

LAB 6: VISUALISING MULTIVARIATE DATA



Table of Contents

Learning Outcome..... 2

Data Preparation for Task 1 & 2 2

Task 1: Creating Facets 3

Task 2: Creating Bullet Graphs..... 4

Data Preparation for Task 3 6

Task 3: Creating a Heatmap Calendar..... 6

Learning Outcome

At the end of this session, learners will be able to:

- Create facets
- Create bullet graph
- Create heatmap calendar (Optional)

Data Preparation for Task 1 & 2

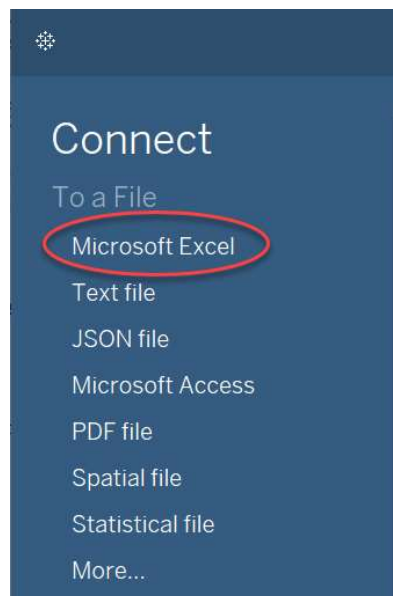
Create a Tableau work book that connect to the **Sample – CoffeeChain** data source.

We are going to use this data source for the first two tasks of this lab.

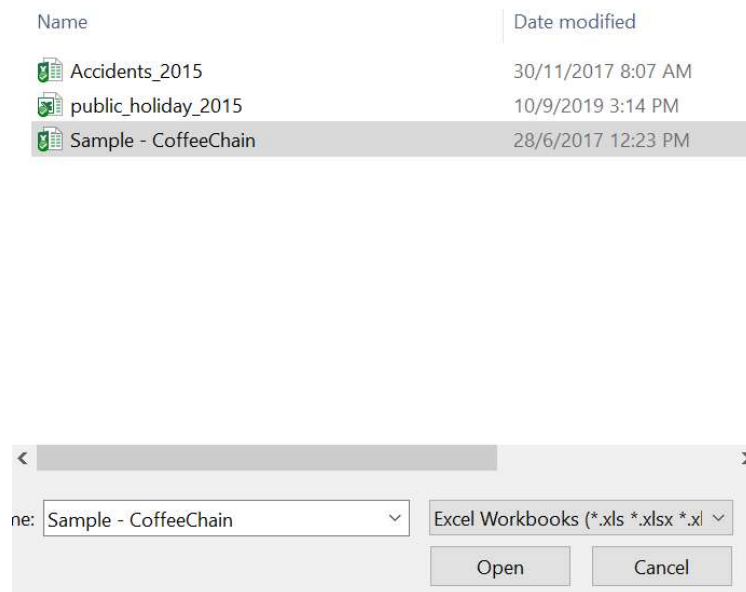
Step 1. Launch Tableau. Under Connect To a File, select **Microsoft Excel**.

Step 2. From the file open window, select the **Sample - CoffeeChain** excel file.

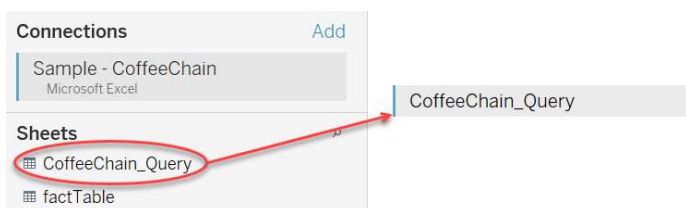
Step 1



Step 2



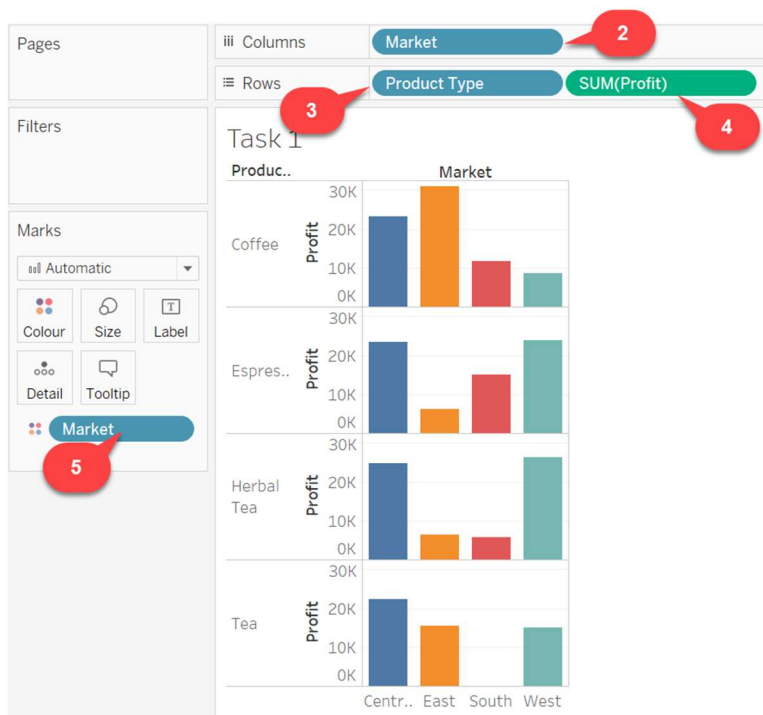
Step 3: Drag **CoffeeChain_Query** to the canvas.



Task 1: Creating Facets


Facets are one of the powerful features in Tableau. These charts show the same measure(s) across various values of one or two variables for easier comparison.

1. Click **Sheet1** tab at the left bottom corner to open the chart designer. Rename it as **Task 1**.
2. Drag and drop **Market** from **Dimensions** pane into the **Columns** shelf.
3. Drag and drop **Product Type** from **Dimensions** pane into the **Rows** shelf.
4. Drag and drop **Profit** from **Measures** pane into **Rows** shelf next to **Product Type**.
5. Drag and drop **Market** into the **Color Marks** box to give color to the four bars of different **Market** areas.
6. The chart should look like the one below. When there is one dimension on one of the shelves, either **Columns** or **Rows**, and one measure on the other shelf, Tableau creates a univariate bar chart, but when we drop additional dimensions along with the measure, Tableau creates small charts or facets and displays univariate charts broken down by a dimension.



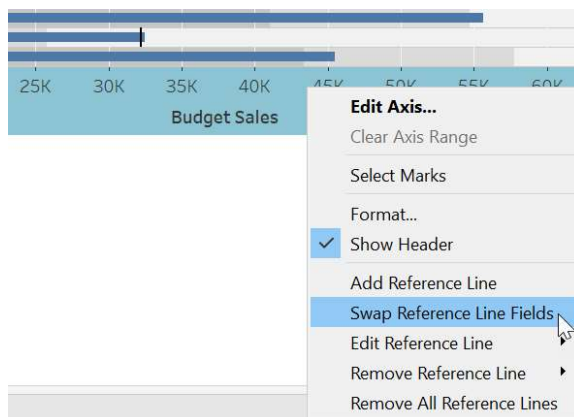
Task 2: Creating Bullet Graphs

Bullet graph is designed to solve some of the problems that the gauges and meters type of charts poses. Gauges, although simple to understand, take a lot of space to show only one measure. Bullet graphs are a combination of the bar graph and thermometer types of charts, and they show a measure of interest in the form of a bar graph (which is the bullet) and target variables.

1. Click **New Worksheet**  at the bottom left corner to create a new worksheet. Rename it as **Task 2**.
2. Click on the **Show Me** button to bring the **Show Me** toolbar on the screen.
3. While holding the *Ctrl* key, click on **Product Type** and **Market** from **Dimensions** pane and **Budget Sales** and **Sales** from **Measures** pane.



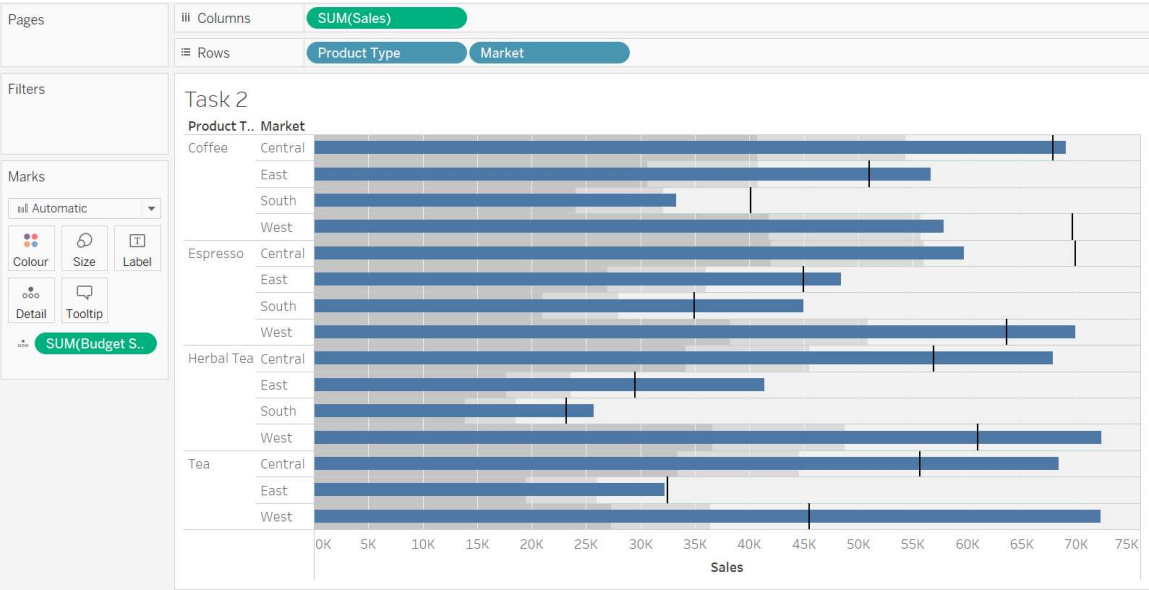
4. Click on the bullet graphs icon on the **Show Me** toolbar.
You may need to drag to swap the sequence of **Product Type** and **Market** in the **Rows** shelf.
5. Right-click on the x-axis (the **Budget Sales** axis) and click on **Swap Reference Line Fields**.




6. The final chart should look like the one in the following screenshot. Although bullet graphs maximize the available space to show relevant information, readers require detailed explanation as to what all the components of the graphic are encoding.

In this example, we want to compare the budgeted sales with the actual sales, we had to swap the reference line from **Sales** to **Budget Sales**. The black bar on the graphic shows the budgeted sales and the blue bar shows the actual sales. The dark gray background color shows 60% of the actual sales and the lighter gray shows 80% of the actual sales. As

we can see in this chart, the blue bars that crossed the black lines tell us the product type with the market regions that exceeded the budgeted sales.

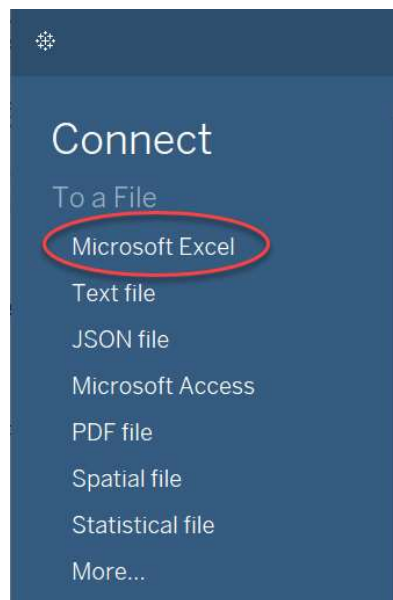


Data Preparation for Task 3

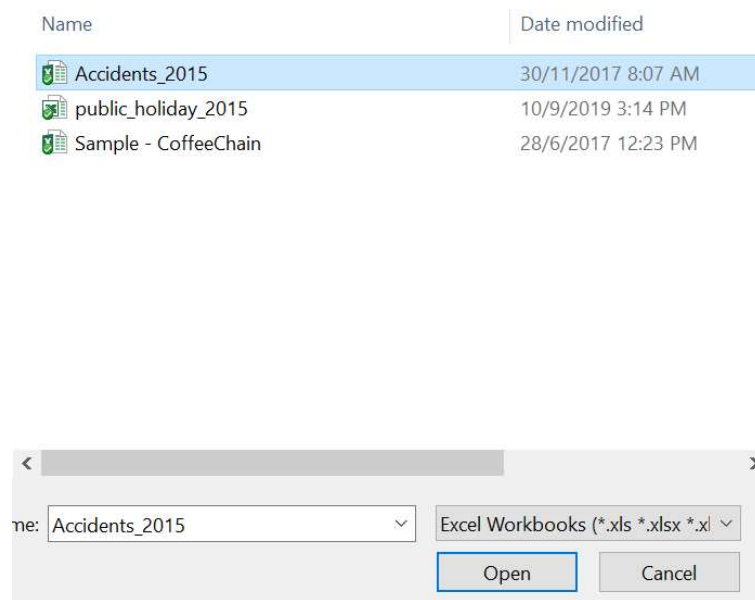
Step 1: Click on  icon to go to **Data Source** page. Under Connect To a File, select **Microsoft Excel**.

Step 2: From the file open window, select the **Accidents_2015** excel file.

Step 1



Step 2



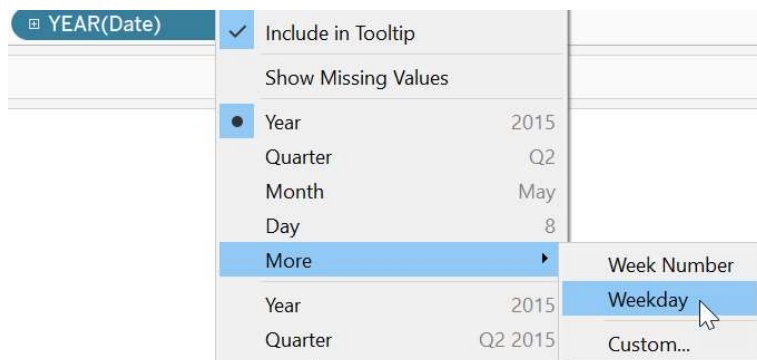
Task 3: Creating a Heatmap Calendar

A heat map is a visual representation of numbers in a table or a grid such that the bigger numbers are encoded by darker colors or bigger sizes and the smaller numbers by lighter colors or smaller sizes. This type of representation makes the reader's pattern detection from the data easier.

It can be created using one or more dimensions or measures. Heat Map is used to compare the data by their color. For instance, how many products are fallen short and how many products are above our expectations, etc.

For this exercise, you will learn how to create a Calendar Heatmap chart visualizes values over days in a calendar-like view, making it easy to identify daily patterns or anomalies.

1. Open a new sheet and rename it as **Task 3**.
2. Drag and drop **Date** from **Dimensions** pane into the **Columns** shelf. Right-click on the **Year(Date)** in the columns shelf and select **More** → **Weekday**.



3. Drag and drop **Date** from **Dimensions** pane into the **Rows** shelf. Right-click on the **Year(Date)** in the columns shelf and select **More** → **Week Number**.
4. In the Fit box, select **Entire Width**.

iii Columns

WEEKDAY(Date)

≡ Rows

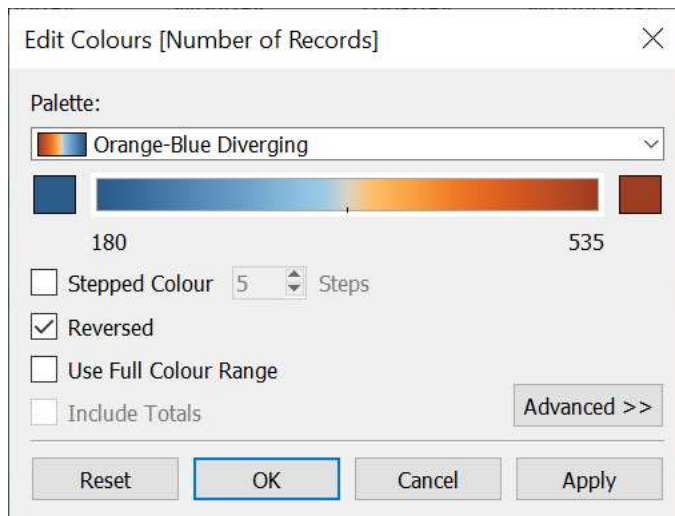
WEEK(Date)

Task 3

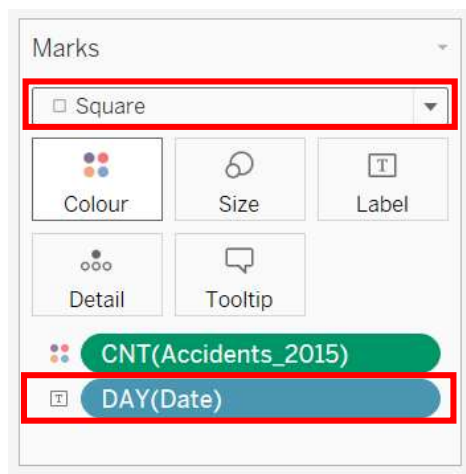
Week o..	Sunday	Monday	Tuesday	Date Wednesday	Thursday	Friday	Saturday
Week 1					Abc	Abc	Abc
Week 2	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 3	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 4	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 5	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 6	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 7	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 8	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 9	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 10	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 11	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 12	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 13	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 14	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 15	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 16	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 17	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 18	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 19	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 20	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 21	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 22	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 23	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 24	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 25	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 26	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 27	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 28	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 29	Abc	Abc	Abc	Abc	Abc	Abc	Abc
Week 30	Abc	Abc	Abc	Abc	Abc	Abc	Abc

5. Drag and drop **Accidents_2015(Count)**, which is the number of accidents, into the **Color Marks** box to give color to the visualization.

6. Click on the **Color Marks** box to edit the color. Change the color to **Orange-Blue Diverging**. Click on the **Reversed** checkbox as we would like to have the orange color to represent more observations.

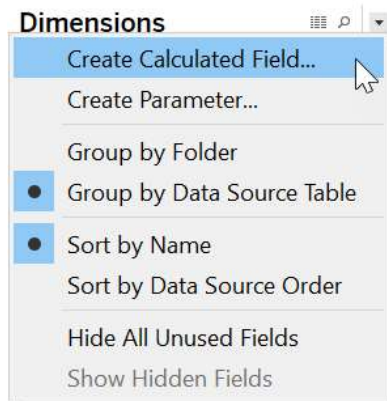


7. Drag and drop **Date** into the **Label Marks** box. To display the date in the label, right-click on the **Year(Date)** in the Marks box and select **Day**. Change the Marks type to **Square**.



8. Click on the **Text Marks** box to edit the text. Change the font size of **Text** to **6**. Set the Vertical Alignment to **Top**.

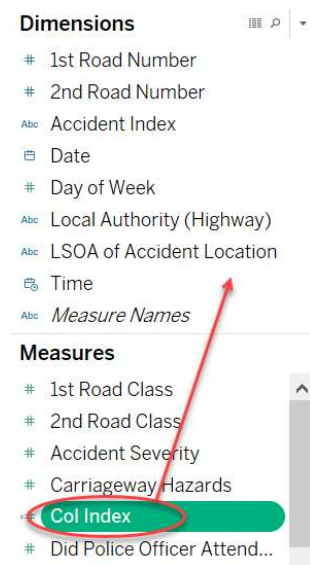
9. To see the month in group, we will create a calculated field. Click on the dropdown near the **Dimensions** pane, select **Create Calculated Field**.



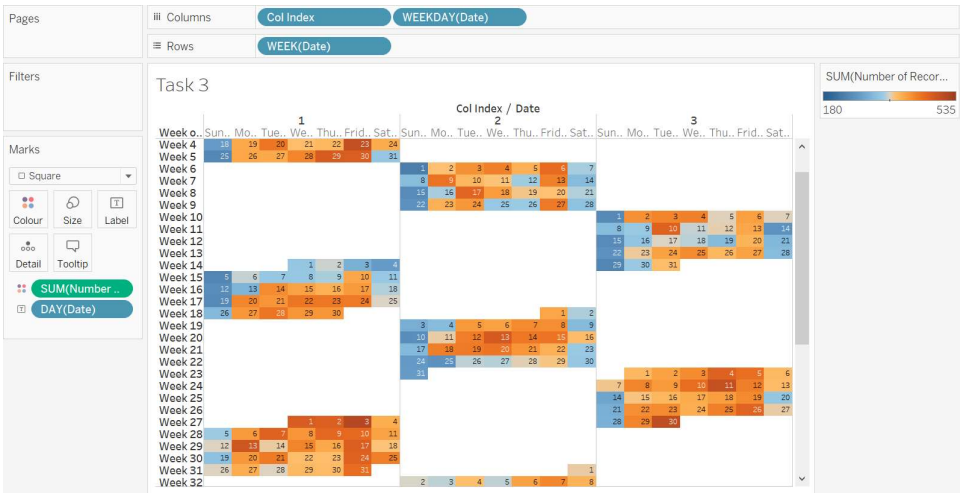
10. Name the field as **Col Index** and enter the formula below:

```
CASE MONTH ([Date])
WHEN 1 THEN 1
WHEN 2 THEN 2
WHEN 3 THEN 3
WHEN 4 THEN 1
WHEN 5 THEN 2
WHEN 6 THEN 3
WHEN 7 THEN 1
WHEN 8 THEN 2
WHEN 9 THEN 3
WHEN 10 THEN 1
WHEN 11 THEN 2
WHEN 12 THEN 3
END
```

11. Drag the newly created **Col Index** from the **Measures** pane and drop it in the **Dimensions** pane.



13. Drag and drop **Col Index** from **Dimensions** pane into the **Columns** shelf and place it before the **WEEKDAY(Date)**.



14. Next, we want to collapse the month, so that you will see that it's next to each other instead of cascading down. We will create another calculated field named **Row Index**. We will be using the FIXED level of detail expressions to compute a value using the specified dimensions without referencing to the dimensions in the view. Enter the formula below:

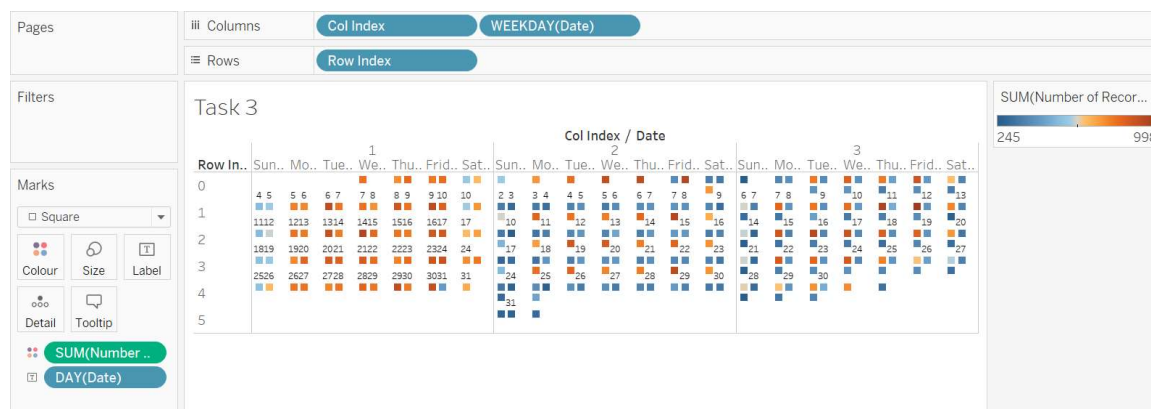
```
DATEPART('week', [Date]) - { FIXED DATEPART('month', [Date]) : MIN(DATEPART('week', [Date])) }
```

15. The formula above determines the row index of each record by subtracting the minimum week number of the month from the week number. You may refer to the table below for the result.

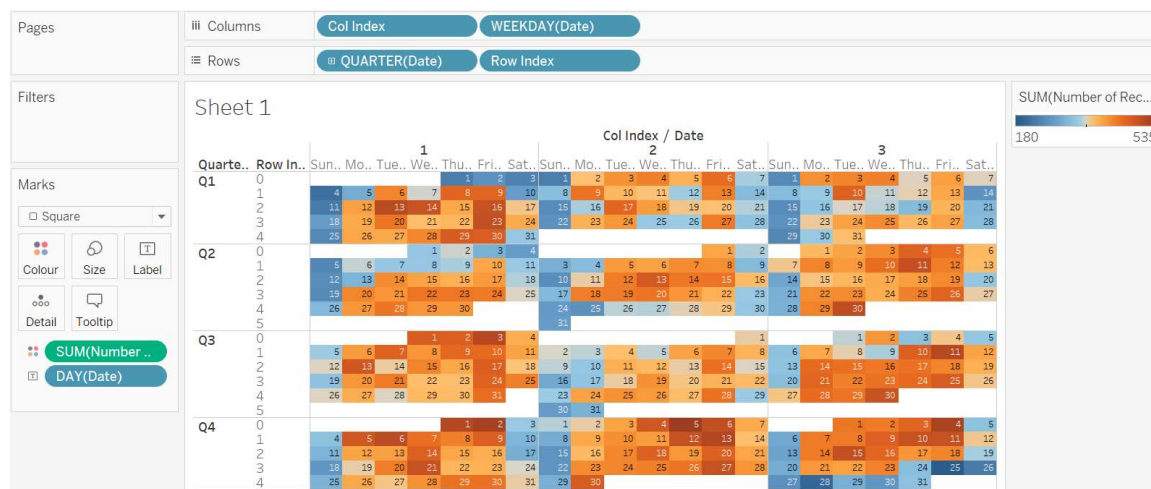
Month of D...	DATEPART(...)	FIXED DATEPART('m...	Row index
January	1	0	
	2	1	
	3	2	
	4	3	
	5	4	
February	6	0	
	7	1	
	8	2	
	9	3	
March	10	0	
	11	1	
	12	2	
	13	3	
	14	4	
April	14	0	
	15	1	
	16	2	
	17	3	
	18	4	
May	18	0	
	19	1	
	20	2	
	21	3	
	22	4	
	23	5	

For more details on FIXED level of detail expressions, you may refer to https://help.tableau.com/current/pro/desktop/en-us/calculations_calculatedfields_lod_fixed.htm

16. Drag the newly created **Row Index** from the **Measures** pane and drop it in the **Dimensions** pane.
17. Replace the **WEEK(Date)** with **Row Index** in the Rows shelf.



18. Drag and drop **Date** from **Dimensions** pane into the **Rows** shelf and place it before the **Row Index**. Right-click on the **Year(Date)** in the columns shelf and select **Quarter**.



- Sheet 1

The image displays a Google Sheets interface with a spreadsheet titled 'Sheet 1'. The spreadsheet is organized into quarters (Q1, Q2, Q3, Q4) and months (Sun., Mo., Tue., We., Thu., Fri., Sat.). A context menu is open over the cell at Q2, Row 4, Column 11, showing options: Keep only (checked), Exclude, Hide, Drill down, Format..., Rotate Label, Show Header (checked), and Show Missing Values. The 'Show Header' option is highlighted by the mouse cursor.

- Pages

iii Columns

Col Index

WEEKDAY(Date)

Rows

QUARTER(Date)

Row Index

Filters

Marks

Square

Colour

Size

Label

Detail

Tooltip

SUM(Number ...)

DAY(Date)

SUM(Number of Recor...

180535

Task 3

Sund..

Mon..

Tuesd..

Wedn..

Thurs..

Friday

Satur..

Sund..

Mon..

Tuesd..

Wedn..

Thurs..

Friday

Satur..

Sund..

Mon..

Tuesd..

Wedn..

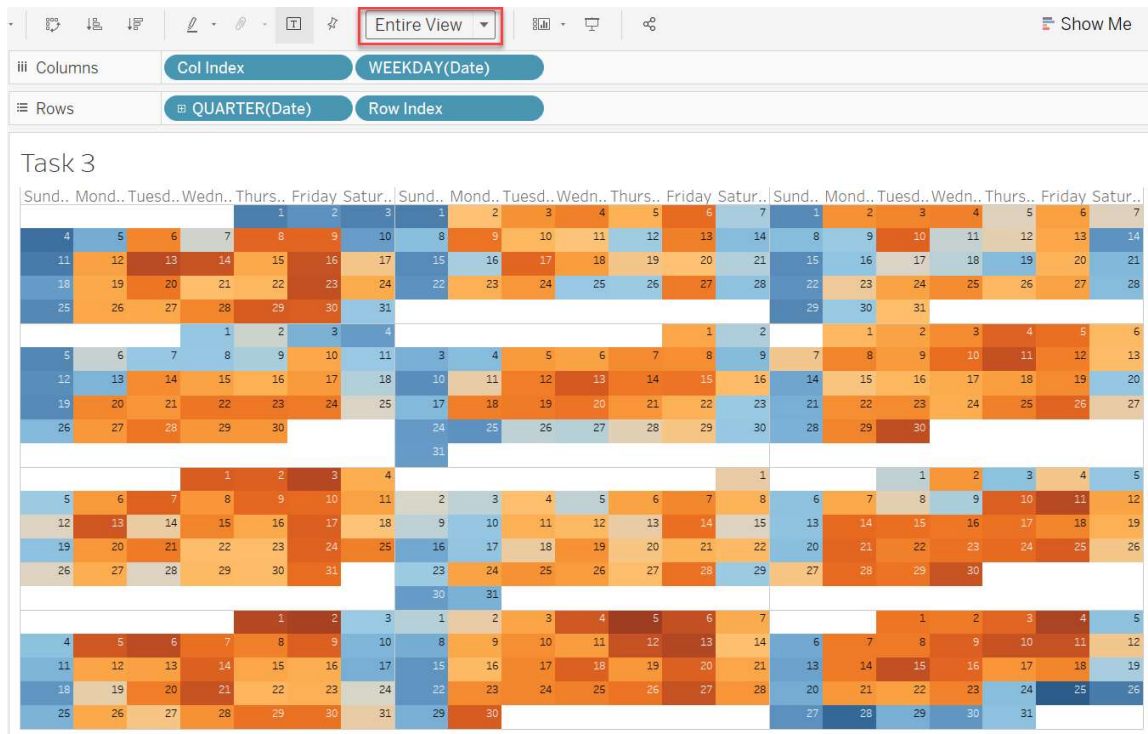
Thurs..

Friday


Satur..

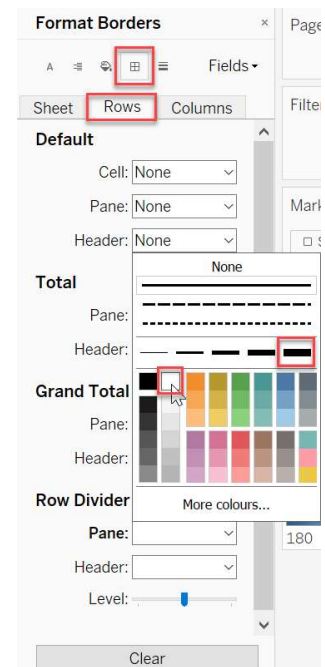
4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	1
---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	---

21. Select Entire View from the toolbar to fit the visualization to full screen.



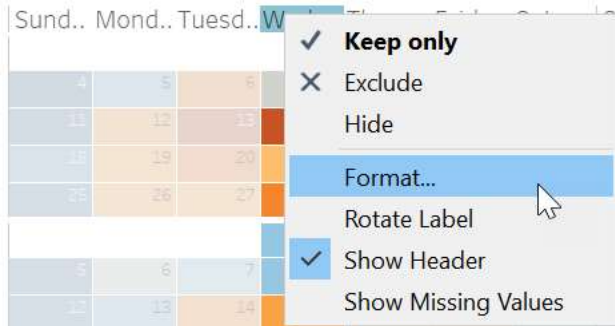
22. Next, we are going to apply some formatting create some spaces between the months and dates. Right-click on the chart and select **Format**.

23. Click on **Borders**  and select the **Rows** tab. Select a **thick white** line for the **Pane** under **Row Divider**.

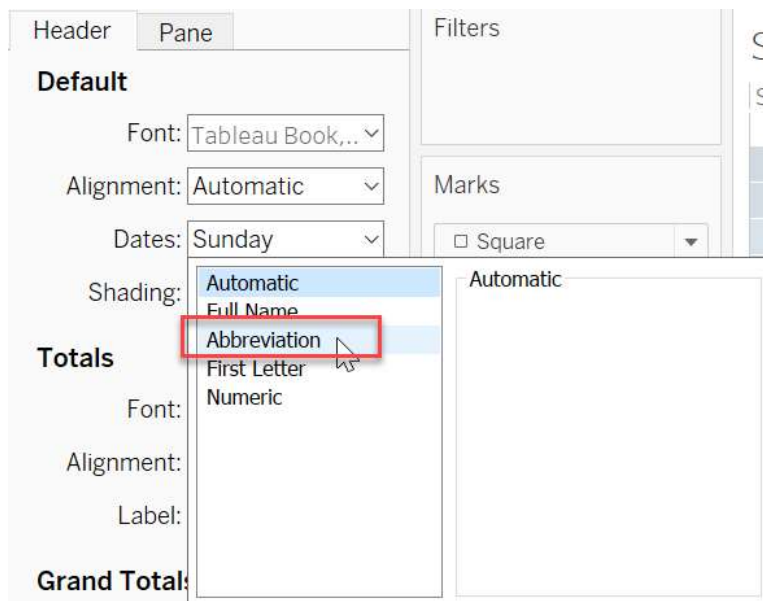


25. Change line color to white for **Cell** under **Default**. Do the same for the Columns.
26. Right-click on the any of day in the chart and select **Format**.

Task 3

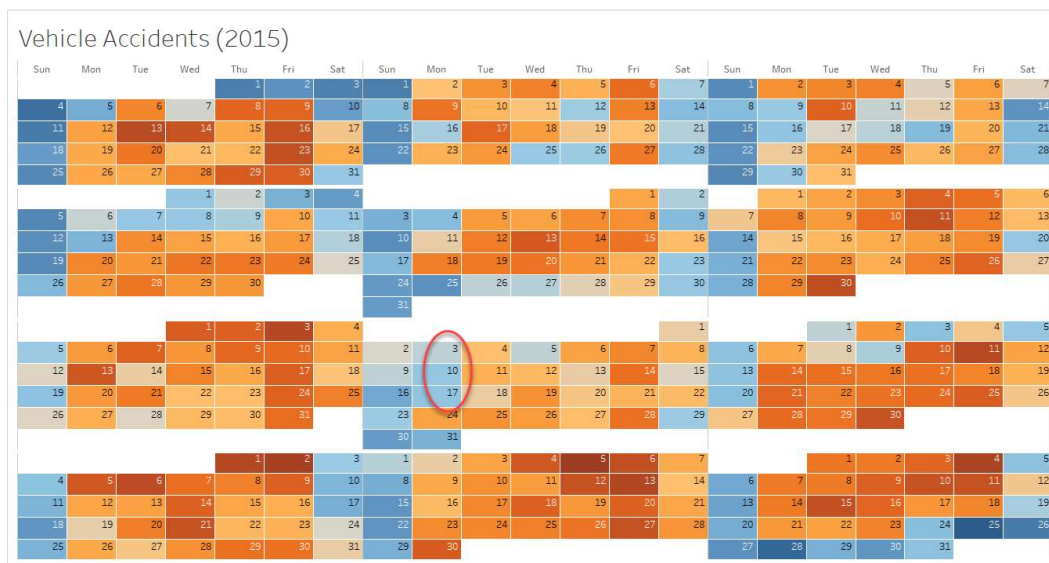


27. Select **Abbreviation** for **Dates** under **Default**. And change the font size to **6** and **bold** it.



28. Change the header of the sheet to **Vehicle Accidents (2015)**.

29. From the chart, you will notice that there's some Mondays that are low in accidents. For this, we can find out more by bringing the public holidays.



30. Click back to the **Data Source** and connect to the **public_holiday_2015** Excel file.
31. We are going to do a data blend to join the two data sources. Select **Data → Edit Relationships** from the toolbar. (Only require this step for older versions of Tableau)
32. Select **Custom** and remove all the predefined relationships. Click Add, select **Date** and click **OK**. Click **OK** to create the relationship. (Only require this step for older versions of Tableau)

Relationships

Relationships determine how data from secondary data sources are joined with primary data sources.

Primary data source:
Accidents_2015 (Accidents_2015)

Secondary data source: ☐ Automatic ☒ Custom

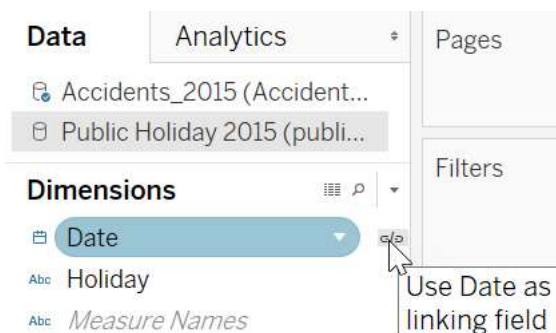
Public Holiday 2015 (publi

Date Date

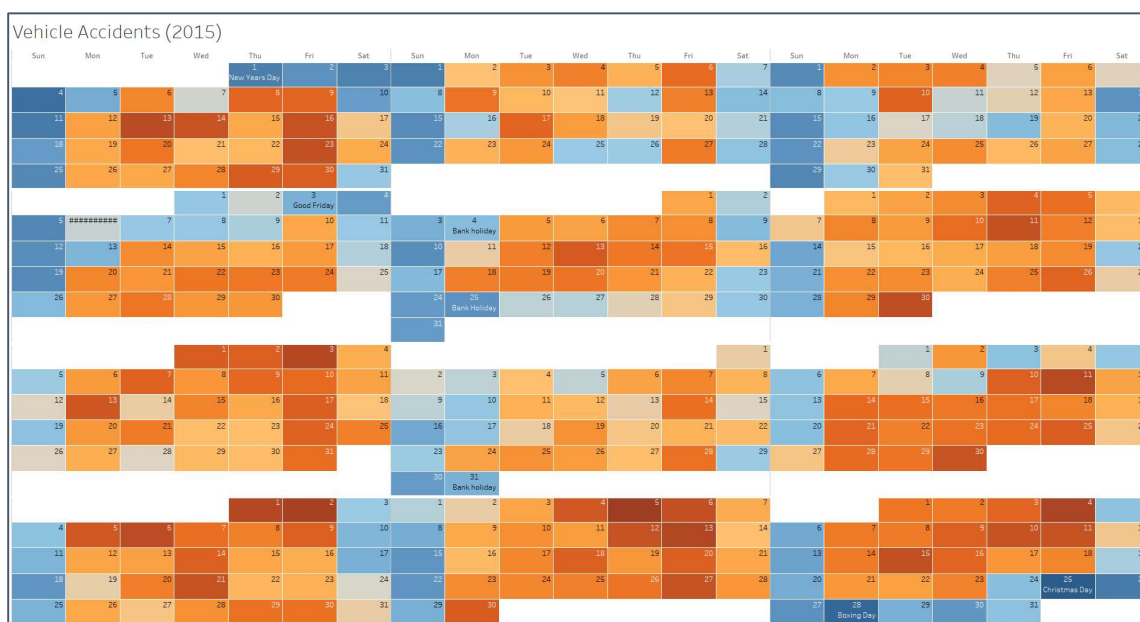
Add... Edit... Remove

OK Cancel

33. Click on the link icon to use the Date field is used as the linking field in the data source.



34. Drag and drop **Holiday** into the **Label Marks** box. Format the font size so that holiday can be displayed properly in the chart.
35. The chart should look like the one below.



Adapted from the tutorial created by Super Data Science on how to create a Heatmap Calendar in Tableau. Watch the video here: https://www.youtube.com/watch?v=VEKbQ_cpS_w