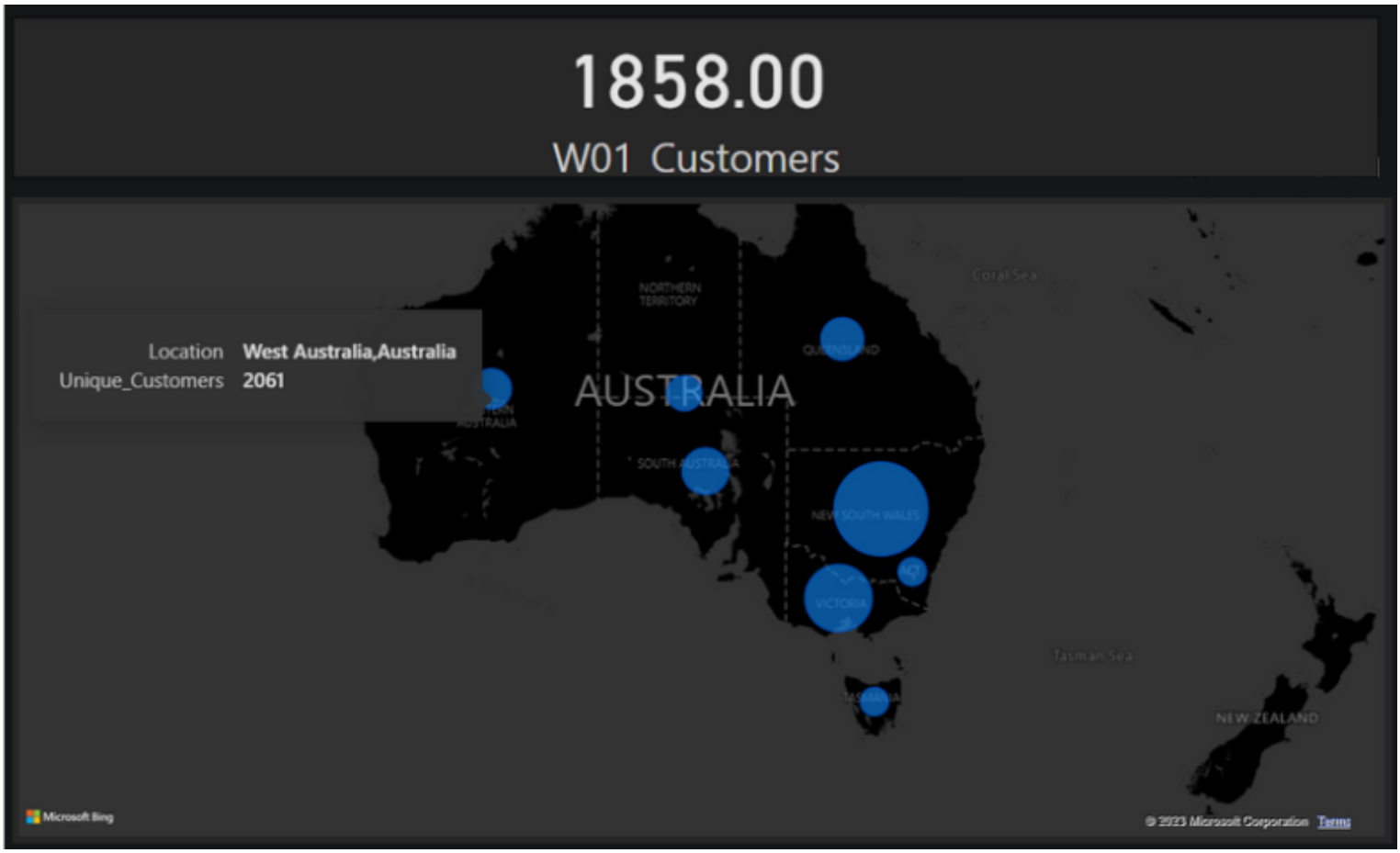
If you look at the table you will find an interesting fact that the item **PRD0904358** has generated the highest revenue that is of **1050.28$**, now for the interesting part it is **not the most sold product**, if you observe closely it is the actually the second most sold product with a quantity being sold equal to **682**.

The most sold product from the analysis is actually item having code: **PRD0903052** with a total quantity being sold **710**. And even though it is the most sold product it generates only approximately half of what item **PRD0904358** generates that is **543.79$**. A similar phenomenon is exhibited by **PRD0903815** which only sold **87** items but is still the **4th highest** revenue generating product. This compels us to think that there is a need of adjusting the pricing of the products.

REPORT Q5:

Unique customers does region W01

ABC Retail Company
Transactions: 10/04/2006 - 09/07/2006
Sales Transactions Analysis



The above page of the dashboard is to answer the question of how many unique customers are in region W01. This is answered by the card visual that actually shows the calculated value which comes to a total of **1858** unique customers in region **W01**.
Just below the card visual we have another important visualization that is the map visualization. The Map visualization reveals the unique customers belonging to different states in Australia. The bigger the circle in a particular state the more number of customers it has. If you refer to the map visualization and see the highlighted state that is **Western Australia** you would see that it has a total of **2061** unique customers.
In the same manner you can hover over the rest of the states to reveal the unique customers that belong there. The significance of this map visual is that it depicts the major and minor client base of the retailer all across the Australia.

Q6 STRATEGIES

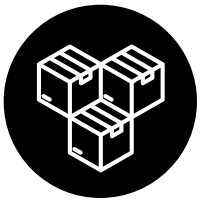
The following five strategies are based on the analysis carried out in the previous reports.

Strategy No. 01 —

There is a notable decrease in the sales at the weekends of the last shopping week seen from the analysis of question 1, so the recommendation for retailer is to start some kind of **weekend sale** this sale will focus on clearance of items that have not been sold for long instances of time moreover **sale on grocery** and other food items as people usually do not have time to go for shopping during the week so by putting a sale on these said items on weekends will encourage customers to come to shop on weekends ultimately raising sales.

Strategy No. 02 —

Since the individuals of PE and OF are not spending as much as other groups the recommendation to retailer would be to start a **delivery service** specifically for the **PE group** as pensioners (PE) is heavily comprised of old age individual and coming to shop can prove to be a daunting task for them so starting this service will help them purchase goods without coming to the store themselves. A **designated POS** for the pensioner who do come in person to the store can also prove to be valuable in longer run as they wouldn't have to wait in long lines with others and would be more encouraged to come to and purchase goods in store.
As for the **OF group** the retailer can start a **loyalty card service** which would give points whenever a purchase is made and those points could be redeemed for discount, by doing so the retailer would intrigue interest in this particular group of people which would have a direct impact on sales.



Strategy No. 03 —

The analysis of question 3 reveals that there are products that only sold 1 item during the complete shopping week cycle hence it would be smart move **to recall such items and replace them with items that are frequently sold** for instance hence increasing it's stock would be a sound move to increase sales as the demand seems to be ever increasing.
Moreover if the recall is not in the question then the retailer can put a special deal of selling them in conjunction with the frequently bought items to make profit and clear up the stock.

Strategy No. 04 —

An interesting phenomenon was observed from the results of question 4 that the product(PRD0904358) that generated the most revenue(1050.28$) was in-fact not the most sold item coming second to PRD0905032, which compels us to regard as it **"Chart Buster"** or **"Hot Seller"** product, there upon **having stock of PRD0904358 as backup would be a favorable course of action**.
Another thing is that the product **PKD0903052** had the most sales which means it is in high demand but is not generating as much as revenue as **PRD0904358** so the retailer **can slightly increase it's price** in-order to increase their revenue.

Strategy No. 05 —

The analysis that was conducted for question 5 revealed that the total number of customers from region W01 were 1858. Since we know that this region is comprised of individuals belonging to various states the retailer can take a **survey of the people of region W01** to find out the suggestions regarding what can be improved or added into the store.
Moreover if you look at the Map visual in the page number 5 of dashboard you will see that New South Whales and Victoria contribute around 53.9% of the total clients so having frequent promotional deals and always having stock ready should be a priority if the retailer wants to increase the revenue.

TECHNICAL SPECIFICATION

QUESTION NO 1:

Since we only needed to calculate the spend by customers each week hence it didn't matter if same customer bought items more than once with in a week.
To create the card visual I created the following measure and put it into my card visual to display the results.

```
1  Total_Spend = SUM(TRANSACTIONS[SPEND])
```

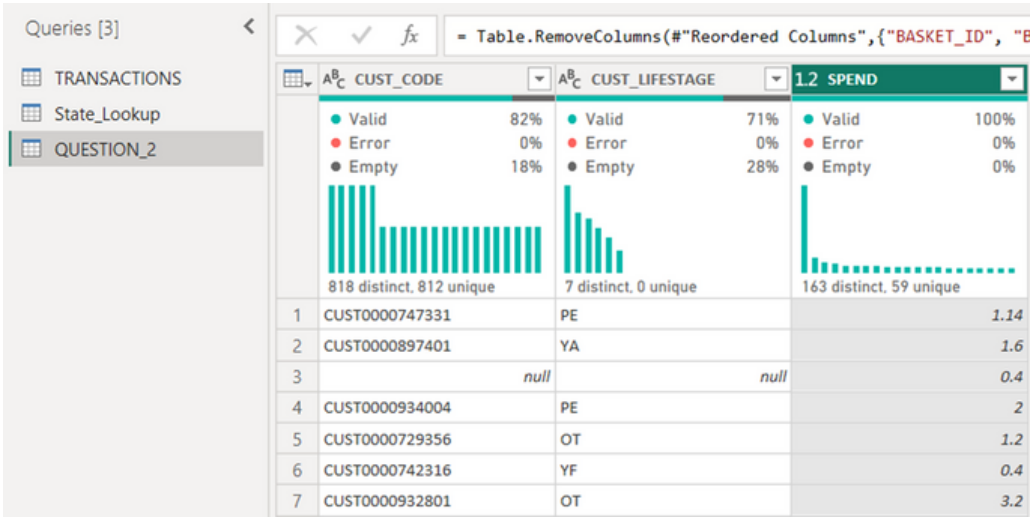
In-order to create the filter I created the following column in my dataset.

```
1  Day = FORMAT(TRANSACTIONS[SHOP_DATE],"dddd")
```

Then I dragged and dropped that column onto my filter. To create the rest of the visualization on the page I simply had to drag and drop the respective column onto the visualization and did not need to perform any extra calculation.

QUESTION NO 2:

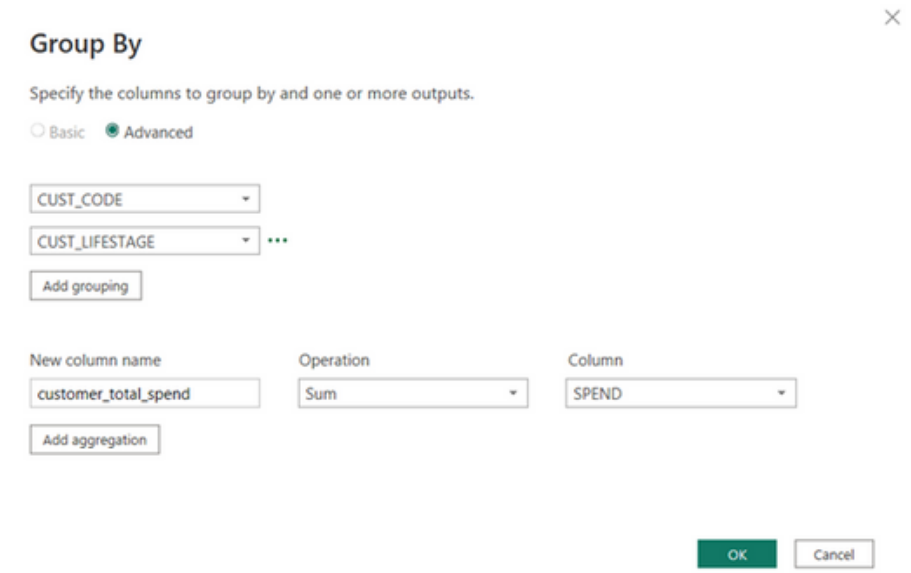
Here I first had to select unique customers only so that they do not skew the data multiple times and give false perception of a particular age group/customer life stage being more than the other. This was done using Power Query



As you can see that a particular customer bought twice

CUST0000999951	YA	0.28
CUST0000999951	YA	1.46

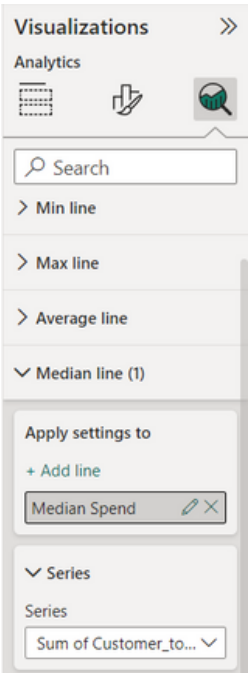
Then I calculated how much each unique customer spent using the group by function.



And by doing so I now have the total amount spent by each customer and the age group that they belong to.

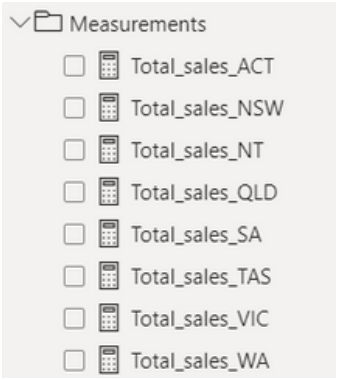
2	CUST0000999951	YA	1.74

Finally I dragged the newly created column of customer total spent and the cust_lifestage columns onto my bar visualization.
One last thing I did to my visualization was adding the median line onto the chart which I added through further analysis pane of the visualization as shown:



QUESTION NO 3:

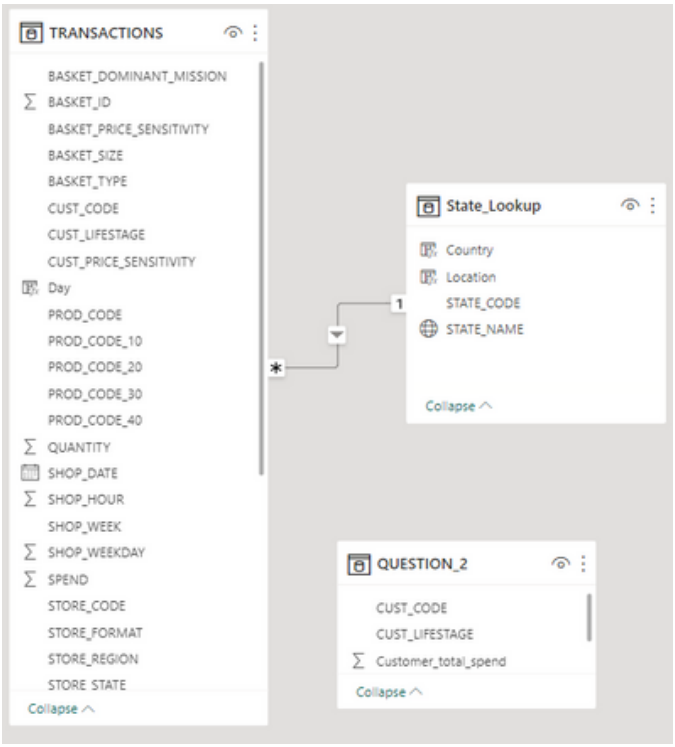
For question 3, multi-card visualization I had to perform calculations for each of the eight states as follows.



The formula for calculation looks like:

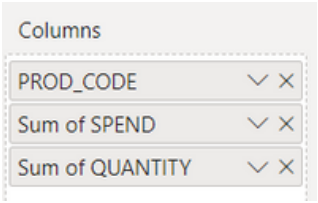
```
1  Total_sales_ACT = CALCULATE(SUM(TRANSACTIONS[SPEND]),FILTER(TRANSACTIONS,TRANSACTIONS[STORE_STATE]="ACT"))
```

The only change in the rest of the formulae is in the **FILTER** where I pass the relevant state code who's spend I am calculating.
For the filters and table visualization I only had to drag and drop the relevant column into the visualization.
Finally to show the state names with the state code I created a 1-to-many relationship between the transaction and state lookup table as follows

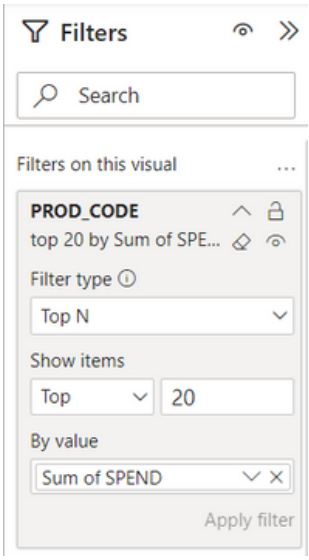


QUESTION NO 4:

For the table and bar chart I had to drag and drop the relevant columns on to the visualization. Then I had to set the **SPEND** and **QUANTITY** columns to **SUM.**



Finally to filter out only the top 20 items I applied the filter on both of the visualization from the filter pane as shown:



QUESTION NO 5:

For all the unique customers in the W01 region I had to create a measure for the card visualization as shown below:

```
1 W01_Customers = CALCULATE (
2     DISTINCTCOUNT (TRANSACTIONS[CUST_CODE]),
3     FILTER(TRANSACTIONS,TRANSACTIONS[STORE_REGION] = "W01"
4     ))
```

For the map visualization I had to create a measurement with distinct count as follows:

```
1 Unique_Customers = DISTINCTCOUNT(TRANSACTIONS[CUST_CODE])
```

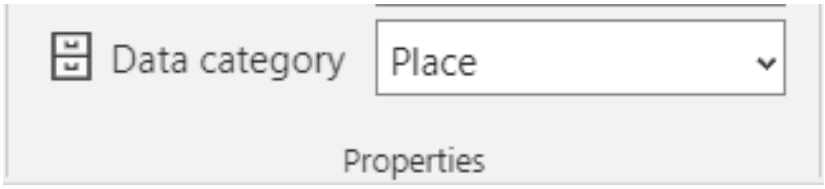
Final thing that I did for the map visualization was create two new columns called **Country** and **Location**.

```
1  Country = "Australia"
```

```
1  Location = CONCATENATE(CONCATENATE(State_Lookup[STATE_NAME],","),State_Lookup[Country])
```

STATE_CODE	STATE_NAME	Country	Location
NSW	New South Wales	Australia	New South Wales,Australia
ACT	Australian Capital Territory	Australia	Australian Capital Territory,Australia
VIC	Victoria	Australia	Victoria,Australia
QLD	Queensland	Australia	Queensland,Australia
WA	West Australia	Australia	West Australia,Australia
SA	South Australia	Australia	South Australia,Australia
NT	North Territory	Australia	North Territory,Australia
TAS	Tasmania	Australia	Tasmania,Australia

After that I set the type of the Location column as place in the property pane, by doing so Power BI was able to detect it and pin point the locations.



CONCLUSION

The above descriptive and creative analysis conducted on the ABC retailer has yielded interesting findings which in turn helped in developing/suggesting strategies that would help the retailer increases sales and enhance their business. To sum them up:

- Put weekend sale on the merchandise to attract the customers and make up for the noticeable decline observed in the last shopping week.
- Take necessary measures to make shopping experience for specific life stage groups easier so they are more inclined to shop at ABC Retail Company.
- Recall infrequently sold items and sell them if recall is not possible on lower profit and in conjunction with the frequently sold items to avoid loss.
- Increase the backup stocks of top 20 items and increase the pricing of few of the items that are sold in bulk quantity but are generating insignificant revenue relative to their contemporary items.
- Carry out survey in region W01 to get a sense of the people's need and introduce those new proposed needs in the retail store.

The implementation of the suggested strategies have a significant chance of proving to be valuable in increasing the retailer's business revenue.