FIT3179 Data Visualisation

Homework - Week 5: Brushing and Linking

Tableau: Brushing and Linking and Dashboard

1. Overview

- This homework assessment is worth 1% of your final grade.
- The late penalty is 25% of the total mark (1%) per day of late submission.

This week's Tableau homework consists of three activities.

1. Creating an Interactive Visualisation in Tableau
2. Creating a Dashboard and Combining Visualisations in Tableau
3. Creating Interactive Filtering (Brushing and Linking)

2. Submission

A report must be submitted in PDF format through the submission link on Week 5 page. The page limit of the report content (Part 1 and Part 2) is 2 pages. Part 1 and 2 are each worth 0.5%. Write a report that contains the following information:

- Your identity (name, Monash student ID, lab, tutor name)
- A screenshot of all the charts you created in part 1 and the dashboard in part 2
- A URL of a publicly accessible Dashboard (refer to Week 1 Tableau Document - Section 3.4 for publishing a dashboard).

3. Exercise

The two following exercises are marked and should be included in your report. This is an individual assessment. **Discussing this exercise or posting (intermediate) results on any forum is not allowed. We will follow up on and penalise any kind of academic misconduct.**

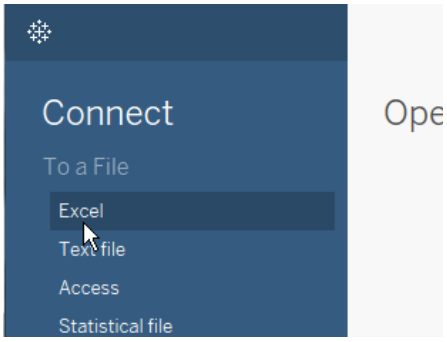
1. Part 1: Creating an Interactive Visualisation in Tableau

In the previous Tableau homework, we learned some basic workflow in creating visualisations with Tableau. We also learnt to create a simple filtering mechanism as an interaction. In this section, we will explore more of the interactivity that Tableau provides. We will create multiple visualisations and add interactive filtering using mouse clicks on a map.

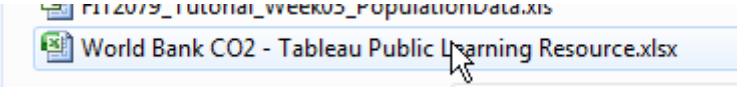
First, let's import the data we need and recall some of the knowledge that we learned over the previous weeks.

1.1. Connecting to a Data Source

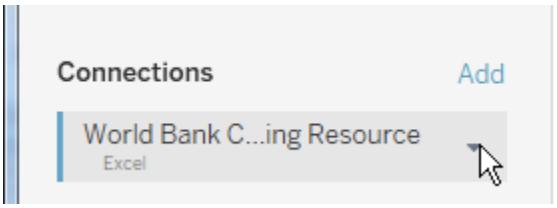
1. Open Tableau. We need to provide the project with a data source.



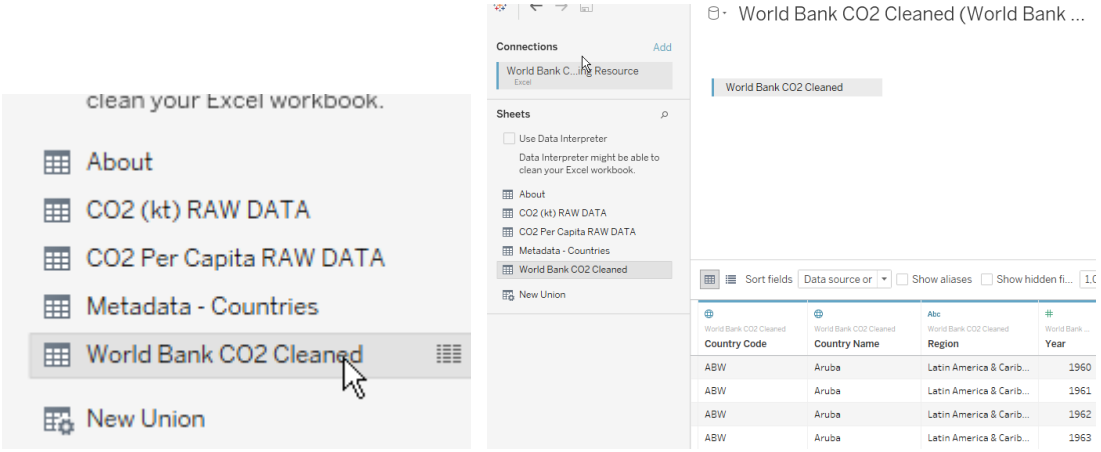
2. Check Moodle for the Country emission dataset for this week. The file name is World Bank CO2 – Tableau Public Learning Resource.xlsx.



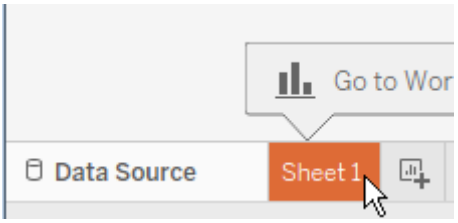
3. Once we have added this, we can add extra datasets if we want more data (this is useful!). We can also remove datasets, but we must have at least one dataset. So, we cannot delete the one we just added until we have added another.

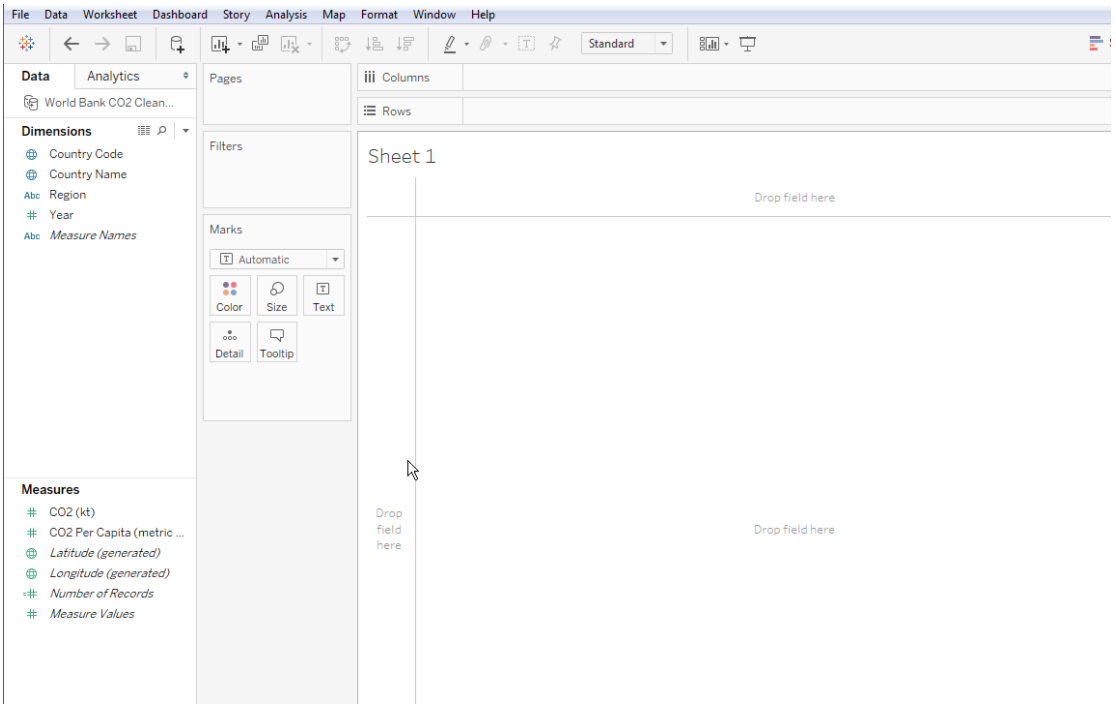


4. There are multiple sheets in the excel file, but we only want to use the World Bank CO2 Cleaned sheet. As per the name, this data has already been cleaned for us. Note that for your assignment, you may need to clean your dataset before you can use it.



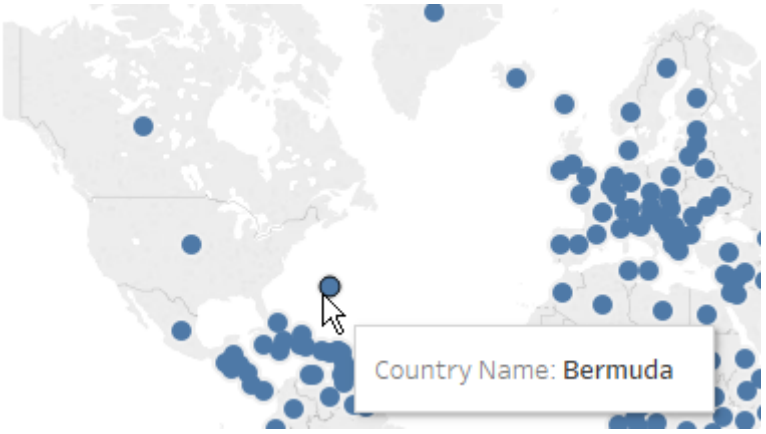
5. Once we have done this, we can now start making visualisations. We can make multiple visualisations from a single dataset. Tableau has already made a sheet for us; let's use that.



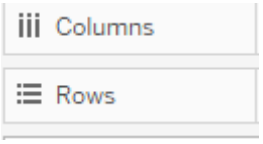


1.2. Building Visualisation Sheets: World CO2 Emission in a Map

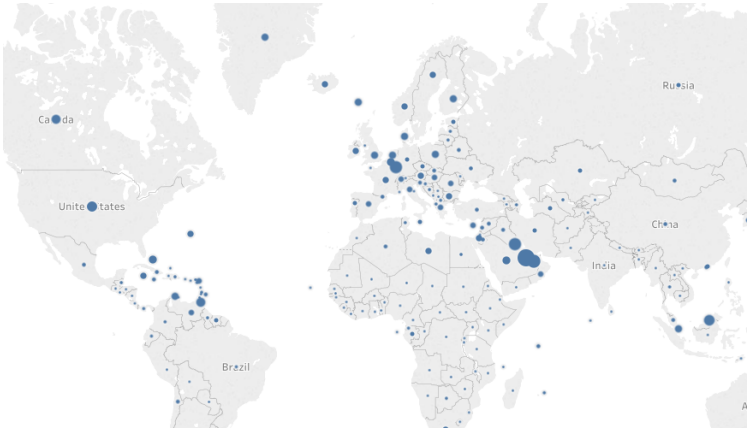
1. Now we want to have a map showing the data. Drag the **Country Name** dimension into the main window. Tableau will recognise each country for us and will automatically generate a map. It will furthermore put a dot on each country on our map.



Look at the **Columns** and **Rows** shelves; do you see any changes after dropping the **Country Name** to the sheet?

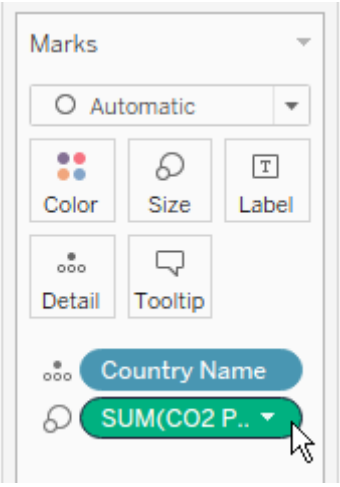


2. The map is just showing the country names and *nothing else*. Can you find a way to encode **CO2 Per Capita** into the visualisation so that the size of the circles represents the **CO2 Per Capita** value (see the image below)?

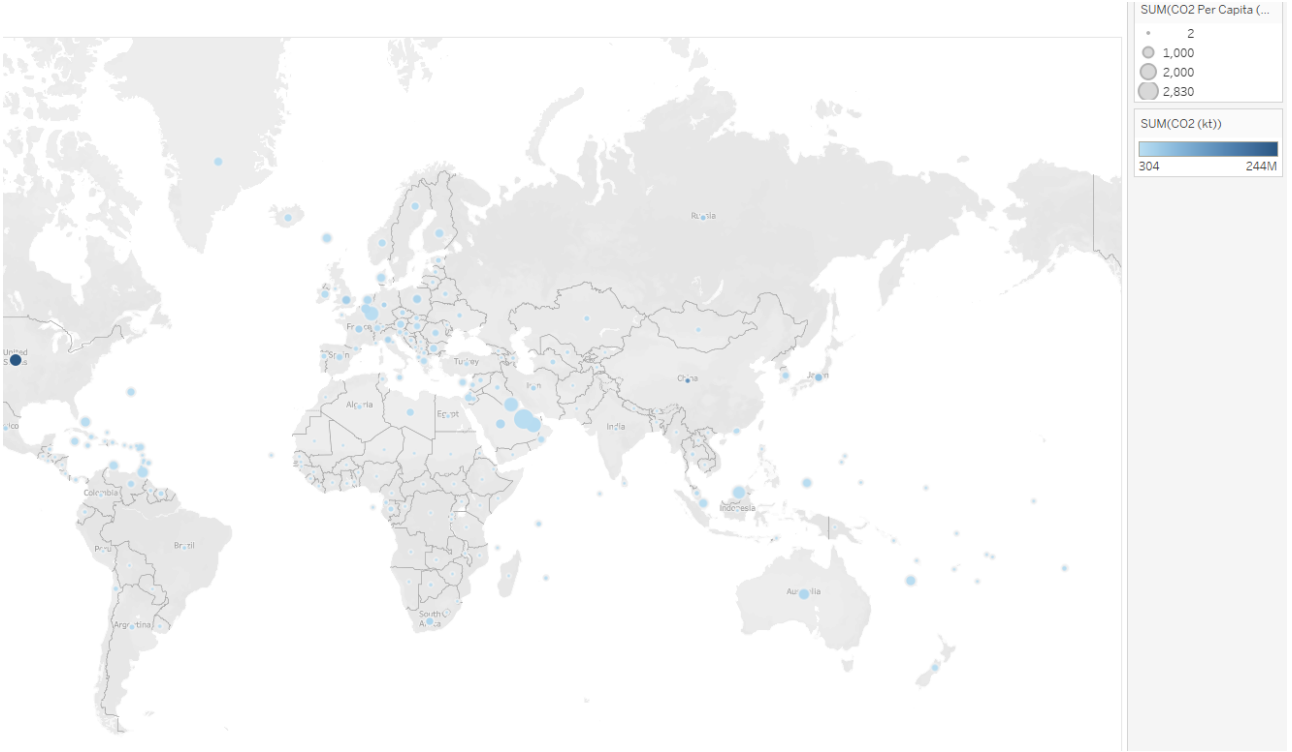


Note: yes, you will need to drag “CO2 Per Capita” to “Size” in the Marks Panel.

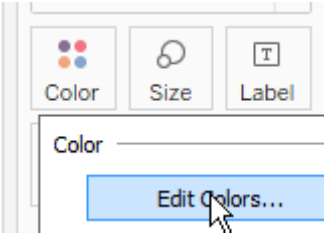
3. Look at the **Marks** panel. There are two marks used so far: **Country Name** for details and **SUM(CO2 Per Capita)** for the size.

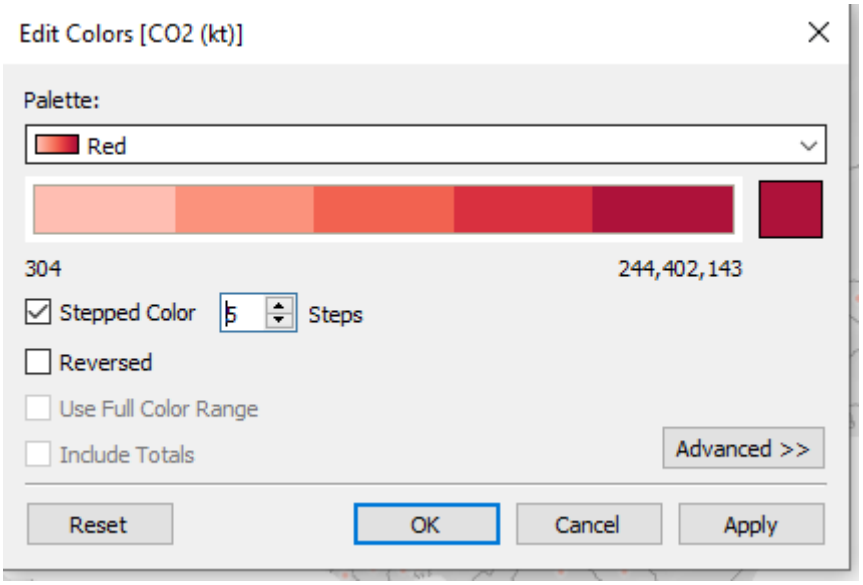


4. Let's encode more attributes to the visualisation. We will have the raw emission encoded as colour. We can do this by dragging the **CO2** (not CO2 Per Capita) onto the **Marks** <colour> icon.



5. By default the emission value, ranging from 340 to 244M kilotons are mapped directly to the colour. This is not ideal. Let us make the colour mapping more meaningful by creating groups. Click the Edit Colors menu and adjust the step and palette.



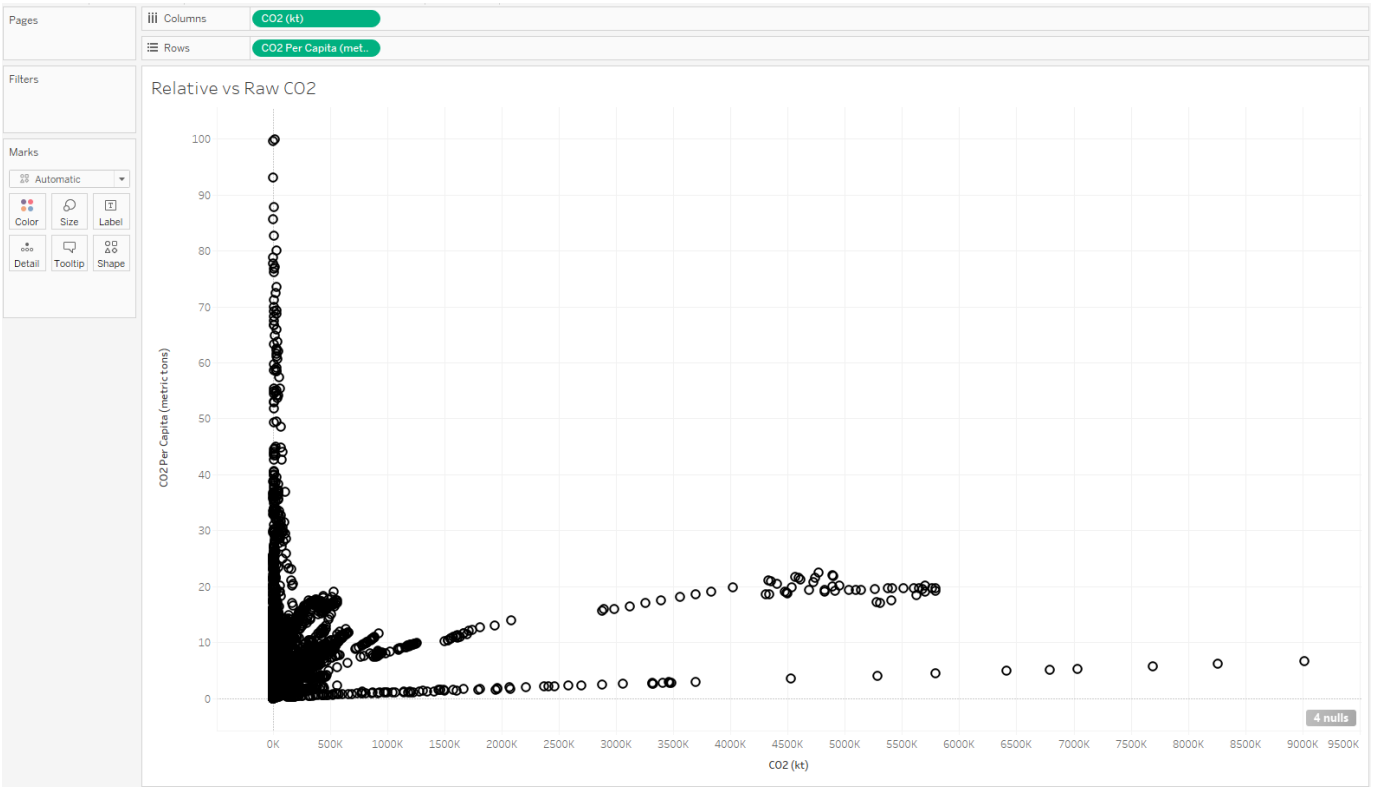


Much better! Now we can see the relative and raw CO2 emission. USA and China seem to produce the highest CO2 but the relative number is different.

Let's name this sheet by <right clicking> on the sheet name. Rename it “World CO2 Emission – Map”.

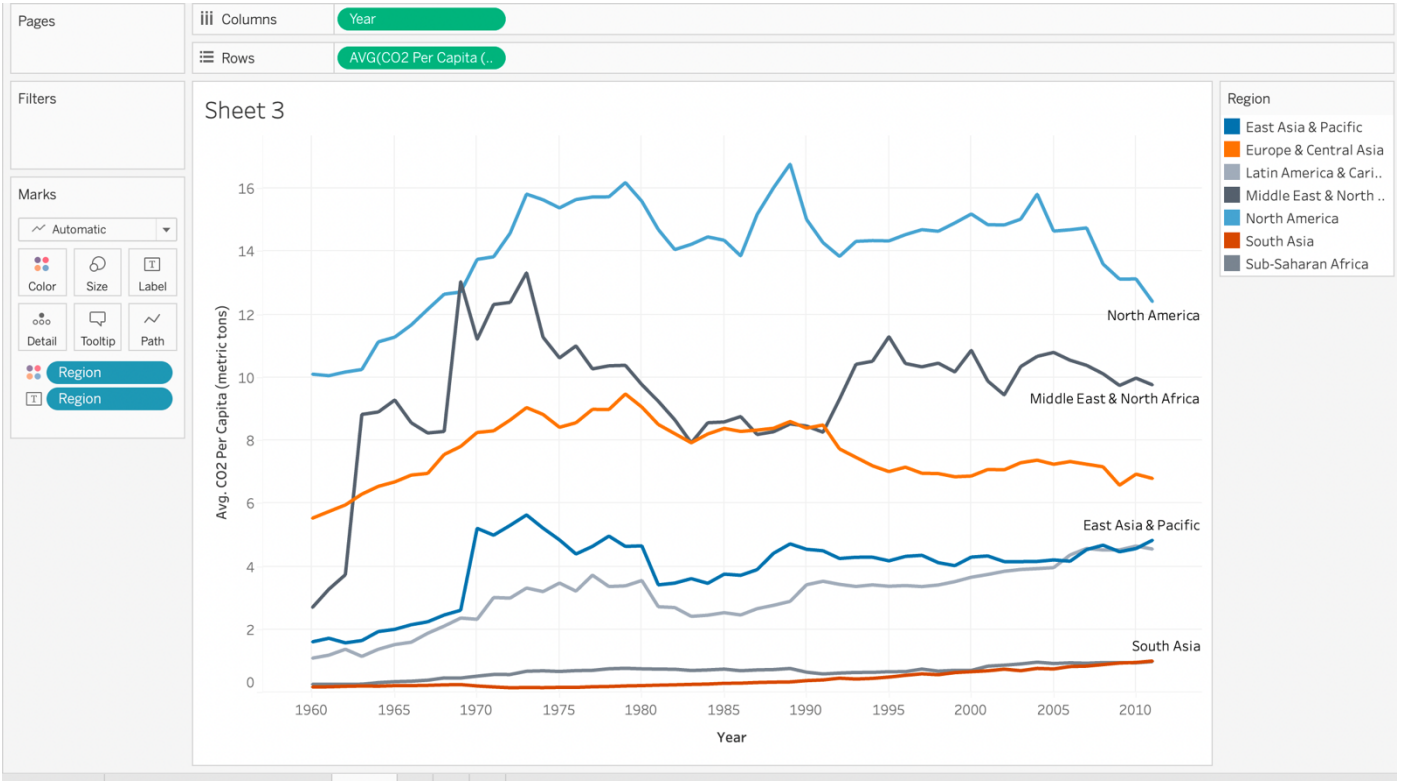
1.3. Raw vs Relative CO2 Emission - Scatter Plot

It’s time to apply what we have learned from our week-1 studio activities to create a scatter plot showing the raw and relative CO2 value. Save it as Raw vs Relative CO2 Emission.



1.4. World Regional CO2 Emission – Line Chart

The line chart should show the average CO2 emission per capita of different **regions** of the world, as shown in the sample below. The colour palette used in this line chart is the **Colour Blind** palette. Save it as “World Regional CO2 Emission”.

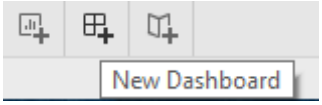


2. Part 2: Creating a Dashboard and Combining Visualisations in Tableau

So far, you have learnt how to create a single visualisation (sheet) in Tableau. In this section, we will learn how to create a dashboard and combine visualisations in Tableau.

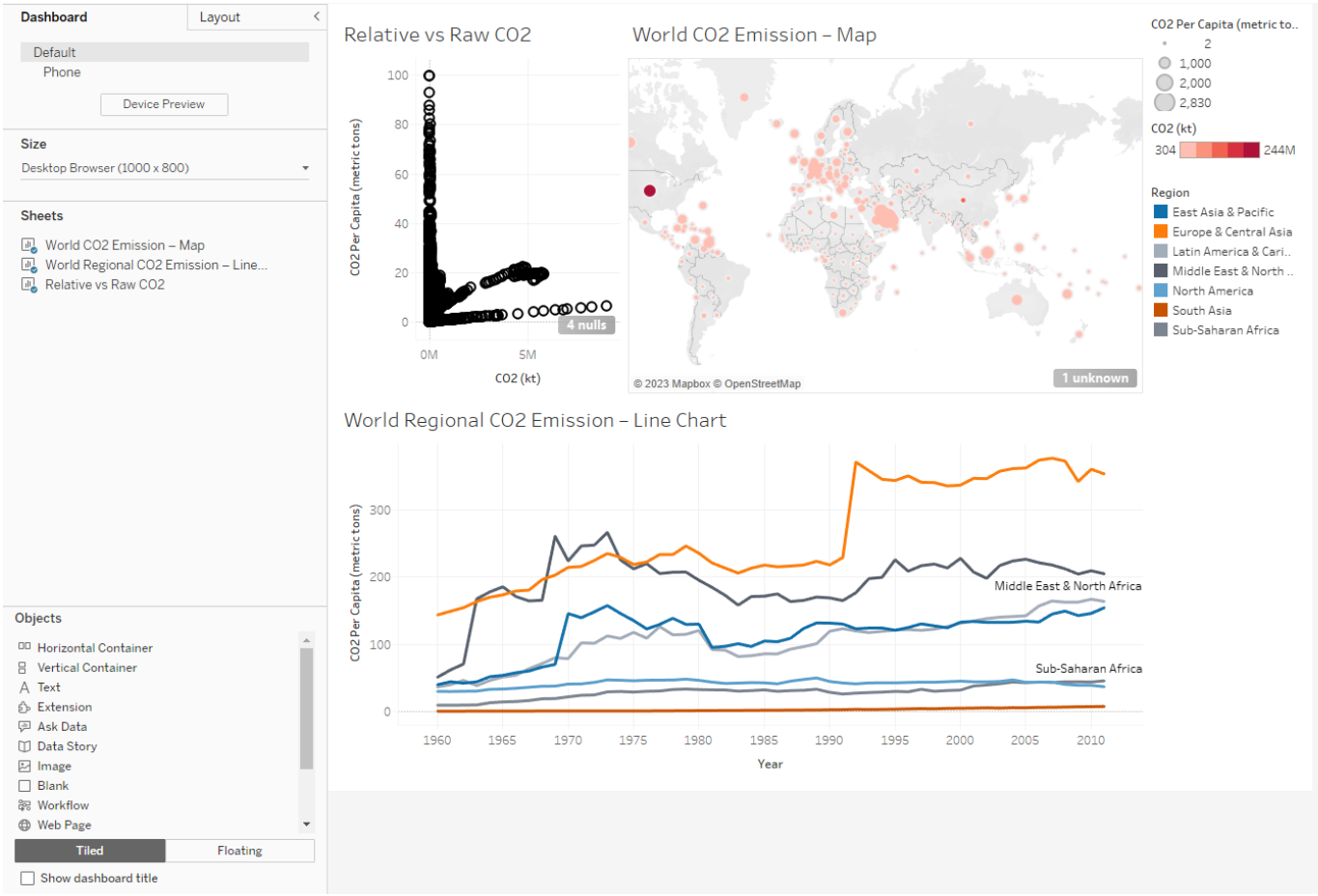
2.1. Combining Your Visualisations Together

1. As the last step, we will see how to combine all of the visualisation/sheets that we have created into a single interactive visualisation *dashboard*.
2. First, create a new dashboard.

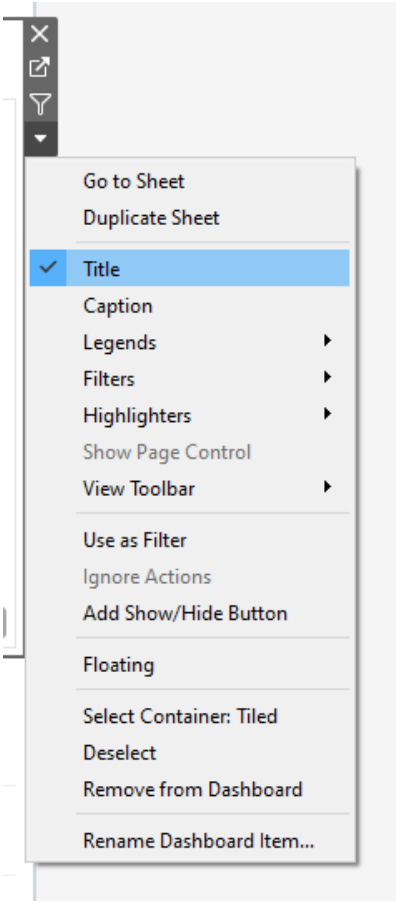


3. In the Dashboard panel, you will see **Size**, **Sheets**, and **Objects**. You can adjust the size of the dashboard in the **Size** menu. Select **automatic** in the **Size** menu so that the dashboard will fit in any device size. **Sheets** show all the sheets you have made. **Objects** show different objects we can put into the dashboard. We will use it later.

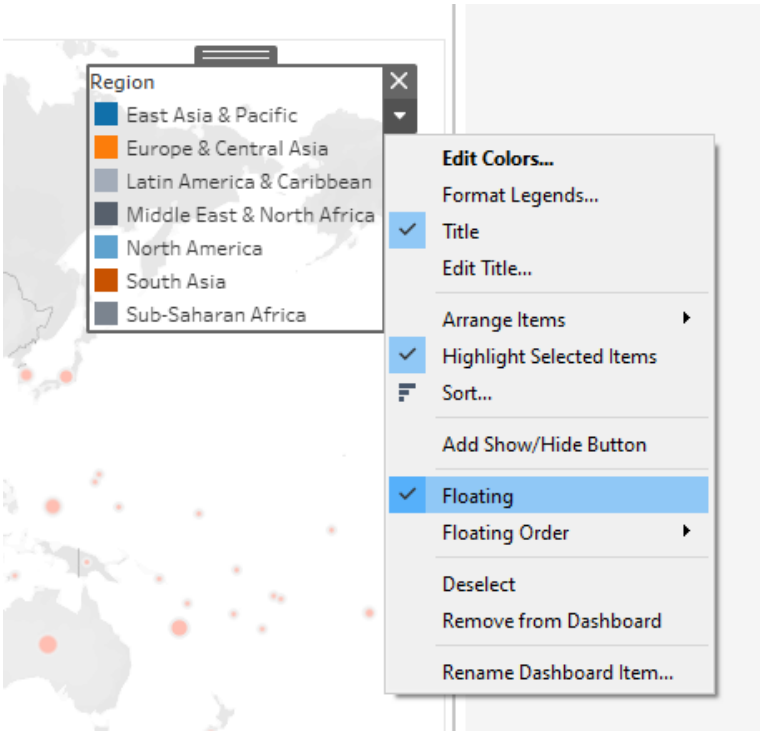
4. We can now drag the visualisations from **Sheets** into our dashboard. Choose any layout that you think is the best for all three visualisations. We can start by randomly placing the charts into the board.



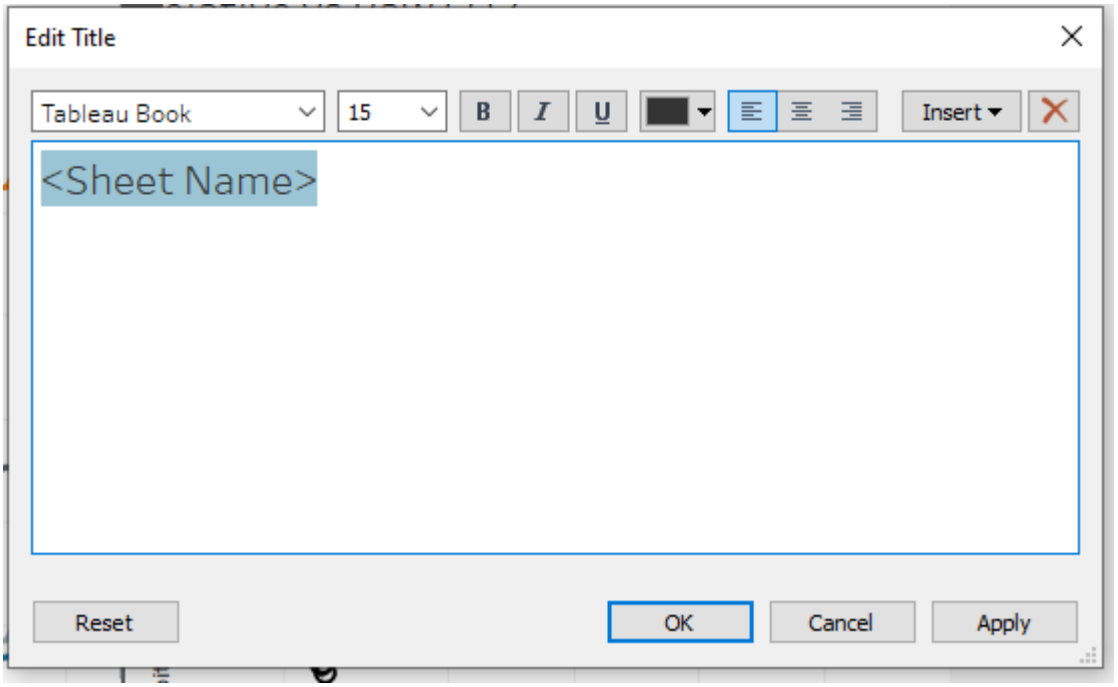
5. Then by adjusting the Size of the board, changing the position of the charts and legends, adding Text, hiding the Map title, and updating the titles of the line chart and scatter plot, we can create a nice dashboard.



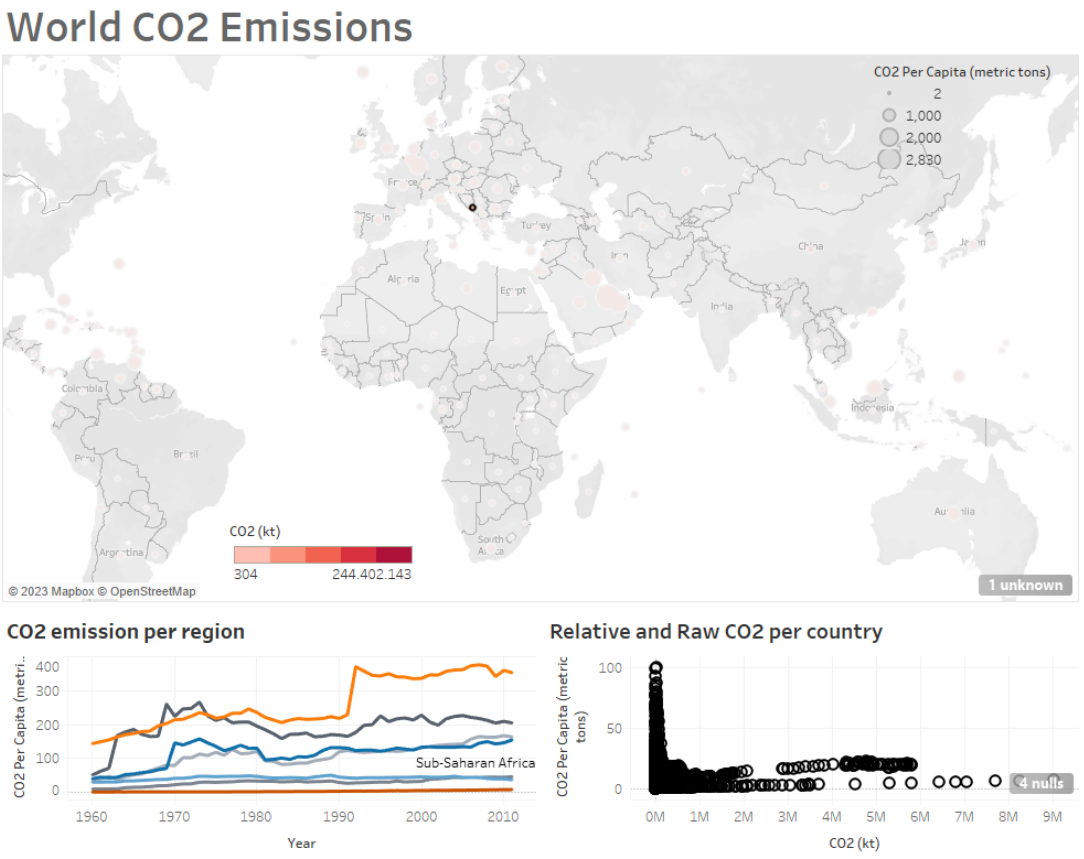
To hide the map title, you can click the option next to the map and uncheck the Title. As you can see there are other options that you can change as well.

6. 

This includes the Floating option that can make the panel's position unconstrained.



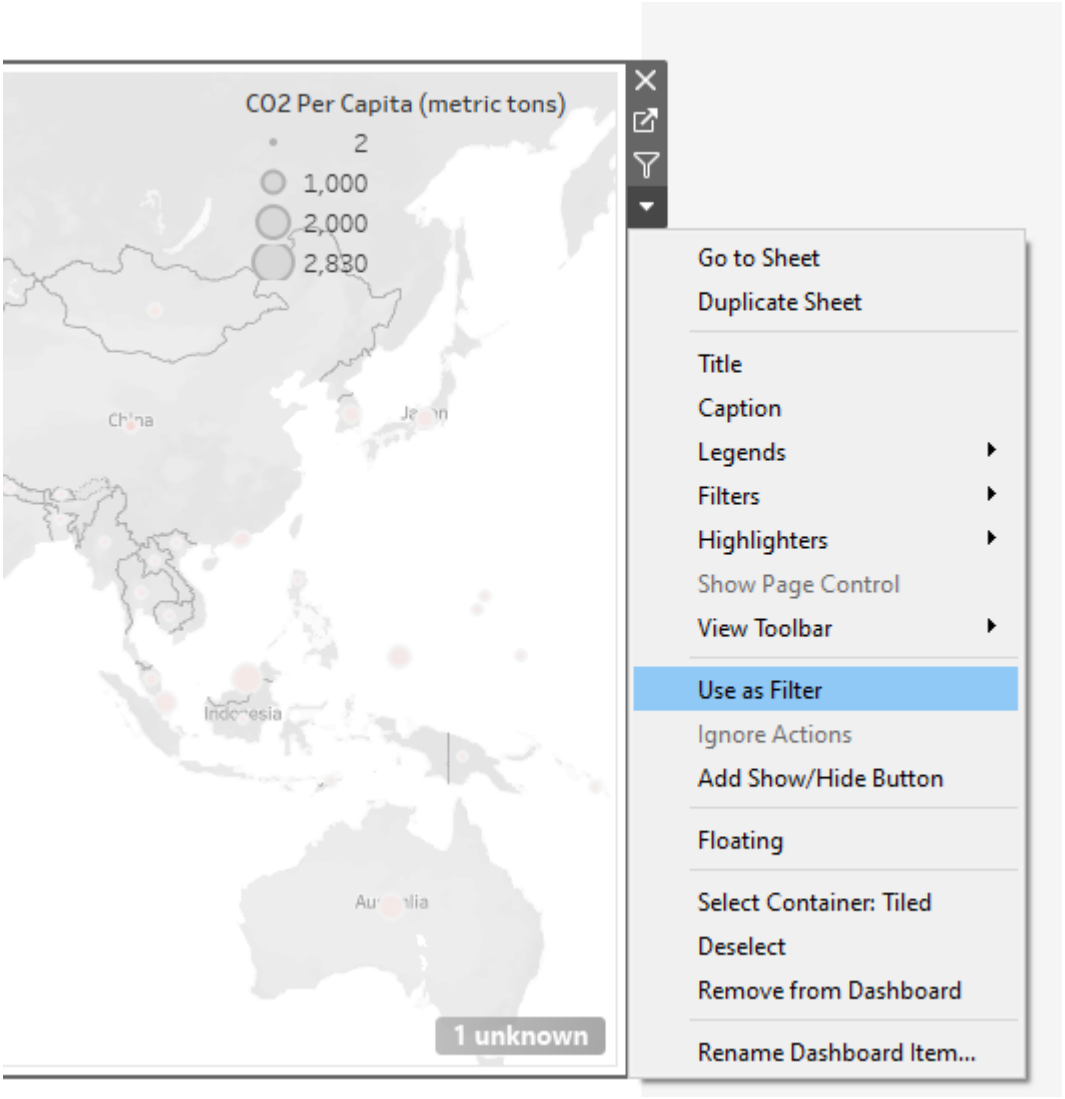
To rename the chart title, you can simply double click on the title. You can also see the typography options.



By adjusting the settings mentioned above, you can come up with something like this. There are a few possible improvements to this, but let us move on to the brushing and linking part for now.

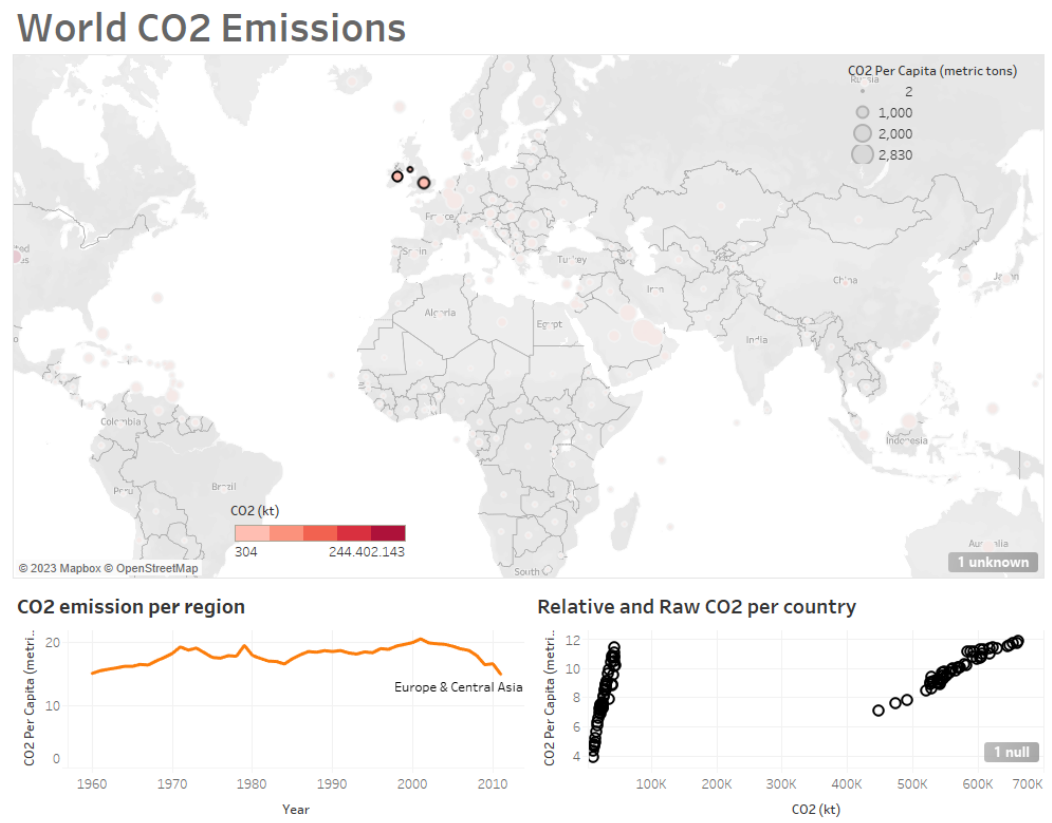
Part 3: Creating Interactive Filtering (Brushing and Linking)

1. Each visual element in the chart can be used as a filter for other charts on the dashboard. To achieve this interactive filtering, we can first check the Use as Filter option on the map.

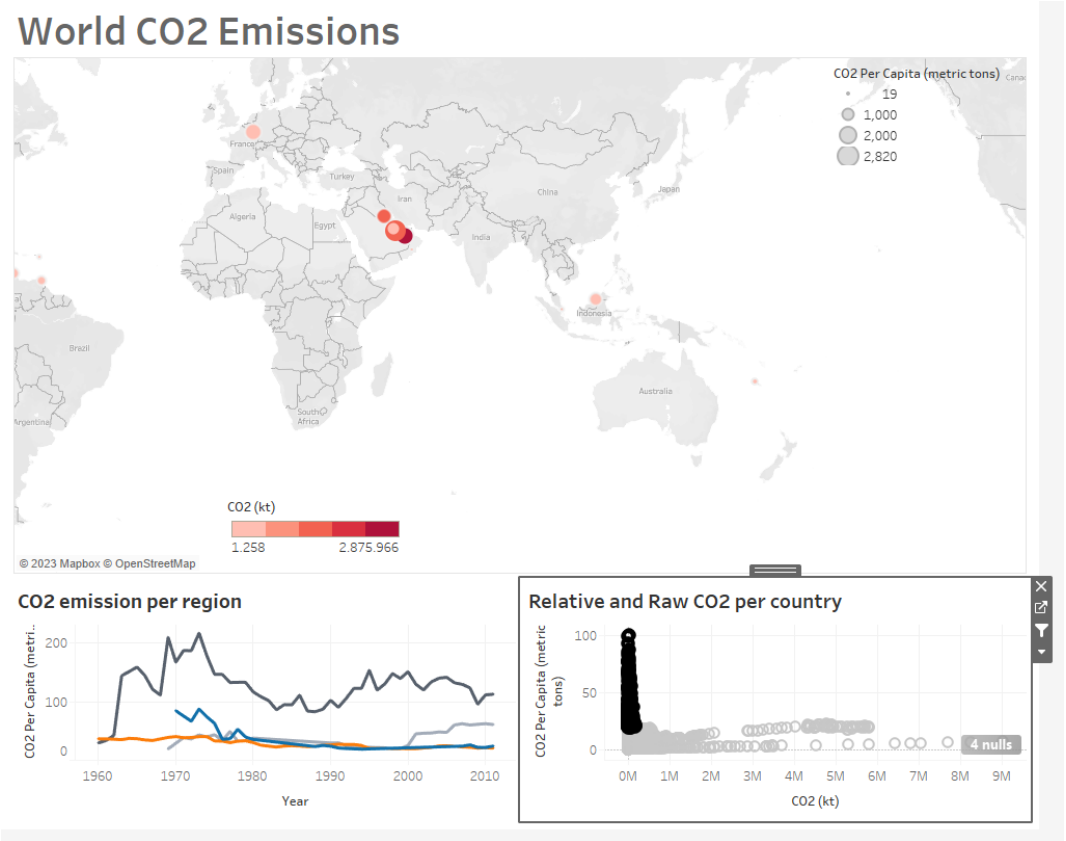


Then, make sure that you activate the selection tool on the map.

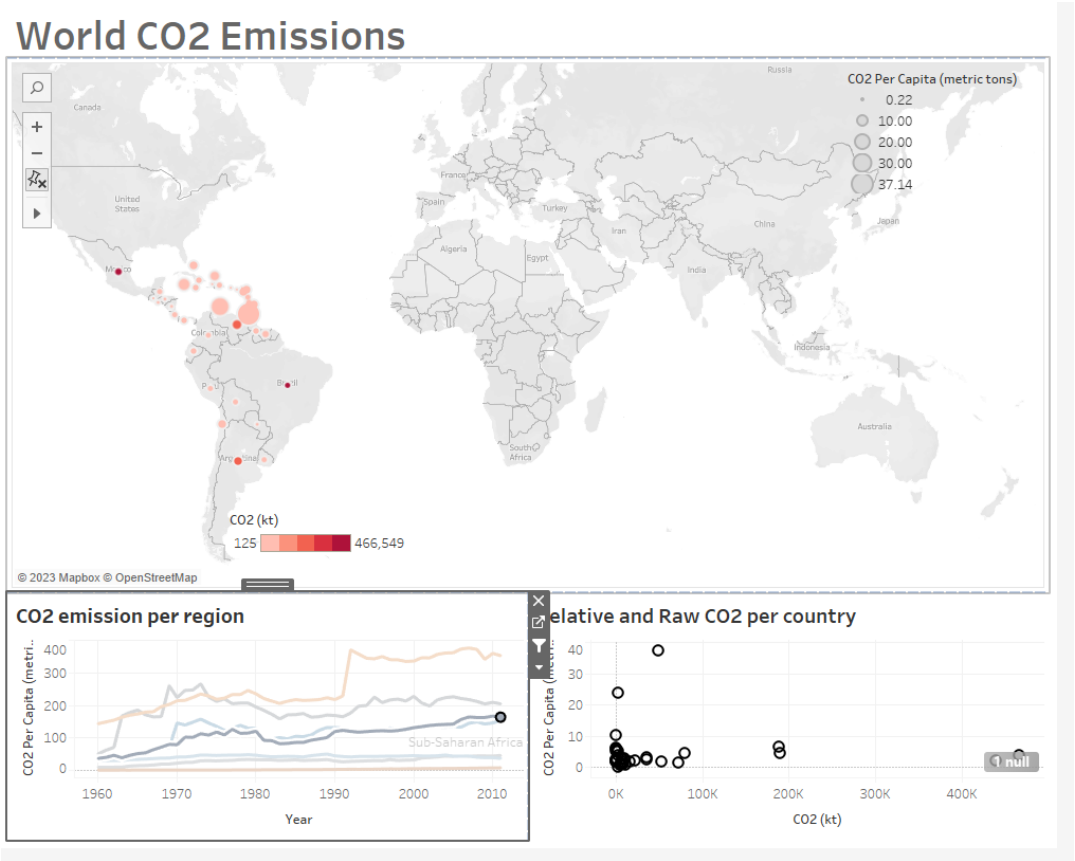
Now, if you select countries on the map, the line chart and scatter plot will be filtered out.



2. So far, we can only filter the line chart and scatter plot using the map but it does not work in the opposite direction. We can also activate the Use as Filter option on these two charts so that we can filter the map.



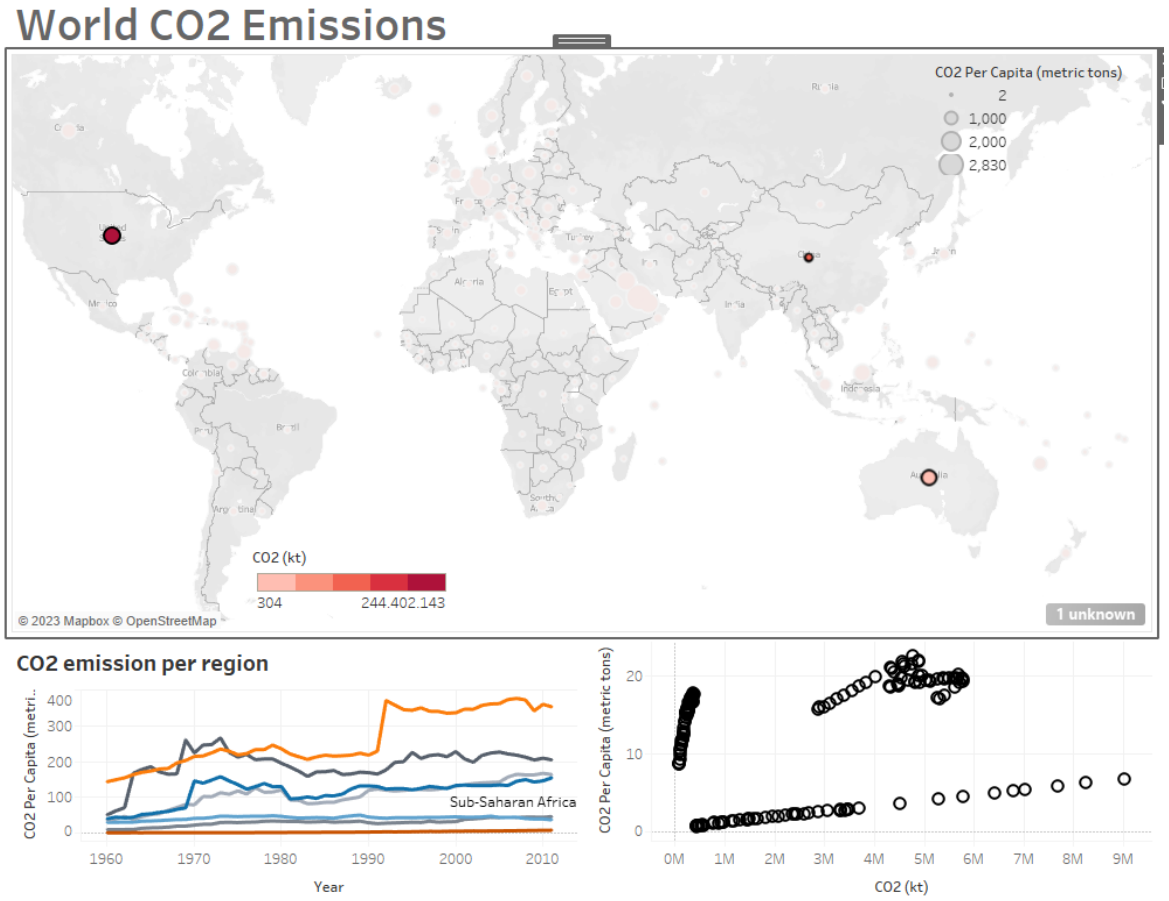
Selecting points on the scatter plot filters the map and line chart.



Selecting the line filters scatter plot and the map.

3. There may be cases where you do not want any filter to be applied to a chart. Suppose that we want to make the line chart static.
4. Ideally, you don't need to filter an uncluttered visualisation because it can be easily understood. Therefore, we need to modify the regional line chart so that it does not react to the map click.
5. To do that, bring the regional line chart back to its previous form by **clicking an empty space** on the map. Then, click the **World's Regional CO2 Emission - Line Chart**, **More Options Ignore Actions**. Now the filter will not affect it anymore!

6. If you want to compare multiple countries, you can use **<Ctrl> + click**.



7. Brushing and linking is a useful technique for data exploration. This technique can help you generate insights and make sense of the data. However, you need to be careful when using it for narrative visualisation as too much interactivity might hinder the story points.

8. A few notes. This part is not mandatory but is worth looking into.

    - We can see here that the scatter plot shows more points than what is being selected on the map. Why did that happen? Is that an issue? Think about that, and see if you can come up with an alternative.
    - Currently, the size of the circle represents the SUM of the emission. What does this mean? What would the map look like if we try other aggregation methods, e.g., mean or median?

9. That is the end of the exercise. Do not forget to save your file.