POWER BI VISULIZATION DASHBOARD PROJECT

A PROJECT REPORT

in partial fulfilment for the award of the degree

of

MASTER OF TECHNOLOGY

In

DATA SCIENCE AND ANALYTICS

Submitted by

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SCHOOL OF DATA SCIENCE AND FORECASTING

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STATEMENT OF ORIGINALITY

In accordance with the requirements for the Degree of Master of Science in DATA SCIENCE AND ANALYTICS, in SCHOOL OF DATA SCIENCE AND FORECASTING, I present this report entitled **INDIAN CENSUS VISUALIZER WEB APPLICATION**. This report is completed under the Supervision of:

INTERNAL SUPERVISOR

Mr. Vandit Hedau

Assistant Professor,

SDSF, DAVV

I declare that the work presented in the report is my/our own work except as acknowledged in the text and footnotes, and that to my knowledge this material has not been submitted either in whole or in part, for any other degree at this University or at any other such Institution.

PUSHPRAJ SINGH RATHORE

SCHOOL OF DATA SCIENCE AND FORECASTING
DEVI AHILYA VISHWAVIDYALAYA
INDORE (M.P)

RECOMMENDATION

This dissertation entitled “POWER BI VISULIZATION DASBORD PROJECT ” submitted by PUSHPRAJ SINGH RATHORE towards the partial fulfilment of Degree of Master of Science in Data Science And Analytics of Devi Ahilya Vishwavidyalaya, Indore is a satisfactory account of his/her project work and is recommended for the award of degree

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SDSF, DAVV

SCHOOL OF DATA SCIENCE AND FORECASTING
DEVI AHILYA VISHWAVIDYALAYA
INDORE (M.P)

CERTIFICATE

This is to certify that the dissertation entitled "POWER BI VISULIZATION DASBORD PROJECT " submitted by **PUSHPRAJ SINGH RATHORE**is approved for the award of Master of Science in Data Science And Analytics.

INTERNAL EXAMINER

Mr. Vandit Hedau

Assistant Professor,

SDSF, DAVV

ACKNOWLEDGEMENT

I am doing a job in Excel R solution AS Junior data analyst.

In the first place, I would like to thank the faculty and staff of the School of Data Science and Forecasting for all of their assistance and support.

I especially want to thank my committee members, Dr. V.B. Gupta, and Dr. Vandit Hedau, who provide me with guidance.

This would not have been possible without their involvement. Finally, I would like to thank all those who have indirectly or directly helped me with this project.

It was a pleasure working with all of you and I am grateful for all that you contributed to the successful completion of this project.

NAME: PUSHPRAJ SINGH RATHORE

ABSTRACT

During my studies I have developed my strong competencies in data analysis data visualization, and statistical analysis as a Data Science student.

I developed a dashboard and visualized it for this project. This project is mainly based on some real-time questions concerning power BI as an industry level solution.

I used some DAX expressions and advanced features of power bi in this project. I also used some common data such as order tables and people.

In addition to exporting charts in different formats, the dashboard offers the ability to export data into CSV and download it as well.

In this Project cove some points who basically use in real time data analysis like Data Understanding Issue Imputation of missing values Relationship between table etc

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INTRODUCTION

Users may view the data in its entirety thanks to the POWER BI VISUALISATION DASBORD PROJECT. The Dashboard's objectives include shedding light on data distribution across multiple formats, problems with data comprehension, the imputed value of missing variables, and query efficiency.

This project's major goal is to employ data science and analytics techniques to design or build a user-friendly platform that makes it simple for scholars and the general public to access, visualise, and analyse the Dashboard. By offering interactive dashboards, charts, and map plots that allow users to analyse different elements of data, the POWER BI VISUALISATION DASBORD PROJECT seeks to streamline this procedure.

The object dashboard is Users may examine data by columns utilizing interactive graphs, maps, and charts that are part of the POWER BI VISUALISATION DASBORD PROJECT. A tool that allows users to compare data across various periods of time and different data sources is also included in this dashboard.

To deliver relevant insights into the Dashboard, the project employs three data set order salespeople as well as analysis and visualization techniques such as data accessing, data cleaning, data pre-processing, and exploratory data analysis. The dashboard was created utilizing a variety of techniques, including DAX formulas, Power Query editor, and charts.

Overall, the POWER BI VISUALISATION DASBORD PROJECT is a helpful tool that helps policymakers, scholars, and the general public analyze data containing a variety of parameters. This project is highly useful for data-driven research policymakers because it uses analytics and data science methodologies to give a better understanding of data.

METHODOLOGY

Data analysis and visualisation are the main goals of the POWER BI VISUALISATION DASBORD PROJECT. The steps for this project are as follows:

Power BI modelling

This series of steps include certain data cleansing operations.

1. Data comprehension

2. Imputed values for missing values

3. A date format error

4. Calculating Tax Slab

Cardinality and Desktop Visualization

1. Relationship between tables:
2. Handling many to many relationships
3. Create a Table visual on the report page:
4. Play axis on the report page:

Desktop Visualization

1.Bar Chart

2.Line Chart Issue

3.Gauge Chart
4.No Page navigator No Landing Page

DAX Expressions

1.GST Column

2.Date difference column

3.Sales Buckets

4.Total Sales

5.multi-row card

6.Gross profit margin

7.Segment-wise average sales

8.Quick Measure.

9.Cumulative Sales Measure

10.days moving average or rolling mean

ABOUT DATA SET

Sample Sales Data, Order data set People data set

Order Info, Sales, Customer, Shipping, etc., Used for Segmentation, Customer Analytics, Clustering and More. Inspired for retail analytics. This was originally used for Pentaho DI Kettle, But I found the set could be useful for Sales Simulation training.

Originally Written by María Carina Roldán, Pentaho Community Member, BI consultant (Assert Solutions), Argentina. This work is licensed under the Creative Commons Attribution-Noncommercial-Share Alike 3.0 Unported License. Modified by Gus Segura June 2014.

RESULT

The POWER BI VISUALISATION DASBORD has been successfully tested and deployed on the Power BI report Server. This Dashboard may correctly provide an overview of data as well as charts and a map plot in an interactive and user-friendly manner.

1. Column distribution, Column quality, and Column profile.

Column distribution:

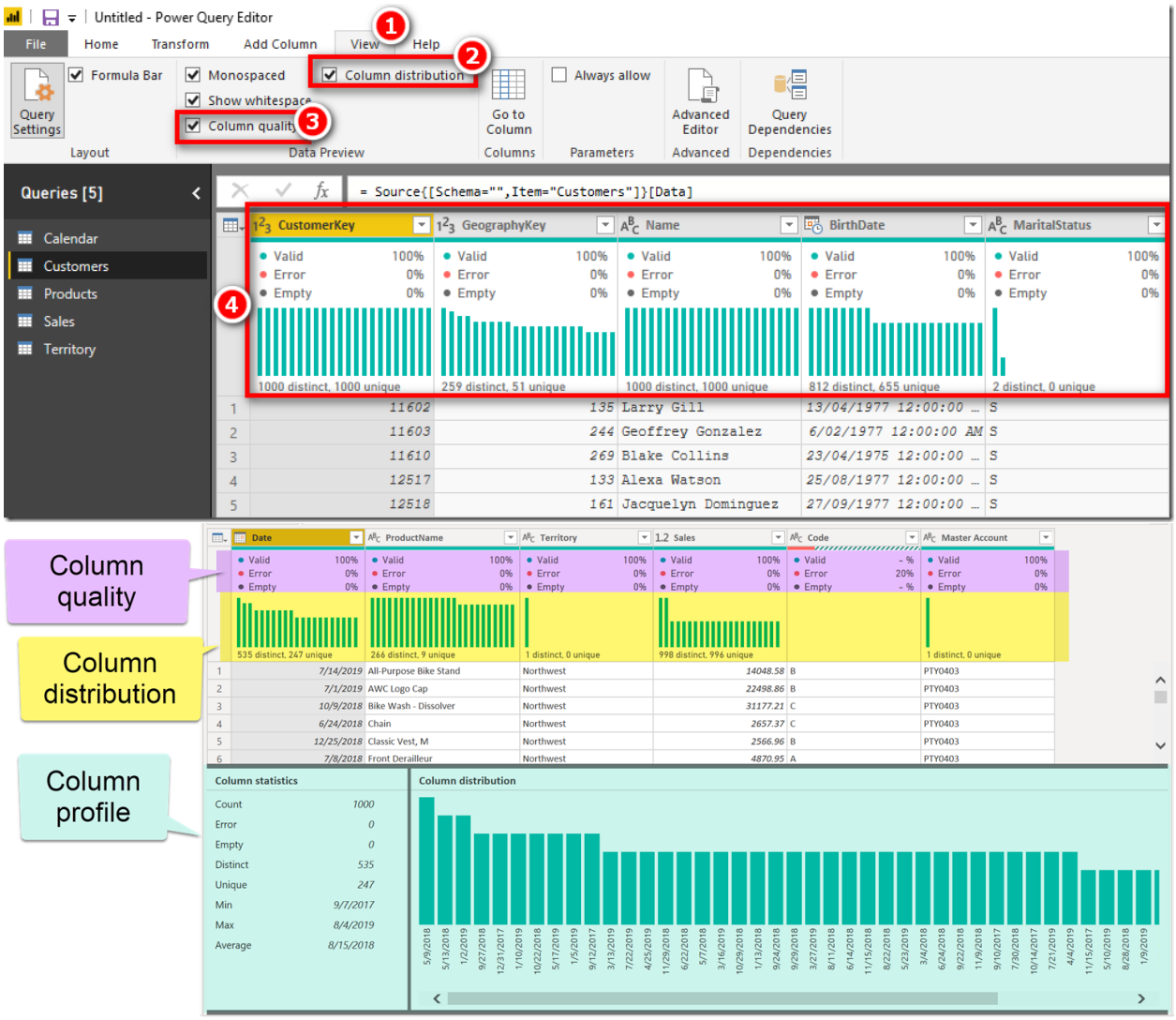
- It is helpful information for that, which can be enabled under the View tab in the Power Query Editor.

Column Quality:

- The information provided includes the number of Error, Empty, and Valid data cells in that column and their percentage.
- You can enable the Column Quality in the View tab in the Power Query Editor.

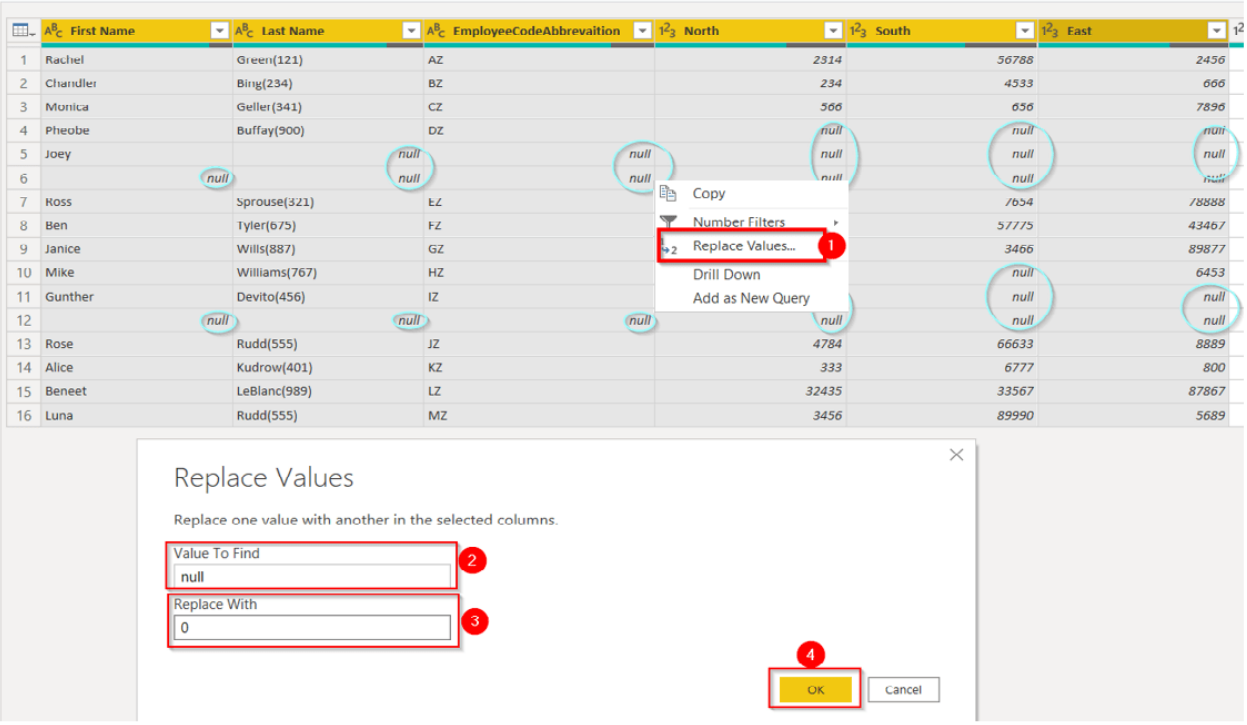
Column profile:

- It includes the count of errors and empty values and the distribution of values in the column.
- Information such as the minimum, and the maximum values, the count of unique values, and the distribution of values in detail.
- You can enable the Column Profile in the View tab in the Power Query Editor.



2. Data cleaning of null values with a replacement.

- Click on the **transform data** option. It will take you to the **Power Query Editor** and check the column which contains null values.
- Click on the transform option in the toolbar. You can see several options in the transform toolbar, click on the replace values option and replace the null values with West.


First Name
Last Name
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North
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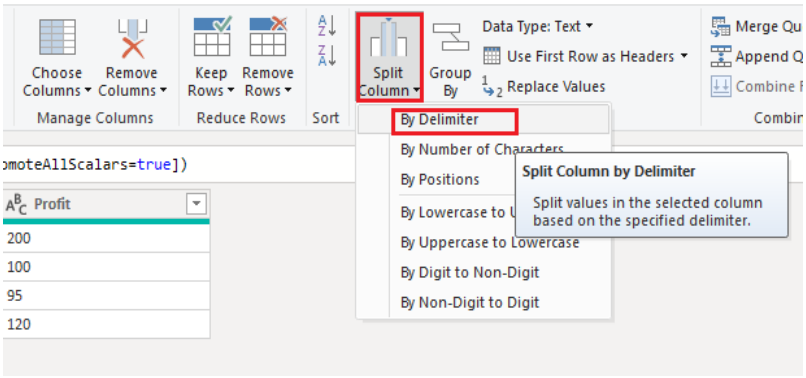
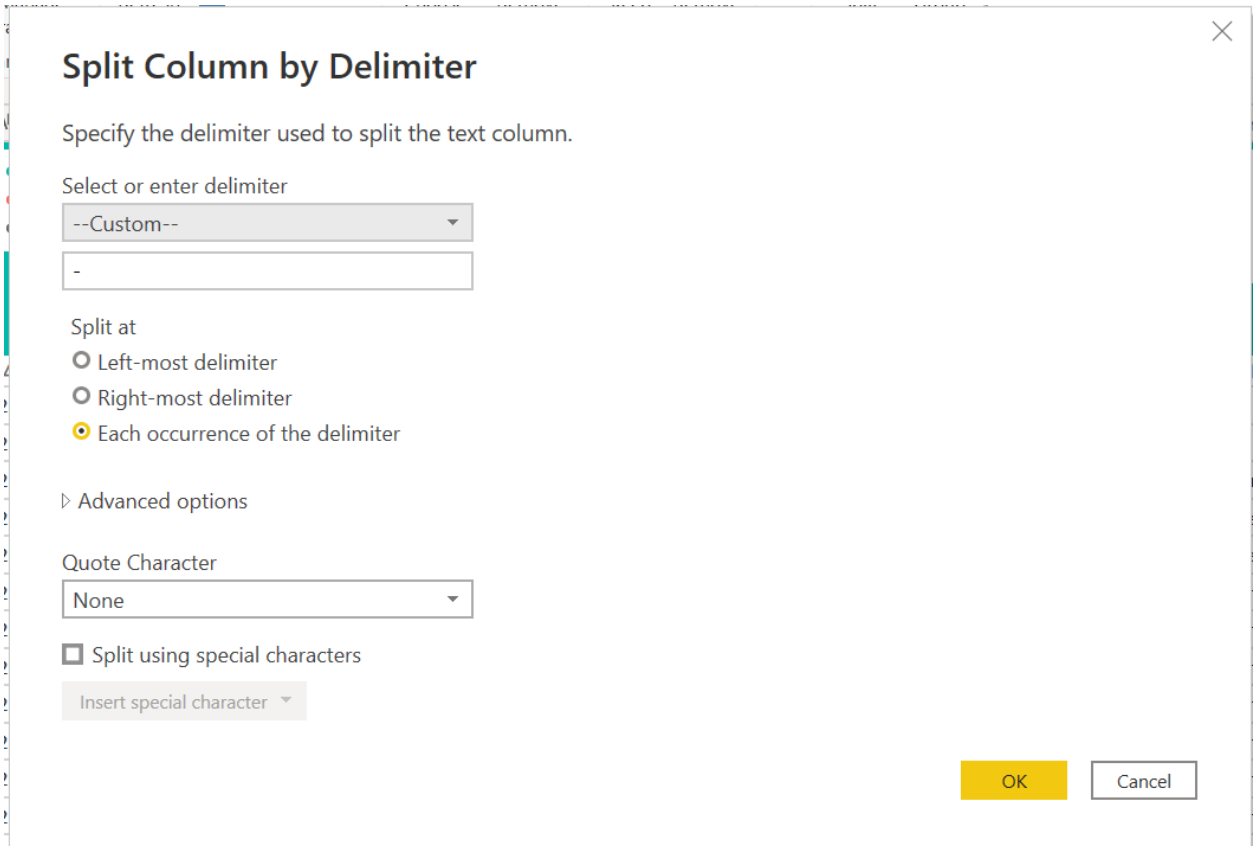
Copy
Number Filters
Replace Values...
Drill Down
Add as New Query
Replace Values
Replace one value with another in the selected columns.
Value To Find
null
Replace With
0
OK
Cancel

3. Changing the Date format from mm/dd/yyyy to dd/mm/yyyy.

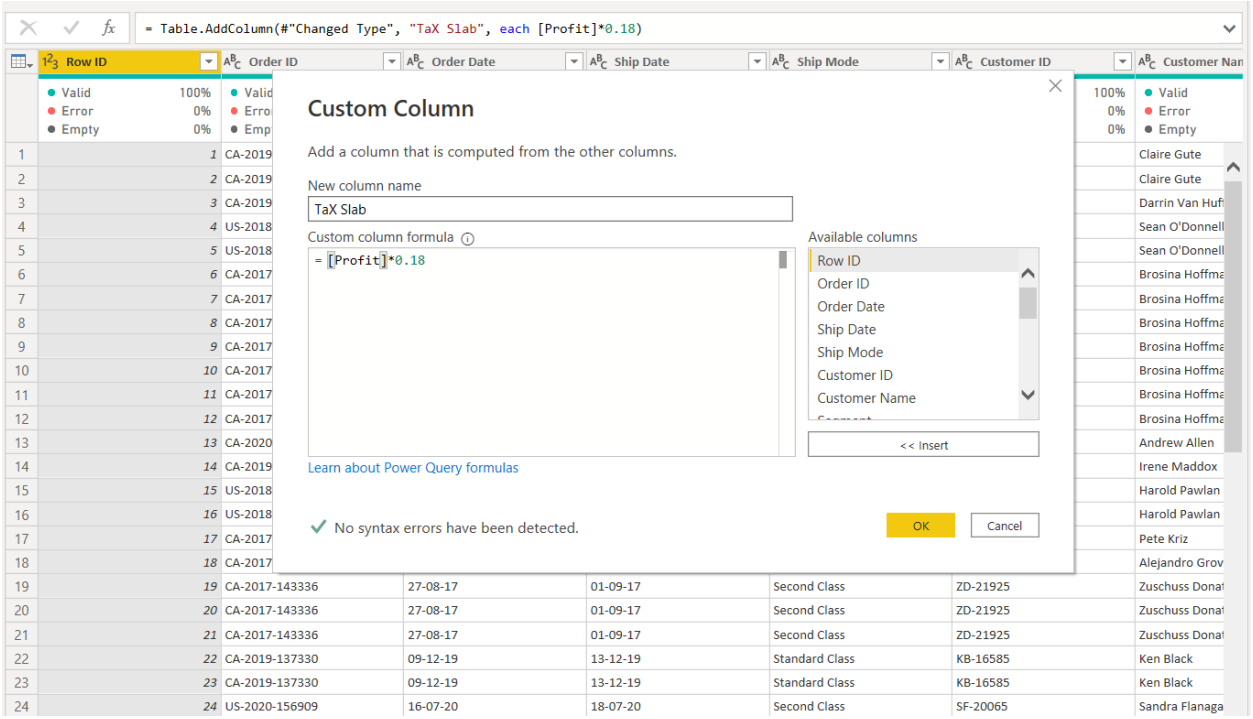
- In the **Power query,** click on the Order Date column; in-home tab, there is an option called **split columns**; click it and split the column **by delimiter.** Please make sure to use the appropriate delimiter "-." You can find the split column in the **home> split column** or **transform> split column.**
- The power query automatically detects the character and just needs to click on ok or you can click on custom and enter the character which the column contains and then click ok.
- After splitting the column, select the column which contains the month. Drag and drop the column between the date and year column then select those 3 columns and click on the merge columns option in the transform toolbar. Change the column **data type** to date after merging those columns.



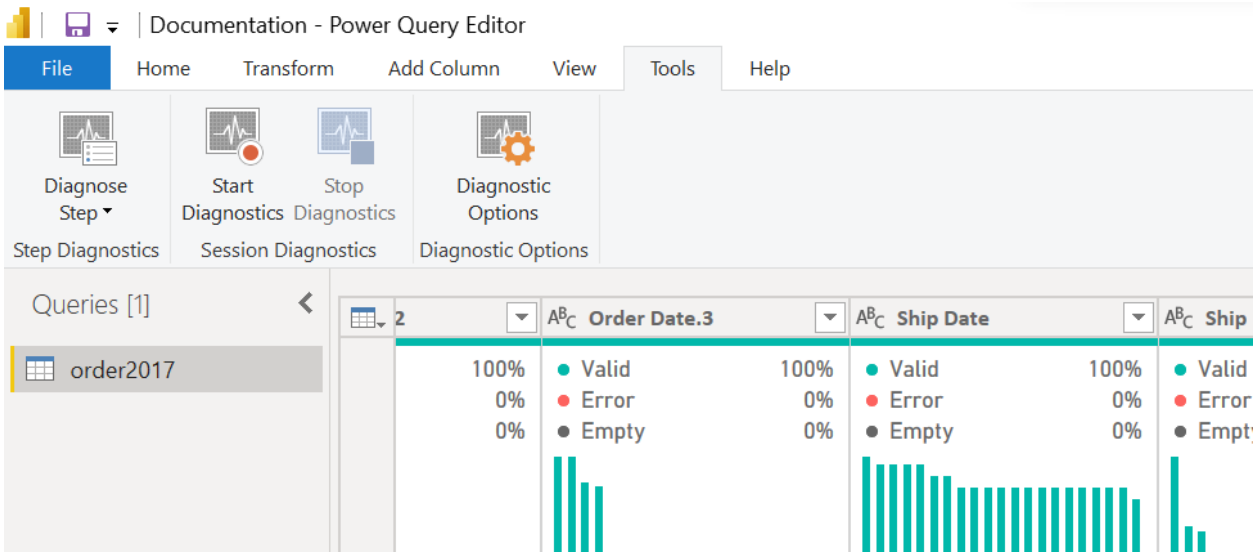


4. I am creating a calculated column for calculating the tax slab using the profit column.

- To calculate tas slab, go to **Add Column** toolbar in **Power Query** and click on the custom column option. **Add column> Custom Column**
- After that insert profit from available columns and multiply it by 0.18 and manually enter the **New column name.**

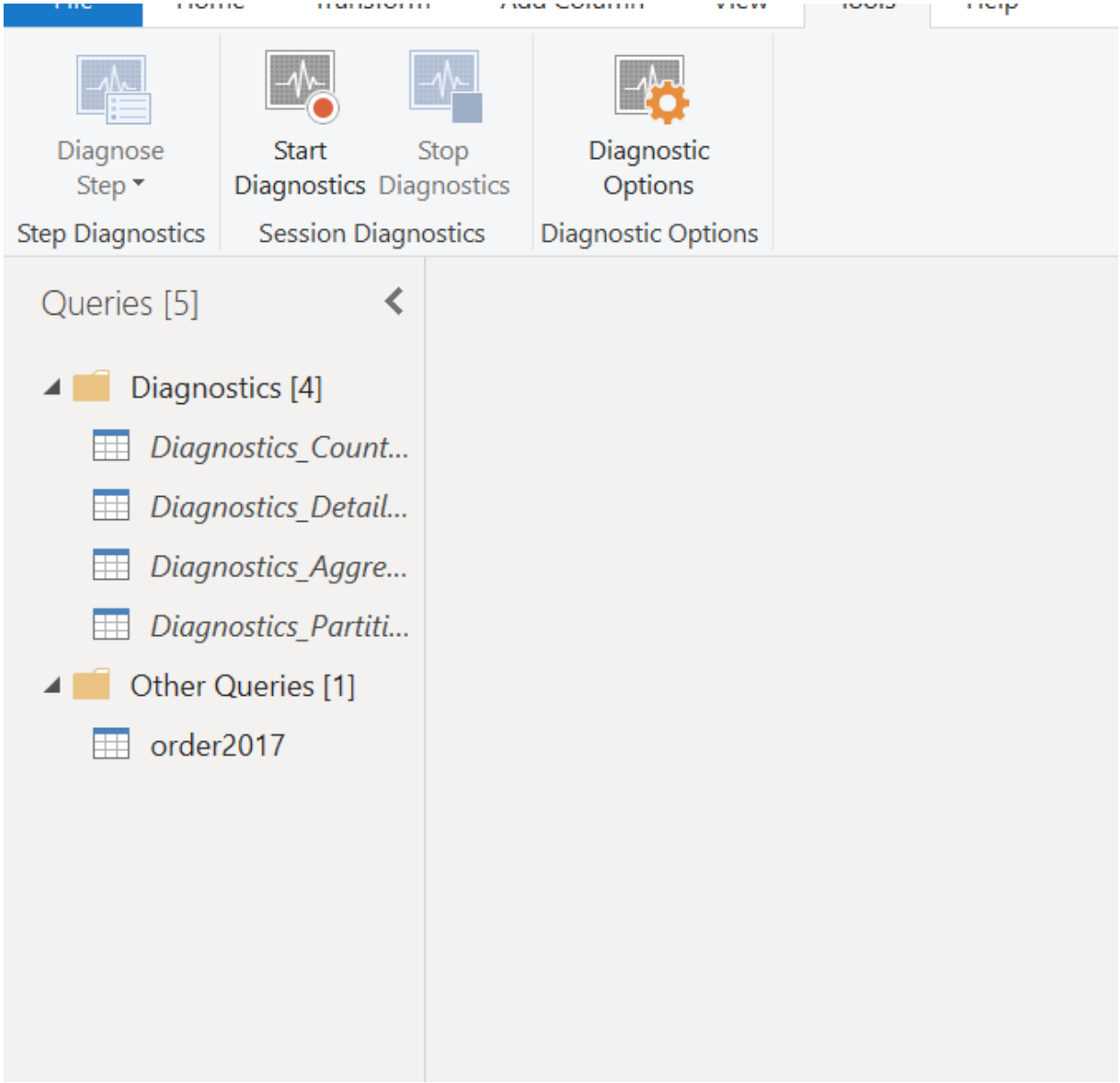


5. Evaluating the performance of the query.
   - **Start Diagnostics**. You can find Start Diagnostics in **Tools>Start Diagnostics.**



Click on start diagnostics.

Perform the query or refresh the data and find the metric table below:

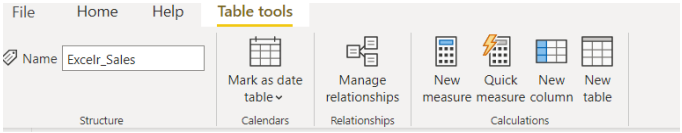


Cardinality and Desktop Visualization Solutions:

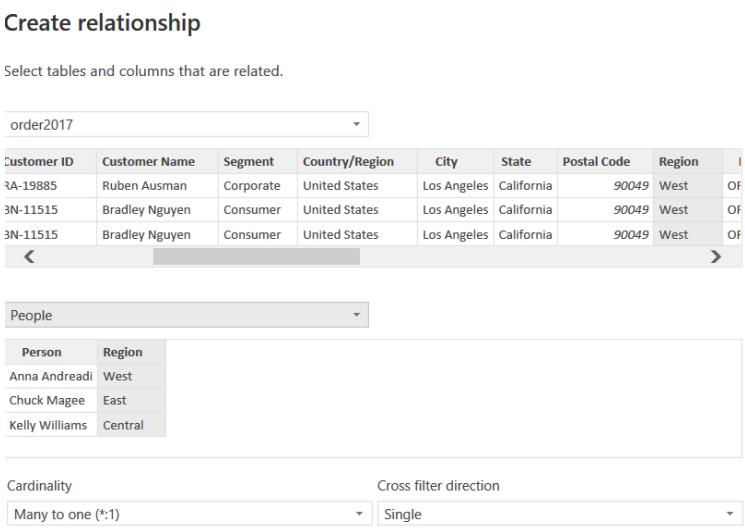
1. Create a cardinal join to apply across filters between people and order tables.

Solution:

- Click on **Text/CSV** in **Get Data.** Upload the datasheet into Power BI.
- Goto the Data view in Power BI and click on **Manage relationship**. A pop-up window will be opened.



- Next click on new and select the tables. Now select columns that are related between order table and people table.

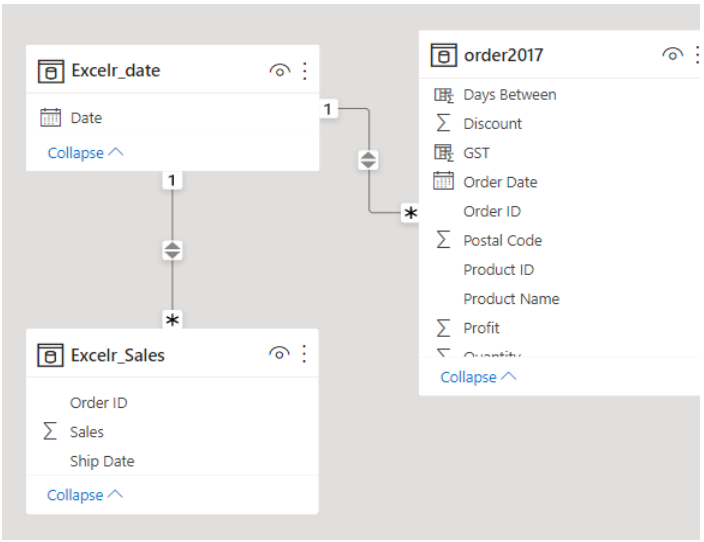


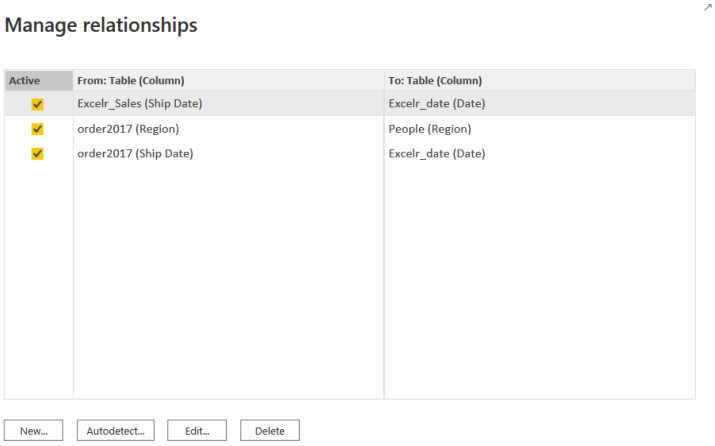
- Select the **Region** column in both tables.
- It will automatically show the type of relationship between the tables on the **Region** column. Click on OK and cardinal join will be created.

2. Order 1 and sales tables have a many-to-many relationship. To create an intermediate key table to call the calendar with a start date and end date from the sales table to create a cardinal relationship between the two tables.

   Solution:

   - Create a new table called the sales table and add order id, sales, and ship date fields to it.
   - Calculate the min and max ship dates from the ship date column. Create a new table called **Date** and add the min to max date in the date column.
   - Import both new tables into power bi and create one-many relationships between order table, sales table, and date table.

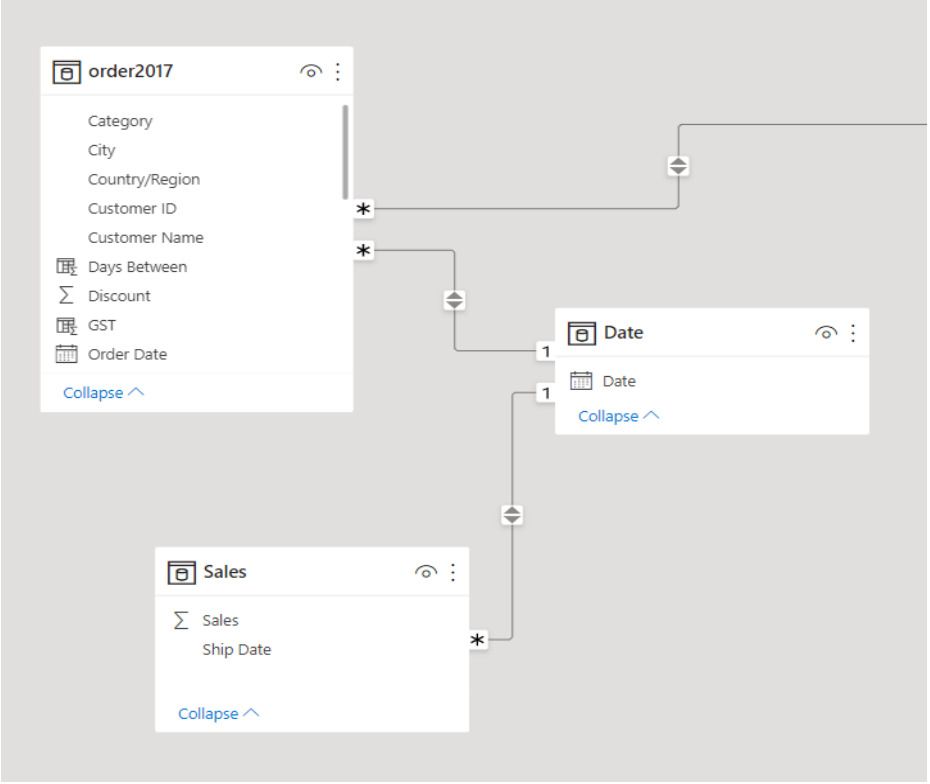


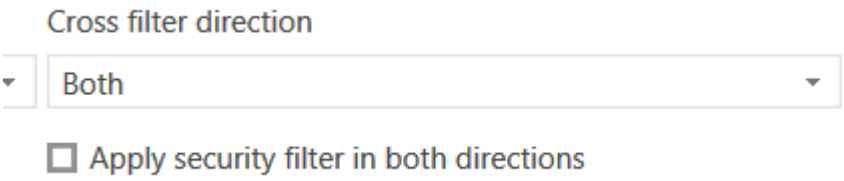


3. Create a table using order quantity from the order table and sales from the sales table. Check whether the issue of many to many relationships arises with the visualization. Apply the color gradient to values in the tables to identify the highest sales and lowest sales. (Please note: Kindly use the following colors
   - The minimum sales color **is red**.
   - Maximum sales color **green**)

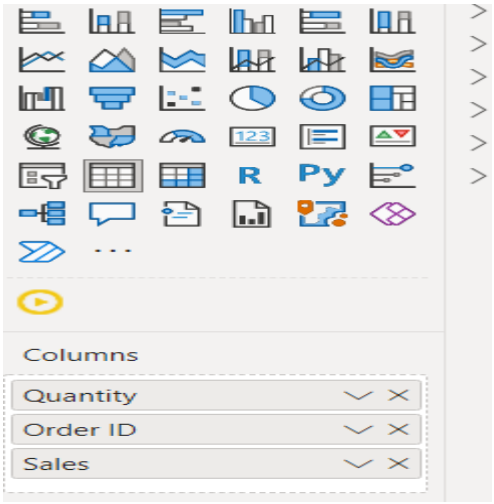
Solution:

Yes, We will face the issue with many to many relationships. We will not get the correct values for the sales field. We will have to correct the relationships between tables as in the below images. We created **one to many** relationships between Date & Sales tables, and **one to many relationships** between Date & Sales tables. In both cases we have selected **cross filter direction** as Both

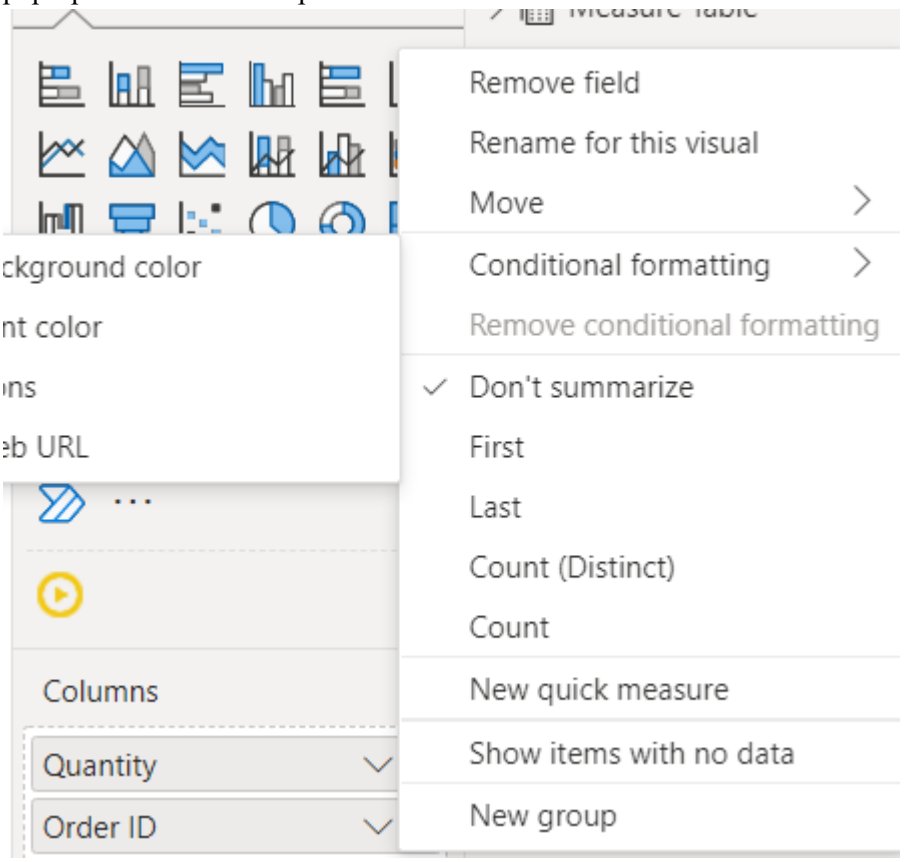




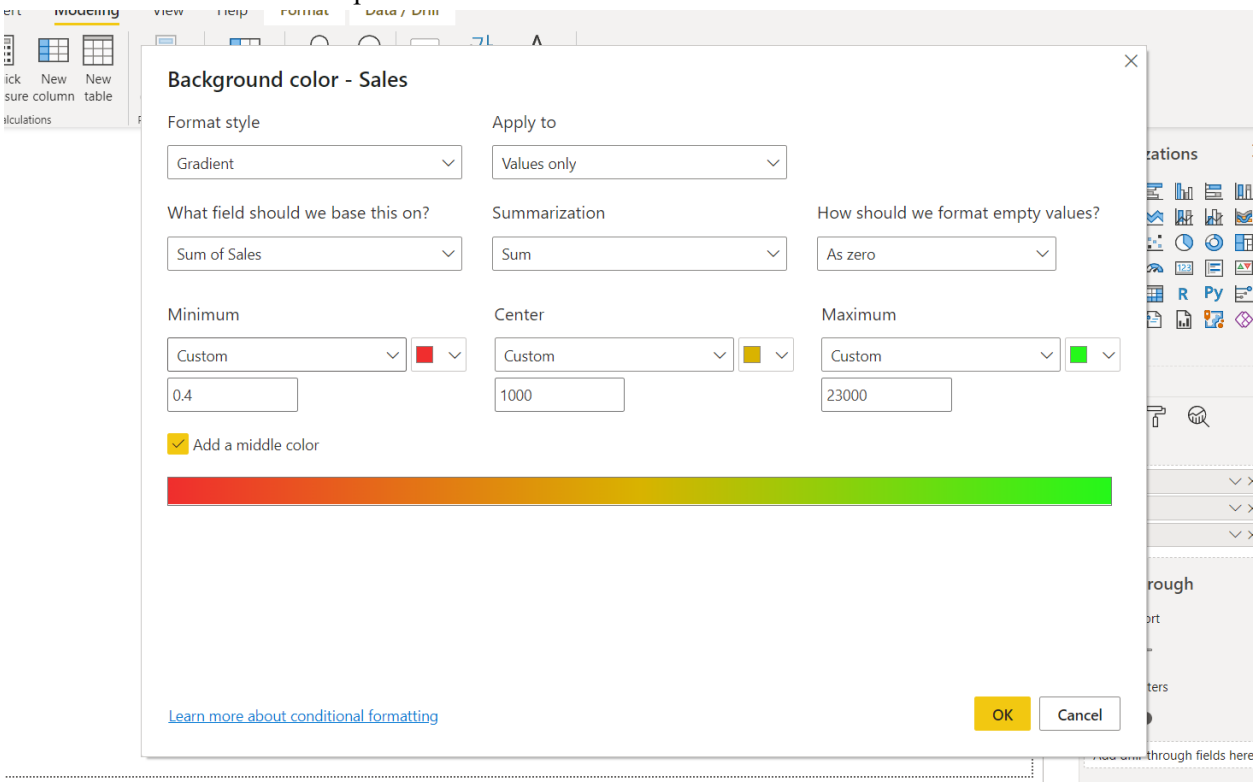
- Click on the **Table** visual in Power BI.
- **Drag-and-drop** or **click on** order id and Quantity from the order table, and sales from the sales table.



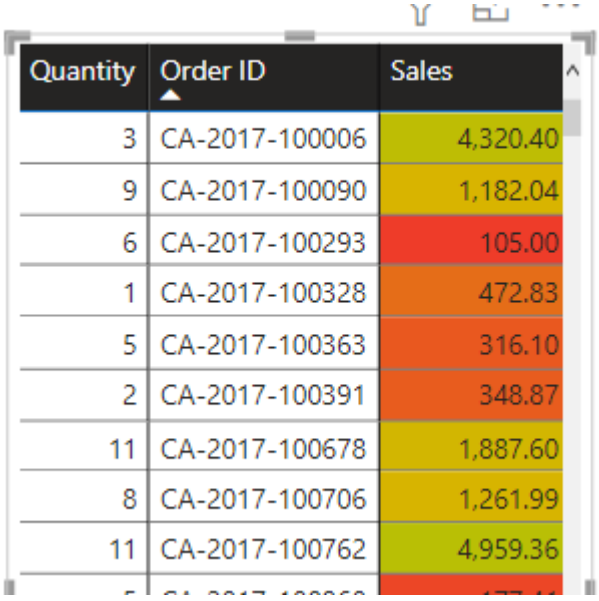
- In the visualizations pane, right click or select the down-arrow next to the field in the Values and select conditional formatting. From the menu select **Background color.** A pop-up window will be opened.



- In Format style gradient: In "**what field should be based this on?**"->select sales and then in the **summarization** option-> select sum.



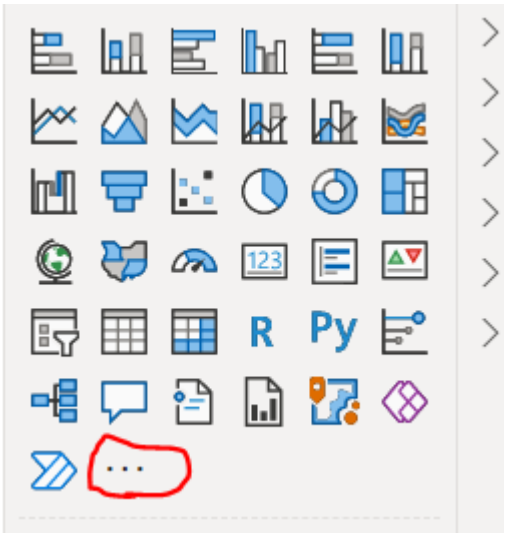
- For the lowest value select red color and for the highest value select green color.



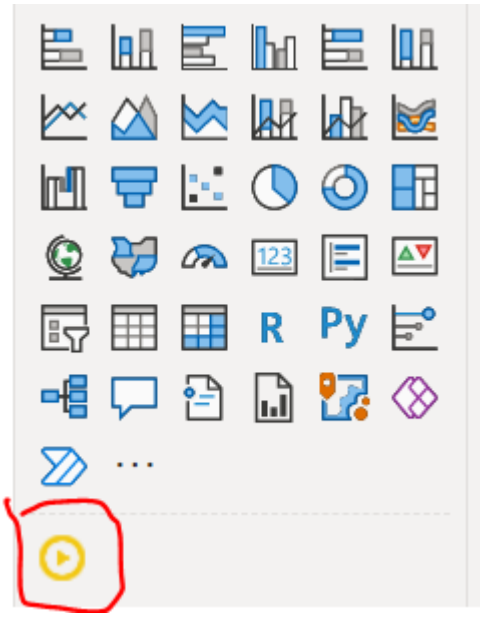
Quantity	Order ID	Sales
3	CA-2017-100006	4,320.40
9	CA-2017-100090	1,182.04
6	CA-2017-100293	105.00
1	CA-2017-100328	472.83
5	CA-2017-100363	316.10
2	CA-2017-100391	348.87
11	CA-2017-100678	1,887.60
8	CA-2017-100706	1,261.99
11	CA-2017-100762	4,959.36

4. Create a scatter plot using sales and quantity information and represent it meaningfully. For example, we are identifying the highest sales using color.
5. Apply the play axis on a date and show how the scatter plot changes from time to time. Please ensure that the play axis does not apply to the table you created.
   Solution(4 & 5):

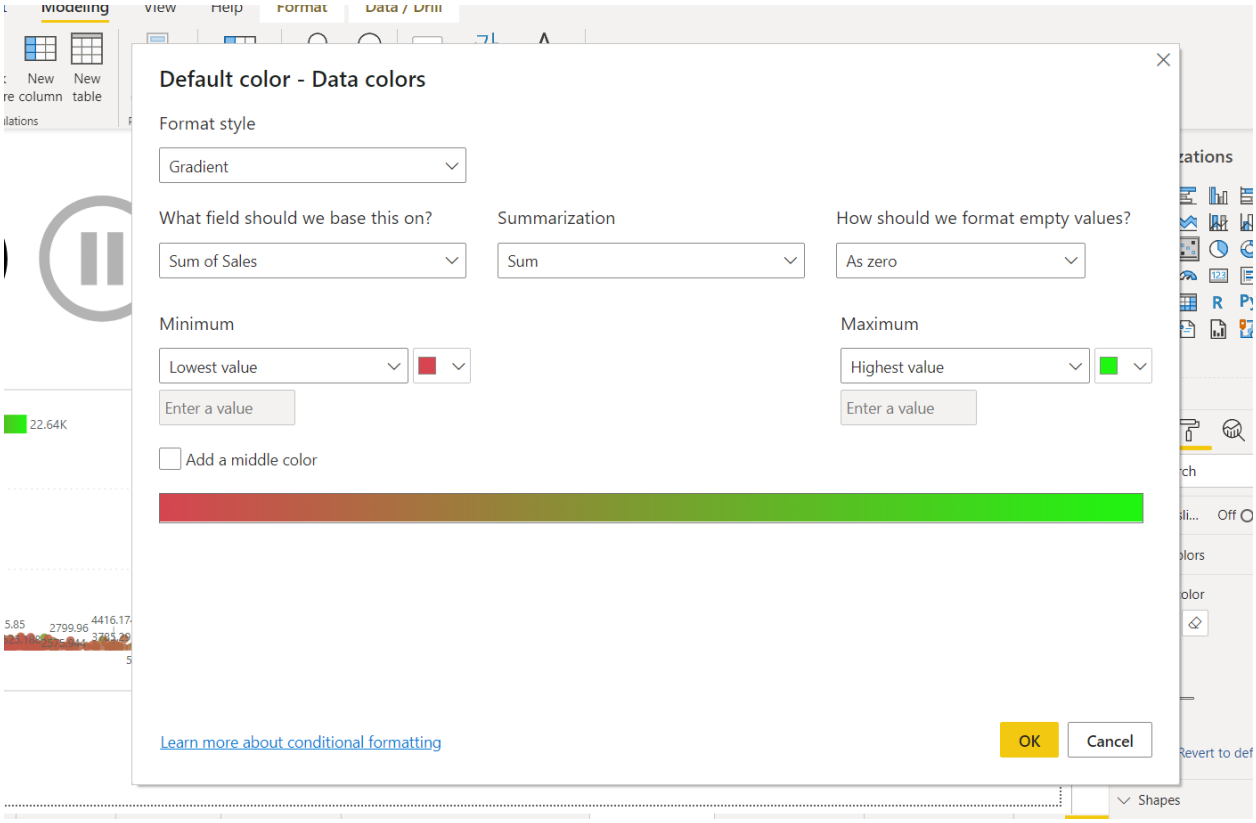
   - Click on the scatter chart in power bi, in the scatter chart fields select sales for the x-axis, and on the y-axis select quantity.
   - Click on ellipsis(three dots) to get more visuals in the visualization selection pane. A pop-up window will be opened.



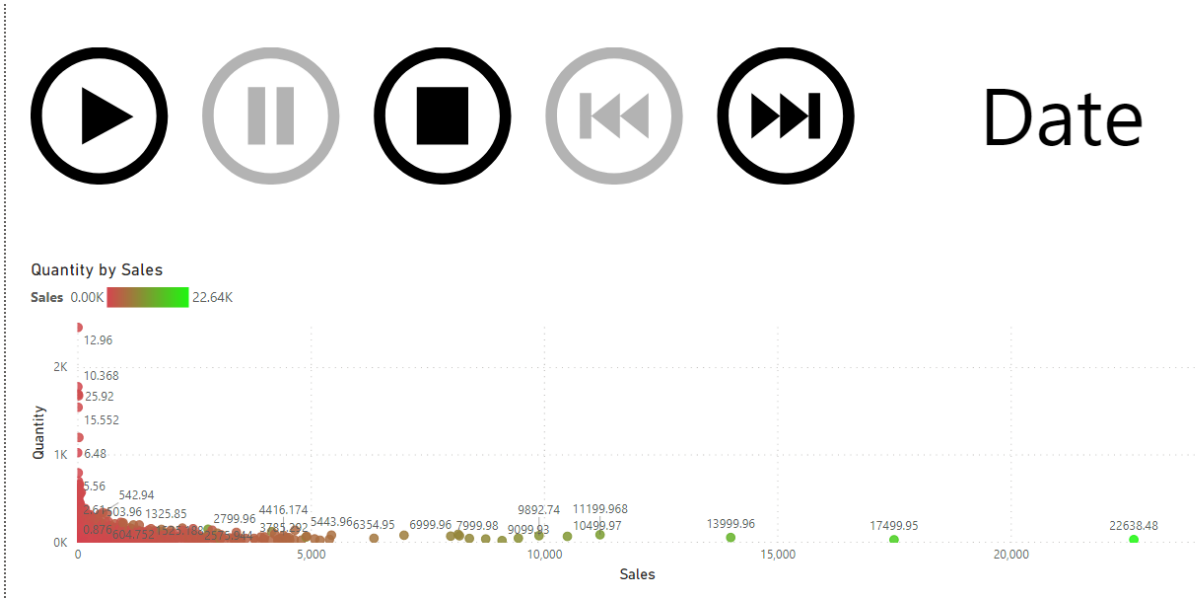
   - Search for the play axis visual and click add. It will be added to the visualization pane.



- Select the play axis visual and select the date field from the date table.
- In the scatter chart, go to the format section and click on the data label.
- You can see the fx symbol. Just click on it and In Format style gradient: In "**what field should be based this on?"->**select sales and then in the **summarization** option-> select sum.



- For the lowest value select red color and for the highest value select green color.

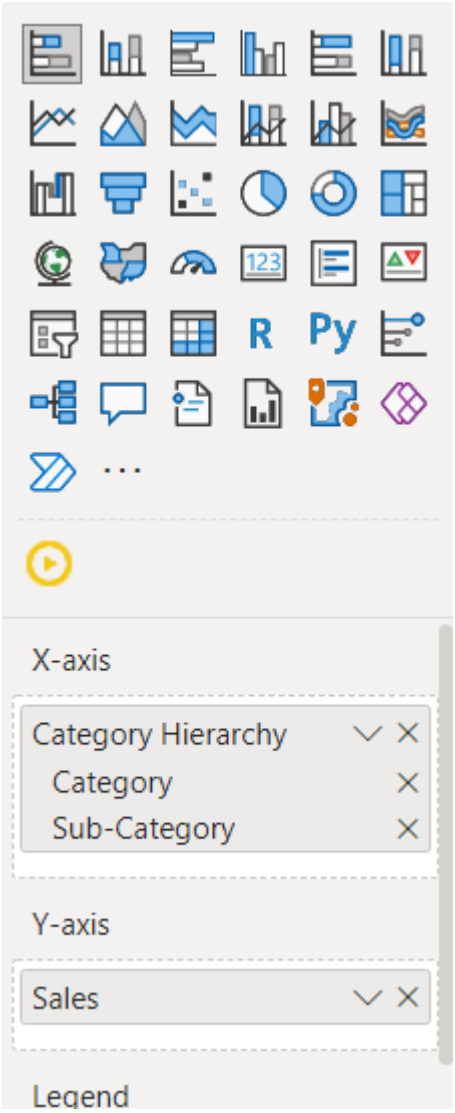


Desktop Visualization

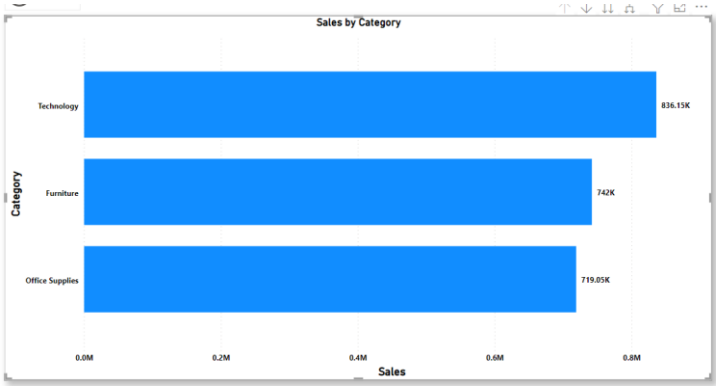
Create a drill-down bar chart with category and subcategory as the x variable and sales as the y variable. On Page 1(Named as a bar chart)

- Goto **Order2017 table**. Click on the ellipses on the right of the field **category.** Select create hierarchy option

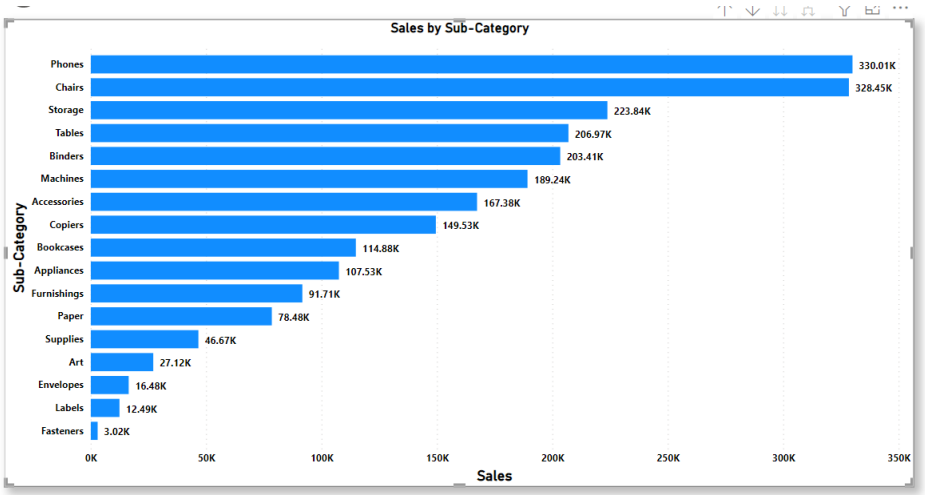
- The hierarchy is created and now click on the sub-category. Select **add to hierarchy option**. Now click on the hierarchy name into which subcategory is to be added.
- Click on the **stack bar chart** in the visualization pane. **Select** or **drag and drop** the created hierarchy in **Axis**. Next, **click** or **drag and drop** the sales in **value**.



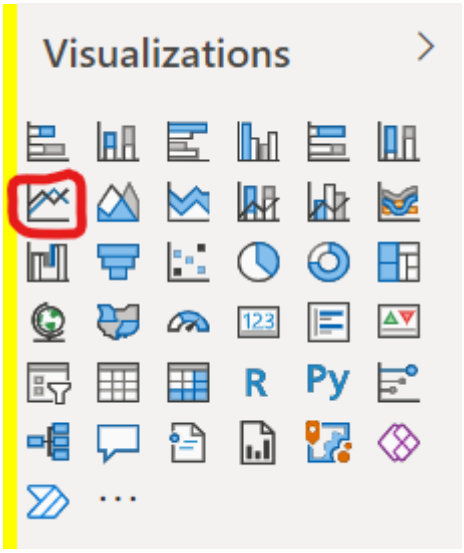
- Now you can see the stacked bar chart with a **drill-down** option on the top corner of the visualization.



- Click on drill-down and notice the changes in the visualization.



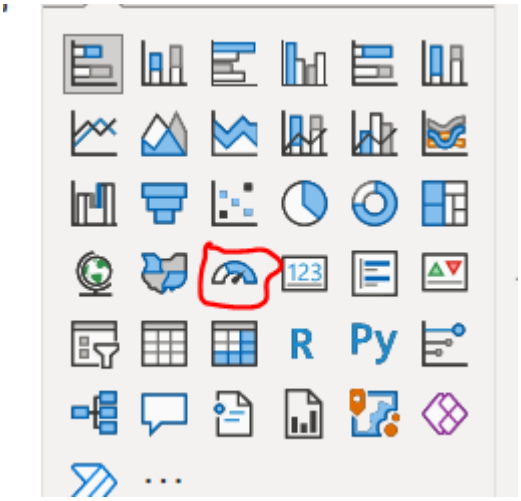
1. Create a line chart with sales, quantity, and order date. Make sure sales and quantity are in the same plot and drill down is applicable on the order date. On page 2(Named it as Line chart)



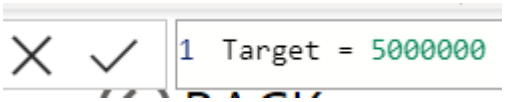
- First, click on the **line chart** in the visualization section.
- Click or drag and drop the sales on **Y-axis** and quantity in **secondary values.**
- Click or drag and drop the order date into the **X-axis** section.
- Now you will see different Y axes for **sales** and **quantity**.

2. Create a gauges chart with 5000000 as the sales target. On page 3(Named as Gauge chart)

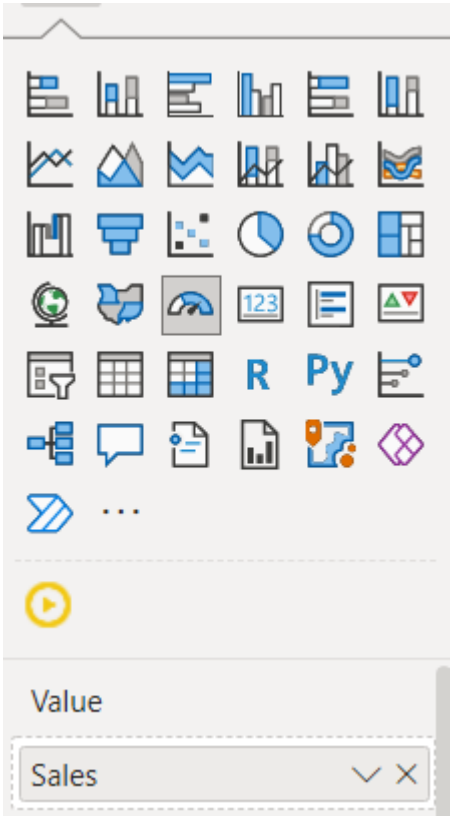
- Click on the **gauge chart** in the visualization section.



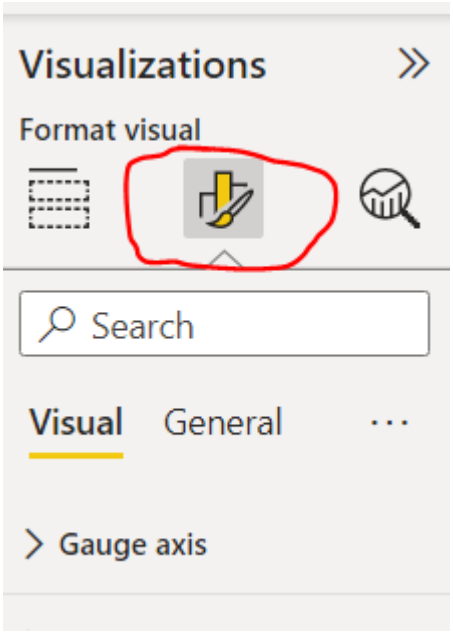
- Create a **measure** as below:
  Target=5000000



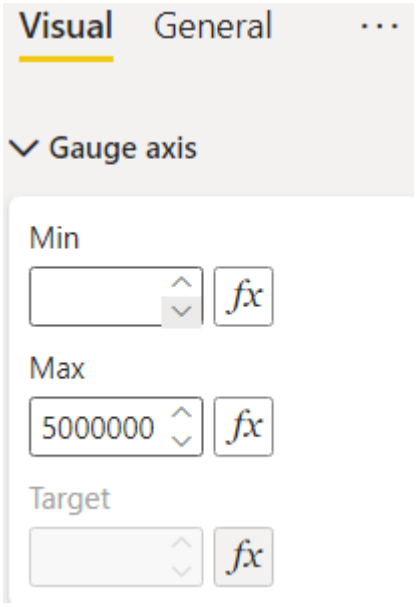
- Click or drag and drop the sales in the value section.



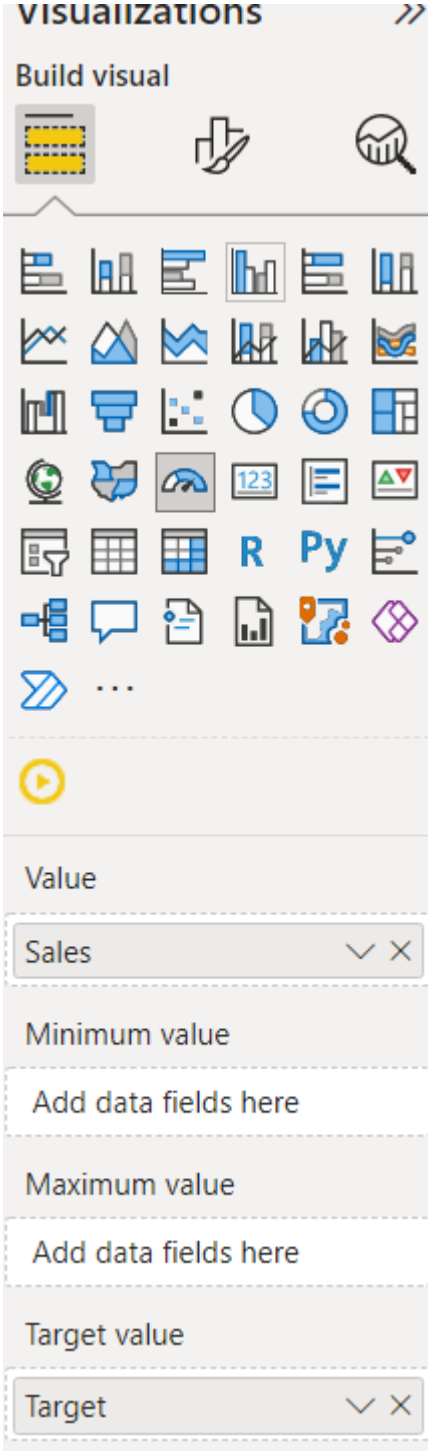
- Goto the **format** section in the gauge chart visual.



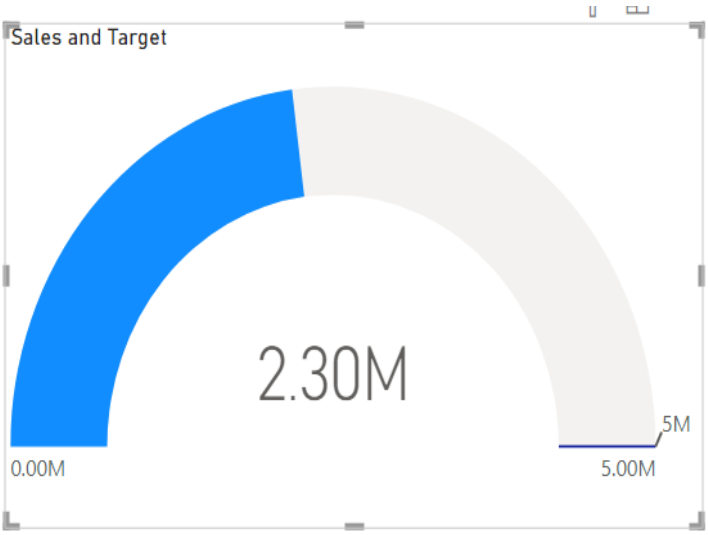
- Click on the **gauge axis to set** the **maximum** value to 5000000.



- Drag-and-drop the created target measure in the **Target value** section.

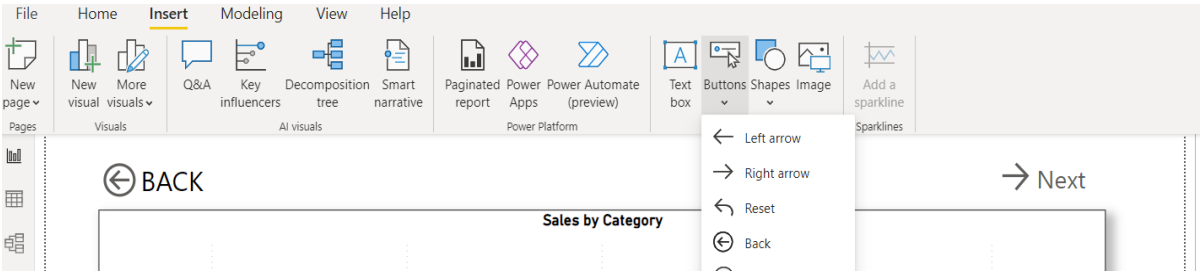


- Now you can see the Gauge chart.

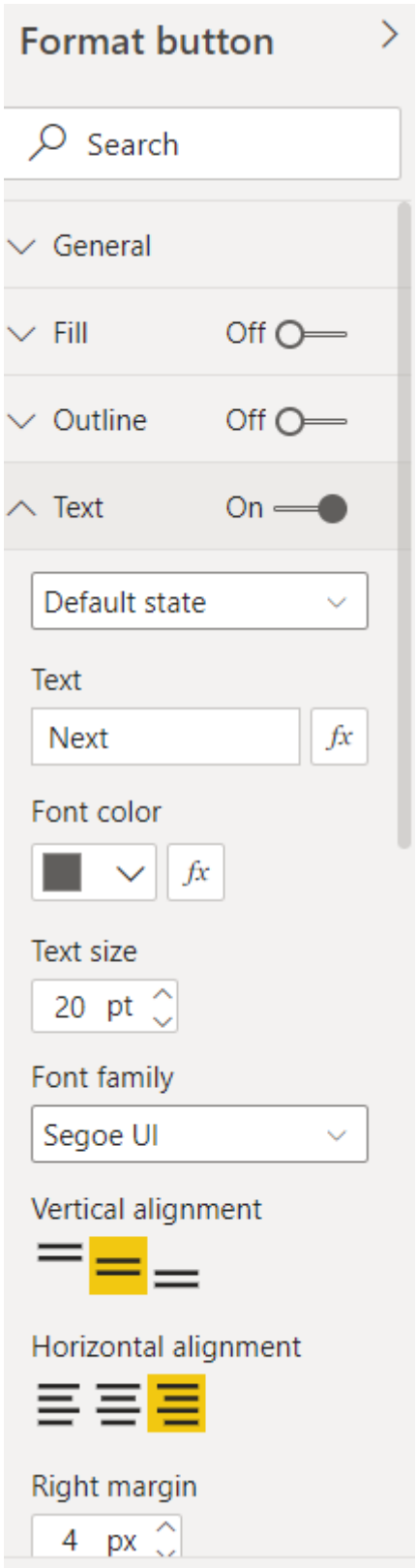


3. Create page navigation from one page to another.

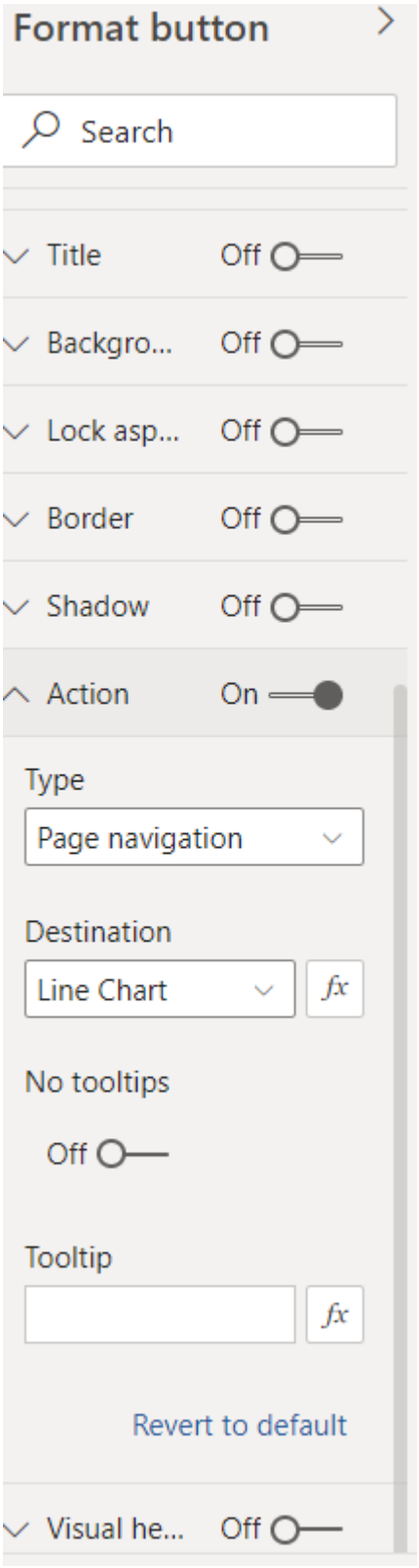
- On the Bar chart page select two buttons from the **Buttons** option present under the **Insert** Tab.



Under **Format Button**, select **Text** and type Next as shown in the below figure.



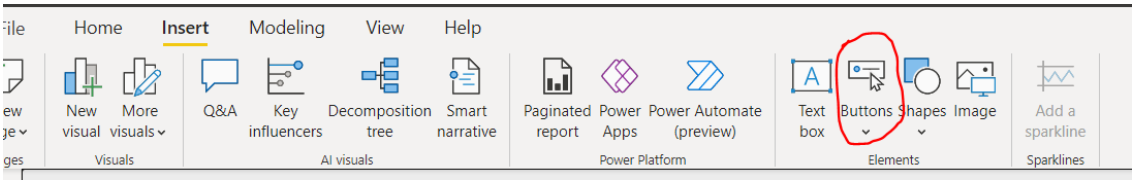
- Turn the **Action** option ON. Under the **Action** option, for each button, do the following configuration:



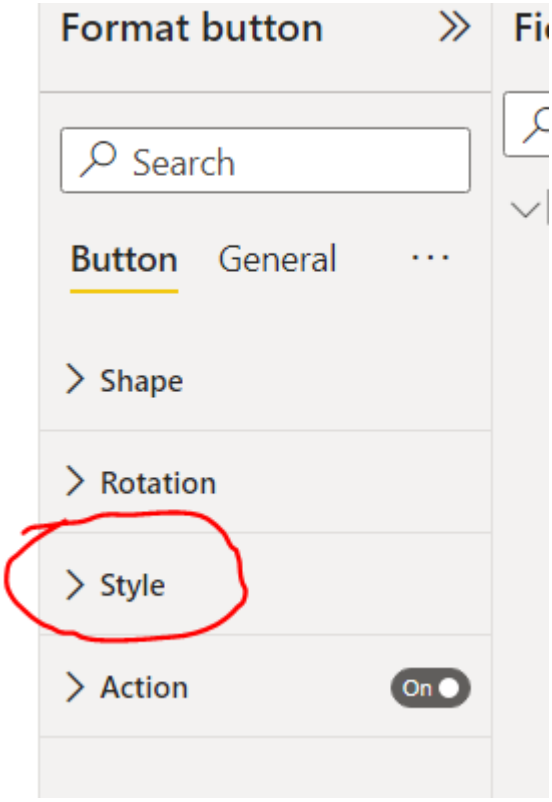
- select **Page navigation** under the Type option and **Line Chart** under the Destination option.
- Follow the same steps for **Back Button.**

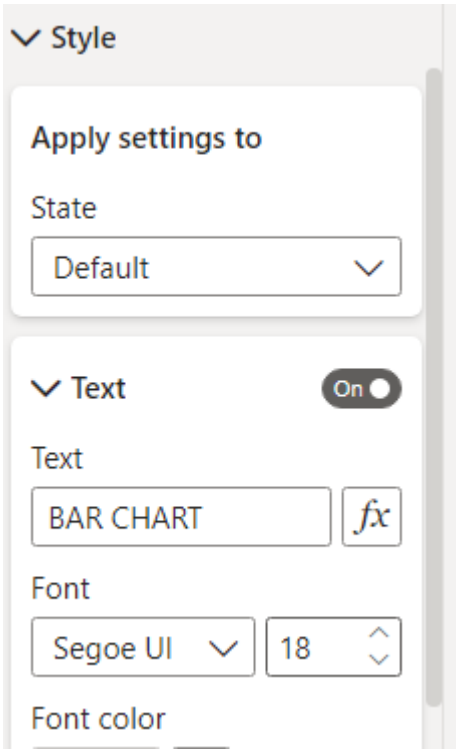
4. Create a landing page from bar chart to gauge chart as buttons for navigation. On page 1(Named it as Landing Page)

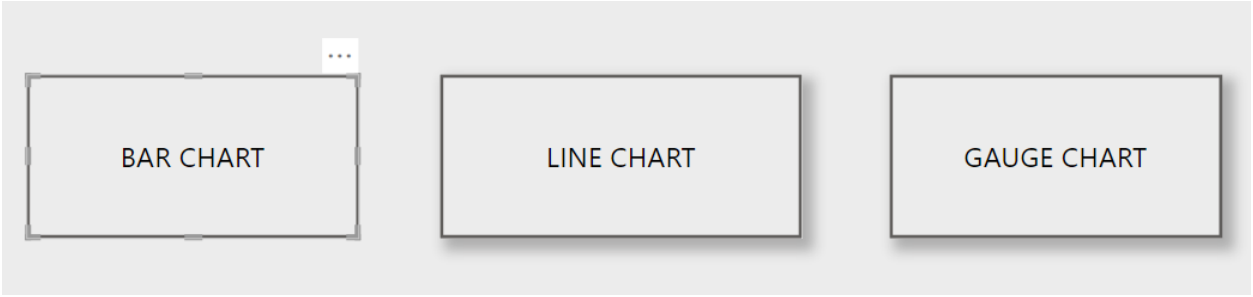
- On the first page(name it as **Landing Page**), select 3 buttons from the **Buttons** option present under the **Insert** Tab.



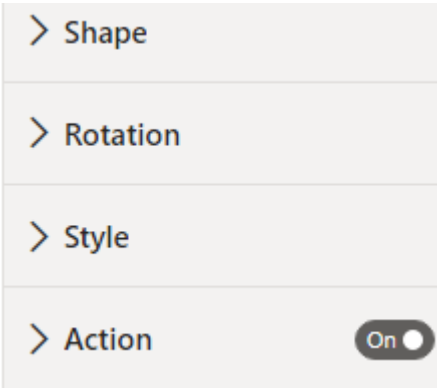
- Under the **Style** option, for each Button provides a name in the Text option.



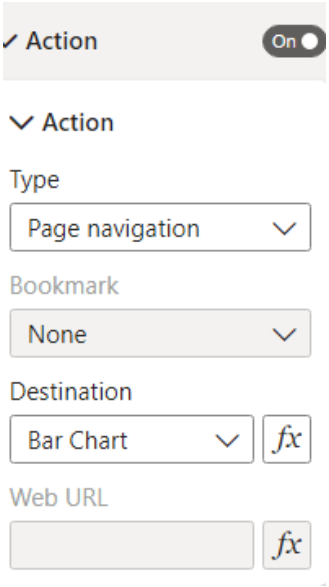




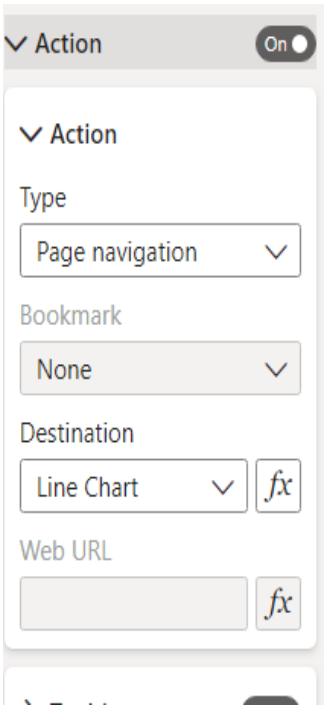
- Turn the **Action** option ON. Under the **Action** option, for each button, do the following configuration:



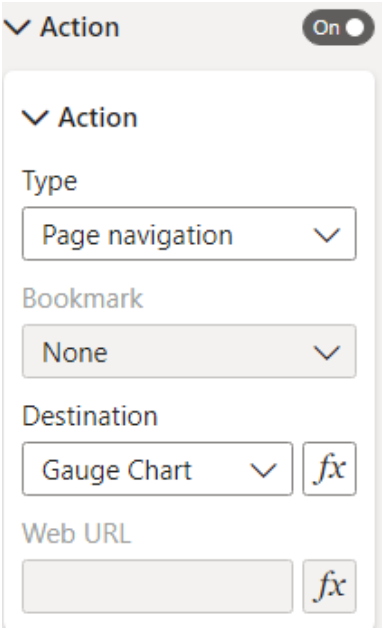
BAR CHART: select **Page navigation** under Type option and **Bar Chart** under Destination option



LINE CHART: select **Page navigation** under Type option and **Line Chart** under Destination option



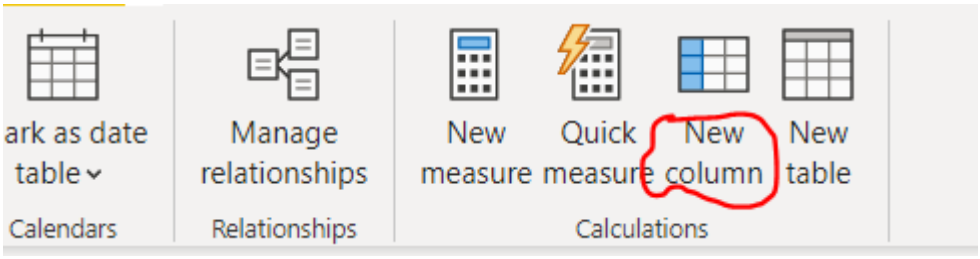
GAUGE CHART: select **Page navigation** under Type option and **Gauge Chart** under Destination option



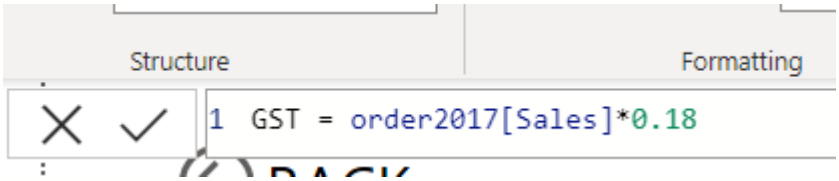
- Instead of a single click, **Cntrl+click** is to be pressed to get these Buttons to work

DAX EXPRESSIONS SOLUTIONS:

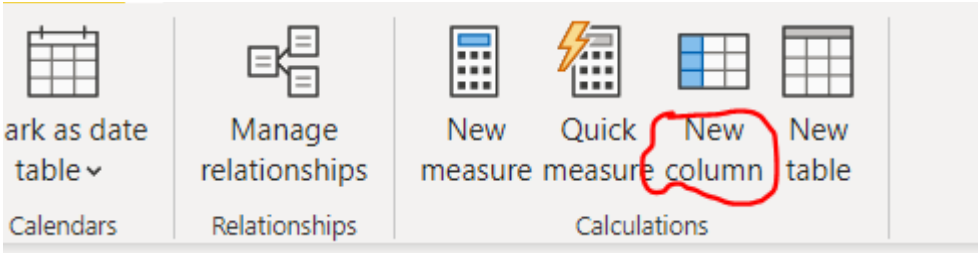
1. Create a calculated column called GST with an 18% tax slab on sales amount.
   - Goto **Data** view in power bi and select table. Click on the **new column** option in the column tools.



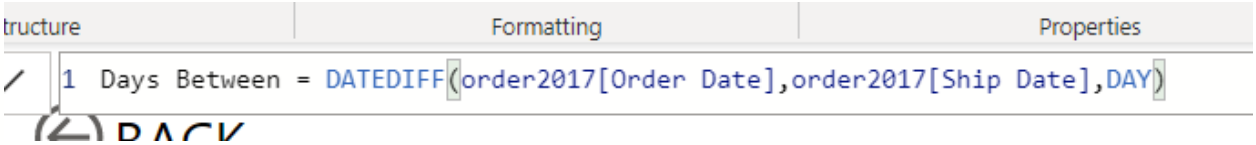
   - GST = order2017[Sales]*0.18
   - Copy and paste the above formula into the new column section and press enter. The GST column will be created.



2. Create a date difference column that shows the delay between the order date and the ship date.
   - Goto data view in the power bi and click on the new column option in the column tools.



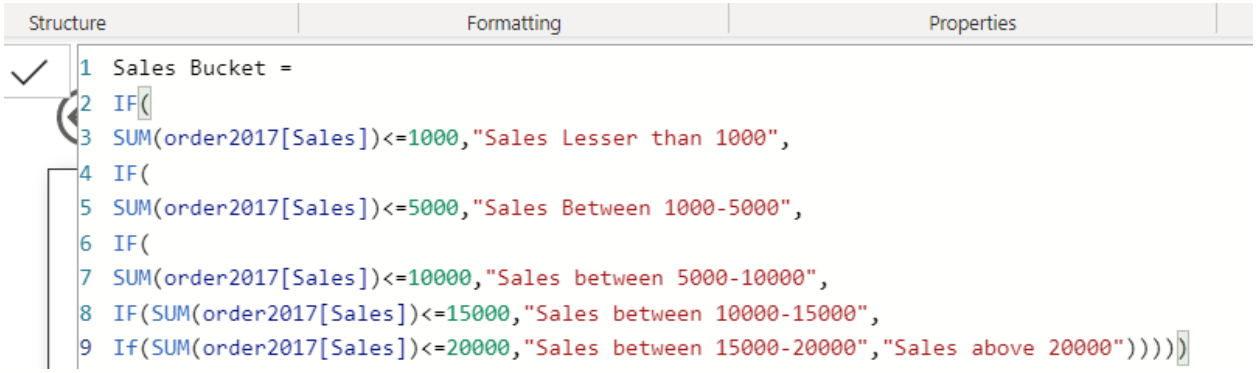
   - Days Between = DATEDIFF(order2017[Order Date],order2017[Ship Date],DAY)
   - Use datediff function to showcase the difference between Order Date and Ship Date.
   - Copy and paste the above DAX to get the date difference delay between the order date and ship date.



3. Create sales buckets with the condition as follows
    a. Sales lesser than 1000
    b. Sales between 1000 to 5000
    c. Sales between 5000 to 10000
    d. Sales between 10000-15000
    e. Sales between 15000 to 20000
    f. Sales above 20000

- Create a new measure in the Measure table and write the Dax to create the sales bucket.
- Need to use If and else or nested if to create a sales bucket.
- Sales Bucket =

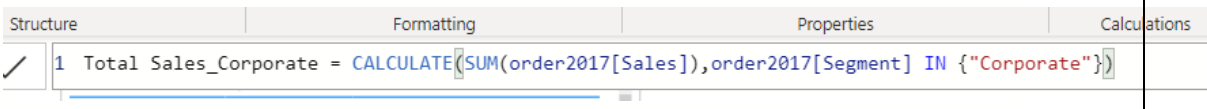
```
IF(

SUM(order2017[Sales])<=1000,"Sales Lesser than 1000",

IF(

SUM(order2017[Sales])<=5000,"Sales Between 1000-5000",

IF(

SUM(order2017[Sales])<=10000,"Sales between 5000-10000",

IF(

SUM(order2017[Sales])<=15000,"Sales between 10000-15000",

IF(

SUM(order2017[Sales])<=20000,"Sales between 15000-20000","Sales above 20000")))))
```



- After writing the above dax formula, click on the Table visual in visualization and select **order id**, **sales**, and created **sales bucket fields**.

Order ID	Sales	Sales Bucket
CA-2017-145317	23,661.23	Sales above 20000
CA-2019-118689	18,336.74	Sales between 15000-20000
CA-2020-140151	14,052.48	Sales between 10000-15000
CA-2020-127180	13,716.46	Sales between 10000-15000
CA-2017-139892	10,539.90	Sales between 10000-15000
CA-2020-166709	10,499.97	Sales between 10000-15000
CA-2017-116904	9,900.19	Sales between 5000-10000
CA-2019-117121	9,892.74	Sales between 5000-10000
US-2019-107440	9,135.19	Sales between 5000-10000
CA-2019-158841	8,805.04	Sales between 5000-10000
CA-2019-143714	8,539.02	Sales between 5000-10000
CA-2017-143917	8,319.29	Sales between 5000-10000
US-2020-168116	8,167.42	Sales between 5000-10000
US-2018-126977	7,678.23	Sales between 5000-10000
CA-2020-100111	7,359.92	Sales between 5000-10000

4. Create a total sales measure with a filter segment = corporate.
   - Create a new measure in the Measure table called total_Sales_corporate.
   - Total Sales_Corporate = CALCULATE(SUM(order2017[Sales]),order2017[Segment] IN {"Corporate"})

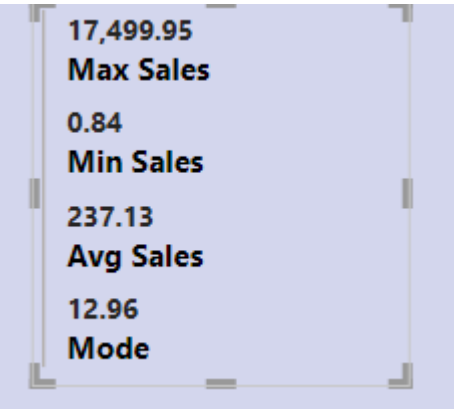


   - Need to use calculate, sum and IN function to get the sales value only for Corporate.

5. Create a multi-row card with **min sales, max sales, average sales, and mode.**
   - Create separate measures for each: MAX,MIN,AVG,MODE.
   - Max Sales = MAX(order2017[Sales])
   - Min Sales = MIN(order2017[Sales])
   - Avg Sales = AVERAGE(order2017[Sales])
   - Use the Max function for maximum sales value, MIn function for minimum sales value, and Avg function for average sales value.
   - To calculate Mode you need to create a new table and use the Dax formula as given below:

     Mode_Example = TOPN(1,
     ADDCOLUMNS(VALUES(order2017[Sales]),"Frequency",Calculate(COUNT(order2017[Sales]))),[Frequency],DESC)

- In the result, you will get the value which is repeated the highest times in the sales column.
- To represent the mode value in the card visualization you need to create a new Dax. Name it Mode and use the below Dax formula for it
- Mode = MINX(TOPN(1, ADDCOLUMNS(VALUES(order2017[Sales]),"Frequency",Calculate(COUNT(order2017[Sales]))),[Frequency],DESC),order2017[Sales])
- Represent MAX, Min, Avg, and MODE values in **multi-row card** visual from the visualization section.

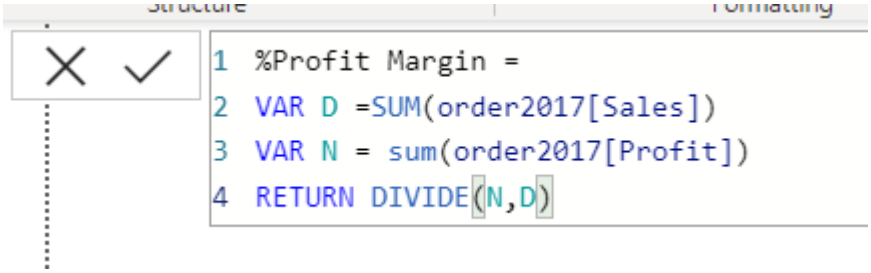


1. Create a Gross profit margin measure using the formula (gross profit/net sales). Create a matrix with the gross profit margin ratio for all the products and sort the matrix from highest to lowest.
    - Create a new measure and name it **%Profit margin**.

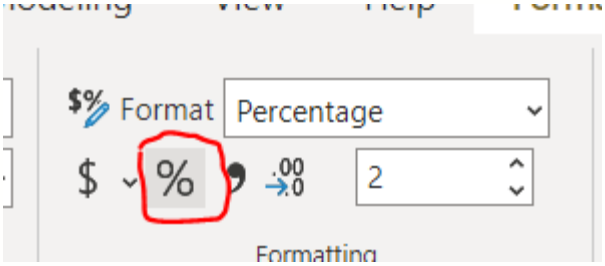
- %Profit Margin =
  VAR D =SUM(order2017[Sales])

  VAR N = SUM(order2017[Profit])

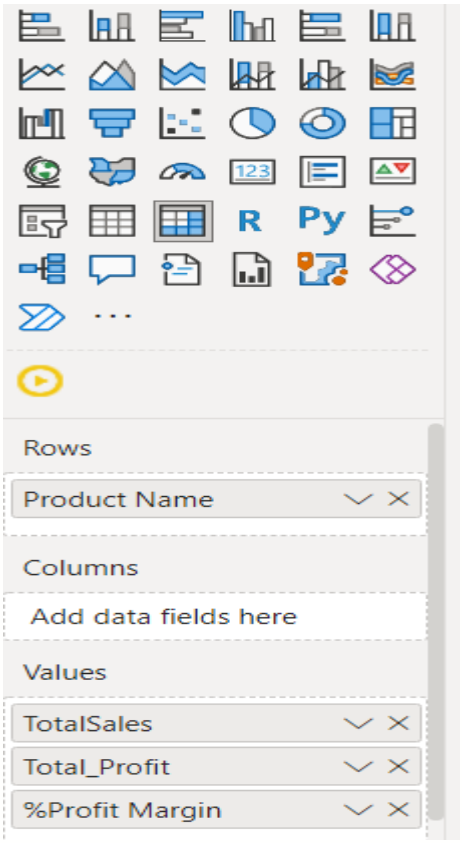
  RETURN DIVIDE(N,D)



- Create a variable VAR D (D means denominator), and calculate the Sum of order sales.
- Create a variable VAR N (N means numerator), and calculate the sum of profit.
- Use the RETURN function with DIVIDE (N, D). This will provide the value of Gross profit.
- Goto Measure Tools section and change the Format of **%Profit margin** to percentage.



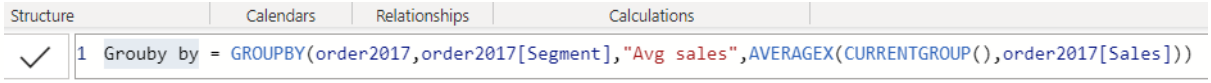
- Click on Matrix visual in the visualization pane. Goto order table, select **Product name**, **Sales**, **Profit**, and from the Measure table select **%profit margin**.



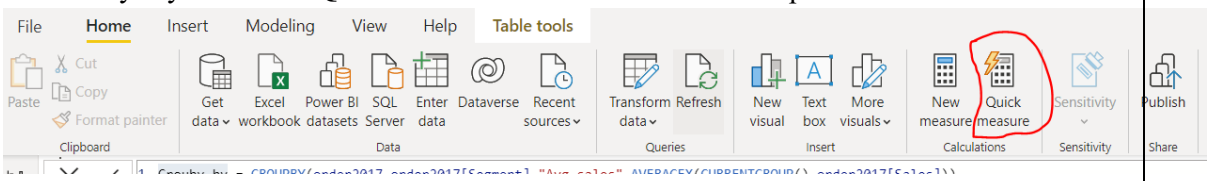
Matrix:

Product Name	TotalSales	Total_Profit	%Profit Margin
Adams Telephone Message Book w/Frequently-Called Numbers Space, 400 Messages per Book	223.44	111.72	50.00%
Avery 475	266.40	133.20	50.00%
Canon imageCLASS MF7460 Monochrome Digital Laser Multifunction Copier	3,991.98	1,995.99	50.00%
Southworth Structures Collection	72.80	36.40	50.00%
Tops Green Bar Computer Printout Paper	342.58	171.29	50.00%
Xerox 1890	244.70	122.35	50.00%
Avery 5	5.76	2.82	49.00%
Xerox 1918	155.04	75.97	49.00%
Ativa V4110MDD Micro-Cut Shredder	7,699.89	3,772.95	49.00%
Avery 478	88.38	43.31	49.00%
Total	**22,97,200.86**	**2,86,397.02**	**12.47%**

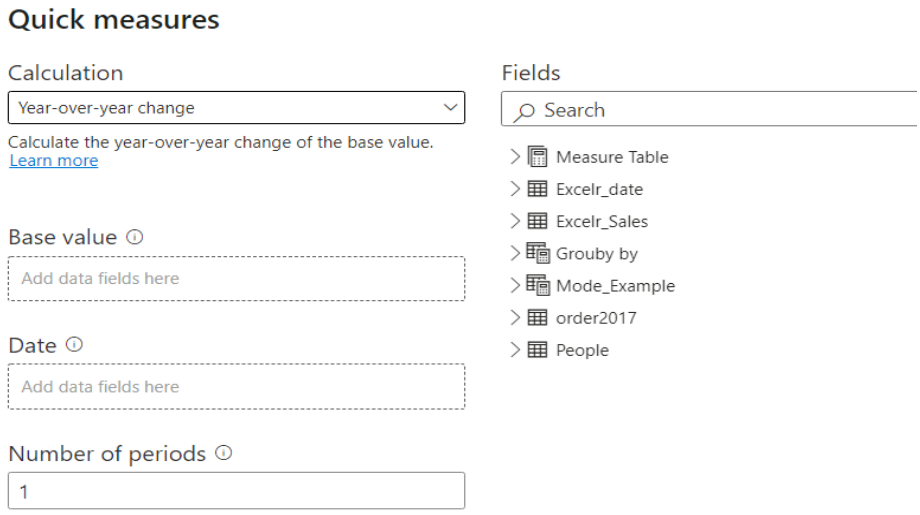
2. Create a table using group by function to identify the segment-wise average sales.
    - Create a new table and name it as **Grouby by** and use the below Dax formula to identify the segment-wise average sales.
    - Grouby by= GROUPBY(order2017,order2017[Segment],"Avg sales",AVERAGEX(CURRENTGROUP(),order2017[Sales]))



3. Use the quick measure to create a y-o-y % sales change.
   - To create y-o-y% click on **Quick measure** under the Home Tab in power bi.

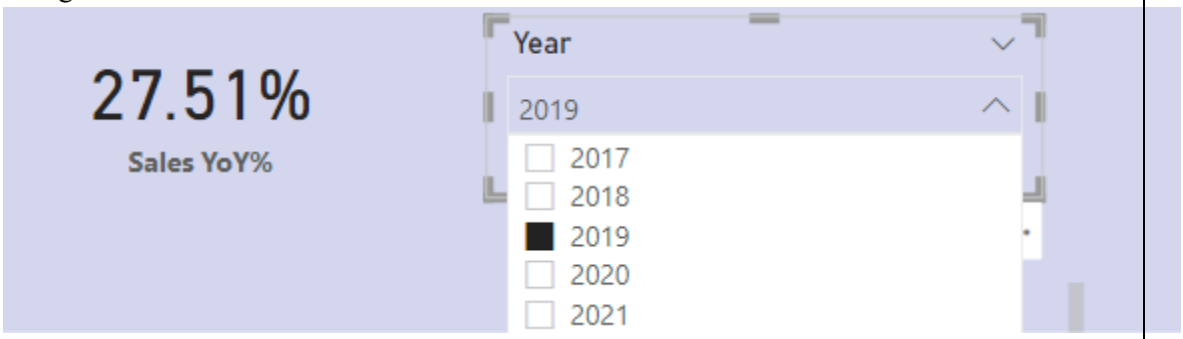


   - A pop-up window will be opened, and select year-over-year change in the calculation field.



   - Select base value as sales from the **order table** and for the **date section** select date from the date table.
   - Next click ok, the y-o-y% is created, and select a card visual from the visualization pane.

   - Select a slicer for the year field and click on the particular year. You can notice the changes in sales.

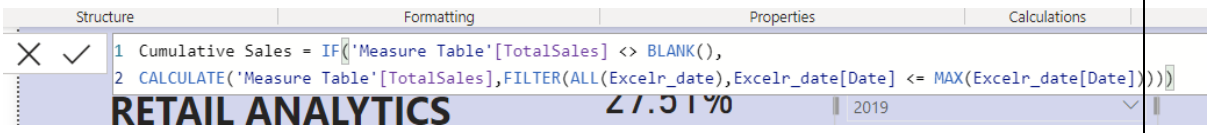


4. Create a cumulative sales measure and plot it on the visualization.
    - Create a measure and name its **cumulative sales**.

      Cumulative Sales = IF('Measure Table'[TotalSales] <> BLANK(),

      CALCULATE('Measure Table'[TotalSales],FILTER(ALL(Excelr_date),Excelr_date[Date] <= MAX(Excelr_date[Date]))))

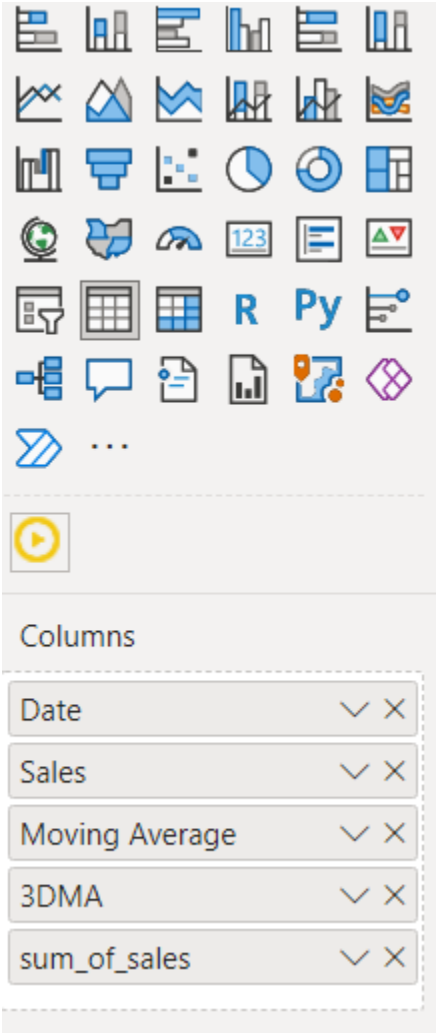
    - Use the above dax to create a cumulative sales.



5. Create a table with the date, sales, and 3 days moving average or rolling mean. And visualize it.
    - Create a new measure to calculate the 3-day moving average.

```
3DMA =
VAR DATE_Filter = DATESINPERIOD(Excelr_date[Date],MAX(Excelr_date[Date]),-3,DAY)
 VAR Rolling_mean =
  CALCULATE(
   AVERAGEX(
     VALUES(Excelr_date[Date]),
     [sum_of_sales]),
   DATE_Filter)
 RETURN Rolling_mean
```

    - Create a measure and use the above DAX formula. The **3-day moving average** measure will be created.
    - Click on table visual in the visualization section. Select **date**, **Sales**, and the created **3-day moving average** measure.


Columns
Date
Sales
Moving Average
3DMA
sum_of_sales

Date	Sales	Moving Average	3DMA	sum_of_sales
09 October 2019	19,413.71	6,621.32	9,185.31	19,413.71
21 December 2019	14,243.34	5,256.48	6,791.75	14,243.34
27 May 2019	10,143.14	6,337.80	3,923.17	10,143.14
15 March 2019	9,926.07	4,902.51	5,135.25	9,926.07
30 November 2019	9,412.42	6,656.51	5,319.31	9,412.42
04 February 2019	9,151.20	4,207.69	3,769.49	9,151.20
20 April 2019	9,135.19	3,636.80	3,223.51	9,135.19
28 December 2019	8,996.36	5,292.08	3,384.09	8,996.36
08 March 2019	7,065.72	2,528.31	2,569.47	7,065.72
26 June 2019	6,315.77	2,375.25	2,676.00	6,315.77
08 October 2019	6,274.91	8,564.52	2,761.51	6,274.91
05 March 2019	6,125.82	2,256.17	2,099.19	6,125.82
03 June 2019	6,104.85	3,483.69	2,809.10	6,104.85
30 December 2019	5,984.99	3,907.81	5,292.08	5,984.99
26 October 2019	5,828.13	3,166.45	2,330.57	5,828.13
06 December 2019	5,690.54	4,375.21	3,117.56	5,690.54
29 November 2019	5,637.58	6,842.22	2,885.12	5,637.58
16 November 2019	5,527.47	3,610.35	3,636.91	5,527.47
01 December 2019	5,476.68	4,500.97	6,842.22	5,476.68

DISCUSSION

The primary goal of this project is to provide an interactive and user-friendly dashboard for exploring and visualizing data. The dashboard includes capabilities such as choosing and comparing major and secondary criteria, exporting data and charts, and focusing on certain columns.

The data for this project was obtained from Excel and saved in a CSV file. The dataset includes attributes such as area sales, order dates segments, category, Product ID, and so on.

The dashboard makes use of a variety of methods for data analysis and cleansing. In this project, I used chart visualizations such as scatter plots, bar charts, and gauge charts. The Dashboard enables users to engage with data by choosing and filtering data based on various factors, examining different data based on the desired parameter, and exporting data and charts for further research.

One of the project's strengths is its user-friendliness and interactivity, which allows users to quickly explore and comprehend data. Furthermore, the project may be expanded by including other data sources, allowing for more complex visualisations, and enhancing the Dashboard's performance for bigger datasets

CONCLUSION

Until now, the POWER BI VISULIZATION DASHBOARD PROJECT has been both a tough and gratifying experience. The project's goal is to give consumers with an easy-to-use and interactive platform for visualising and analysing data.

Due to the vast number of data and the complexity of the demographic criteria involved, the development of this project is quite difficult. Also, I'm having trouble showing the Play axis button and downloading the charts and data in CSV format; this was a challenging difficulty to address throughout the project's creation. I solved this difficulty by consulting the Streamlit manual, where I learned how to plot the play axis button and export the chart. However, by utilising numerous features like as DAX and a Power BI premium account, which is extremely beneficial to the development of this project.

The POWER BI VISULIZATION DASHBOARD PROJECT has been a good learning experience for me since I am using numerous logics and learning new things such as the DAX idea, Action Button, and so on. It has aided in the development of my data visualisation style and new abilities, as well as providing me with a deeper knowledge of the data. I hope that my effort would be beneficial to a wide spectrum of people.