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 submission due date is **Sunday, 28 August 2022, at 11:55 pm**.
- The late penalty is 25% of the total mark (1%) per day of late submission.

This week's Tableau homework consists of two activities.

1. Creating an Interactive Visualisation in Tableau
2. Creating a Dashboard and Combining Visualisations in Tableau

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.**

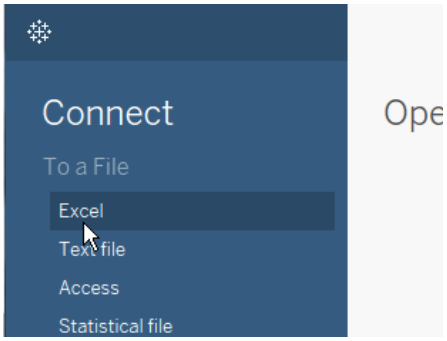
1. Part 1: Creating an Interactive Visualisation in Tableau

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.

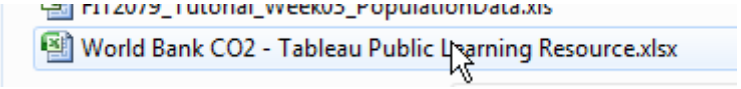
First, let's import the data we need and recall some of the knowledge that we learned over the previous weeks.

1.1. Connecting to a Data Source

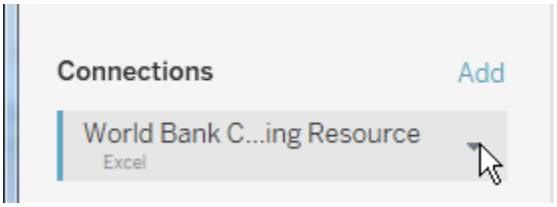
1. Open Tableau. We need to provide the project with a data source.



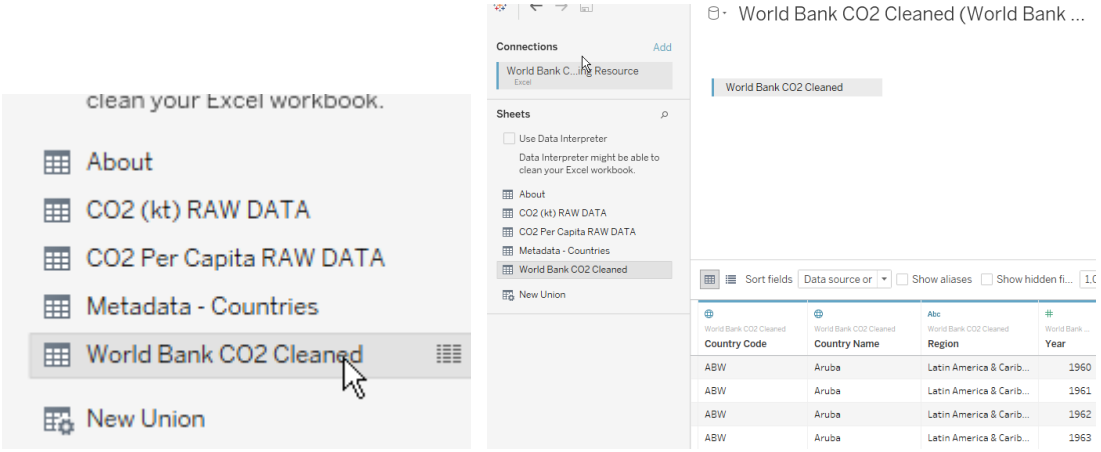
2. Check Moodle for the Country emission dataset for this week. The file name is World Bank CO2 – Tableau Public Learning Resource.xlsx.



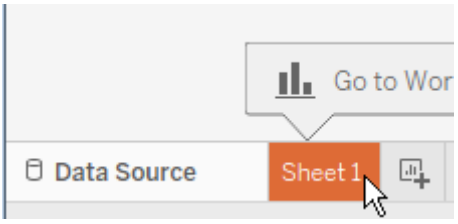
3. Once we have added this, we can add extra datasets if we want more data (this is useful!). We can also remove datasets, but we must have at least one dataset. So, we cannot delete the one we just added until we have added another.

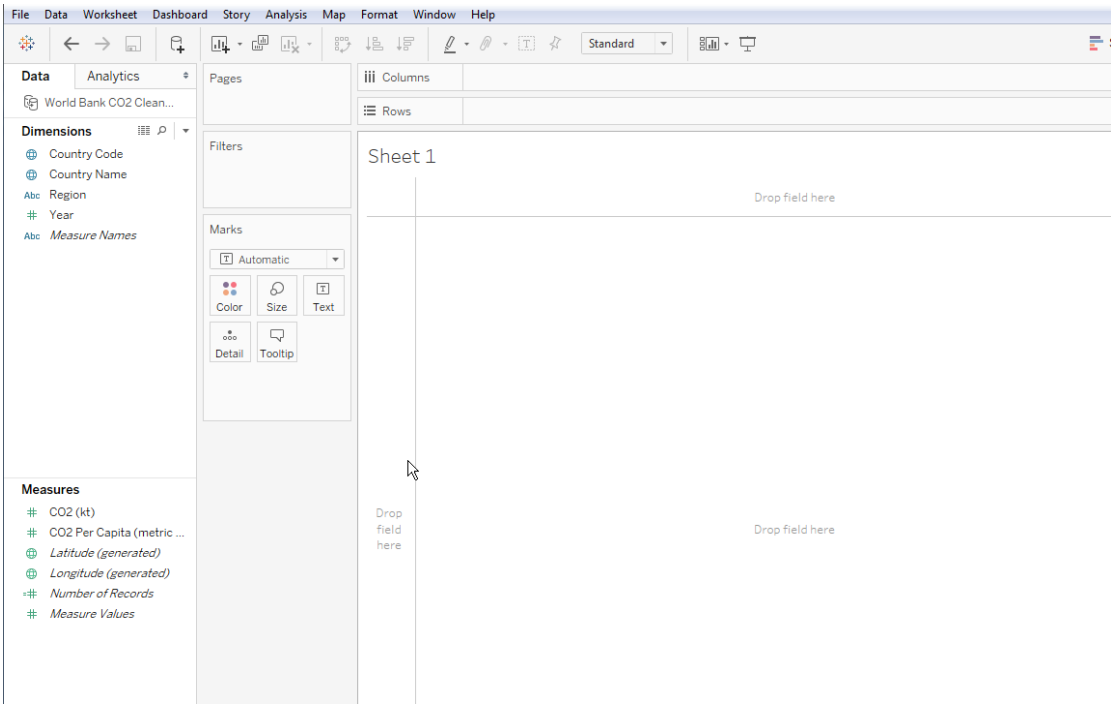


4. There are multiple sheets in the excel file, but we only want to use the World Bank CO2 Cleaned sheet. As per the name, this data has already been cleaned for us. Note that for your assignment, you may need to clean your dataset before you can use it.



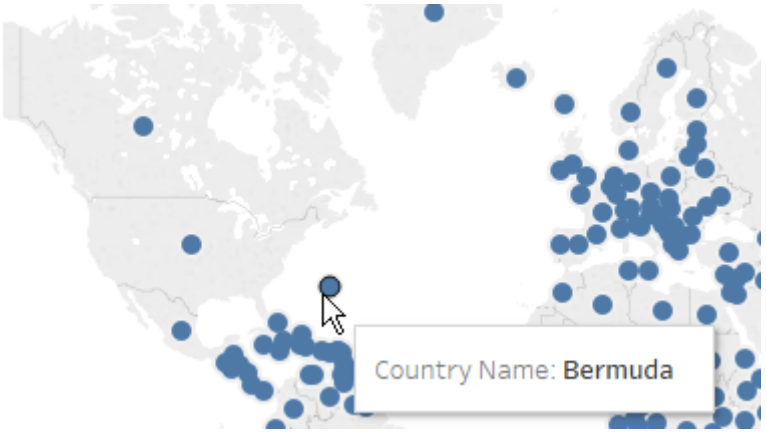
5. Once we have done this, we can now start making visualisations! We can make multiple visualisations from a single dataset. Tableau has already made a sheet for us; let's use that.



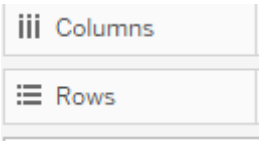


1.2. Building Visualisation Sheets: World CO2 Emission in a Map

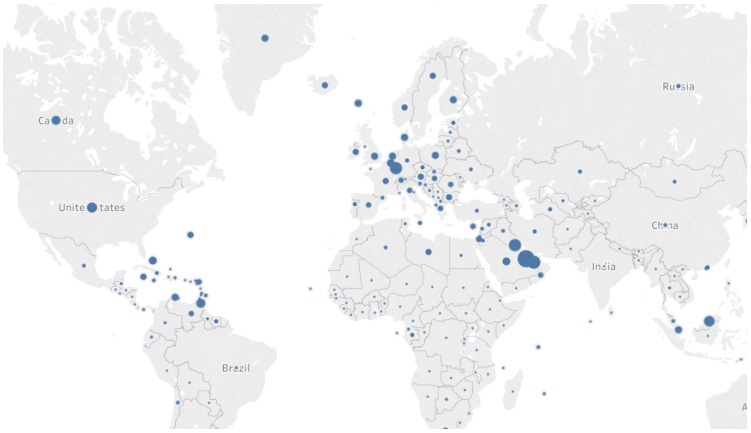
1. Now we want to have a map showing the data. Easy! Drag the **Country Name** dimension into the main window. Tableau will recognise each country for us and will automatically generate a map! It will furthermore put a dot on each country on our map (how easy is that?!).



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

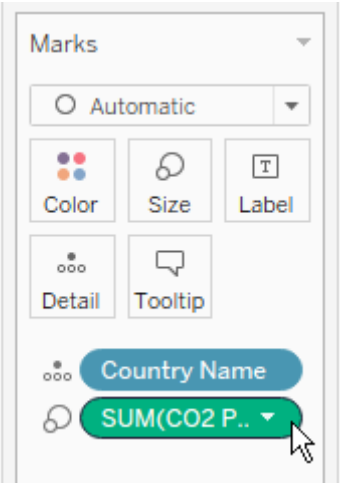


2. The map is just showing the country names and *nothing else*. Can you find a way to encode **CO2 Per Capita** into the visualisation so that the size of the circles represents the **CO2 Per Capita** value (see the image below)?

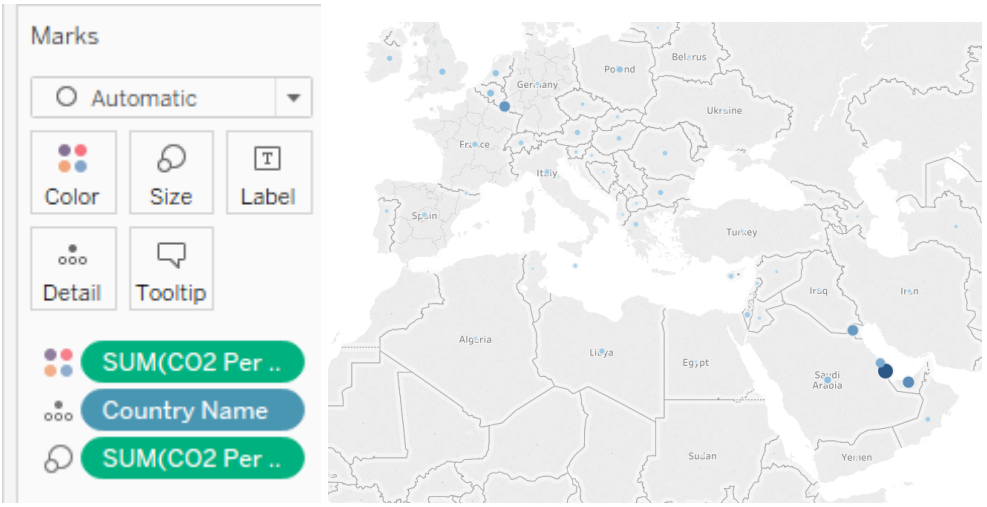


Note: yes, you will need to drag “CO2 Per Capita” to “Size” in the Marks Panel.

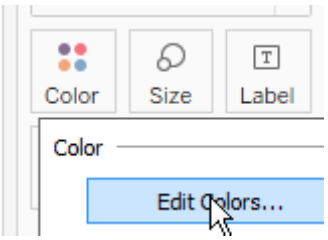
3. Look at the **Marks** panel. There are two marks used so far: **Country Name** for details and **SUM(CO2 Per Capita)** for the size.



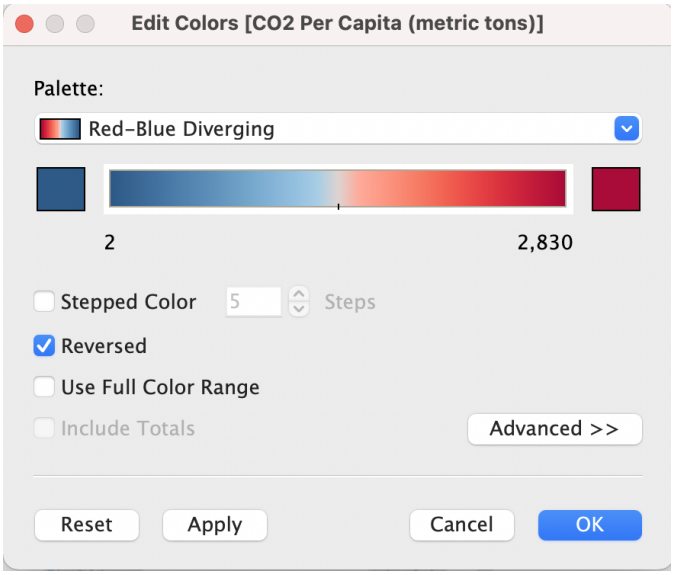
4. Let's do something more complicated. We will have the emissions encoded as colour. We can do this by dragging the **CO2 Per Capita** onto the **Marks** <colour> icon.



5. Now we have three sections in **Marks**! The colour is from white to dark blue based on emissions. This is not easy to read. Let's change this colour palette. We can <left click> on the **Marks** <*colour*> icon and edit the colour.



6. We will change this to be red-blue diverging, flipping the colours, so they start at blue and end in red. Why do you think we reversed this?

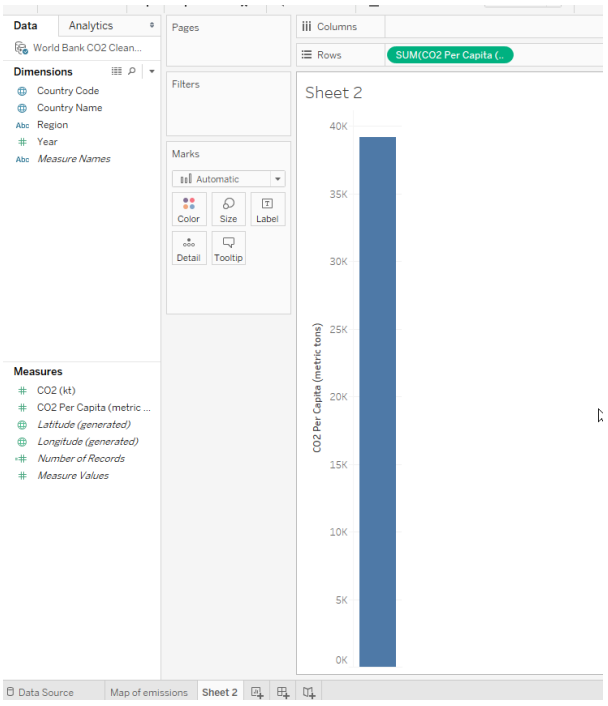


Much better! Suppose we were happy with this. Let's name this sheet by <right clicking> on the sheet name. Rename it “World CO2 Emission – Map”.

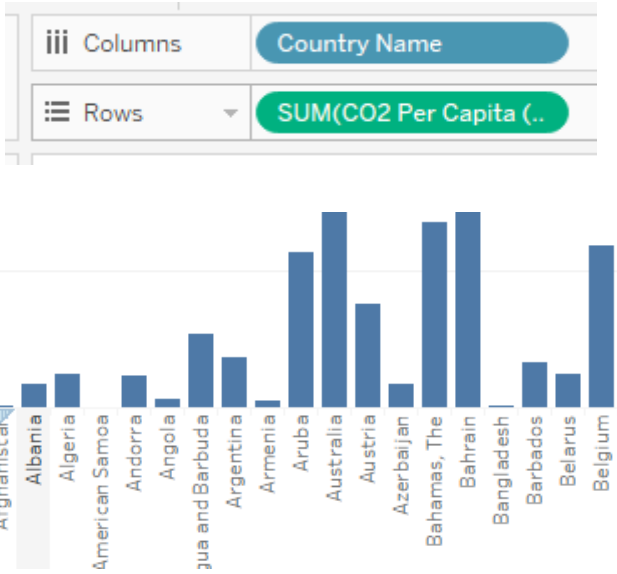
1.3. World CO2 Emission – Line Chart

Now let's make another sheet.

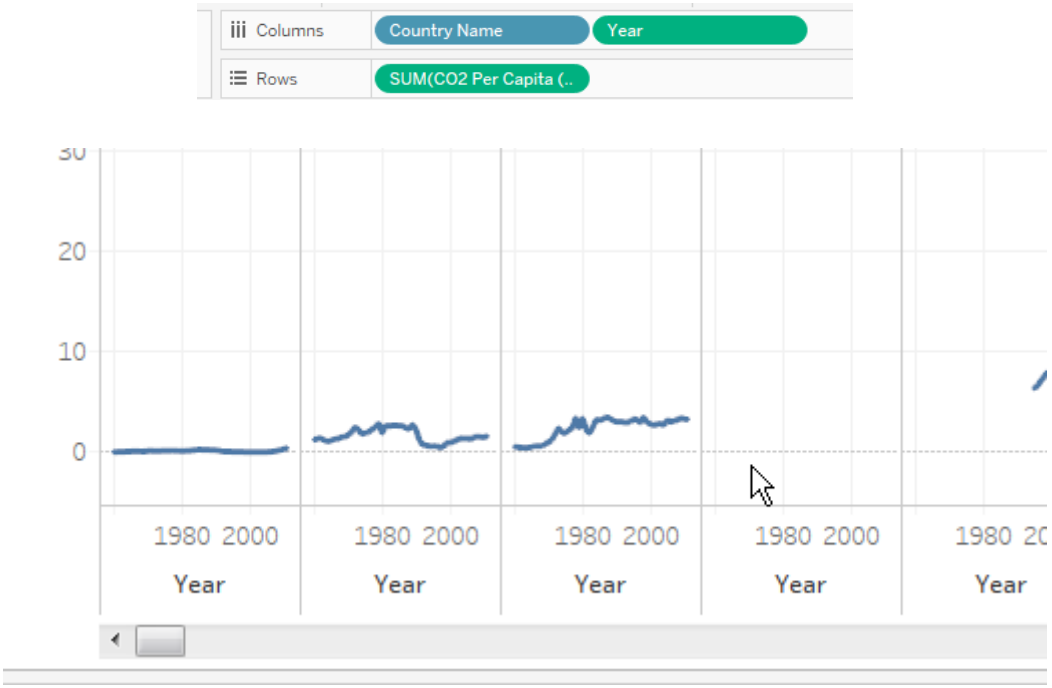
1. Instead of dragging anything onto the new sheet, let's <double click> on the **CO2 Per Capita** data. This will automatically create a bar chart for us. Note that at the top of the sheet, we can see the **rows** (i.e., left axis) is being driven by the **total sum of emissions**. Not very interesting!



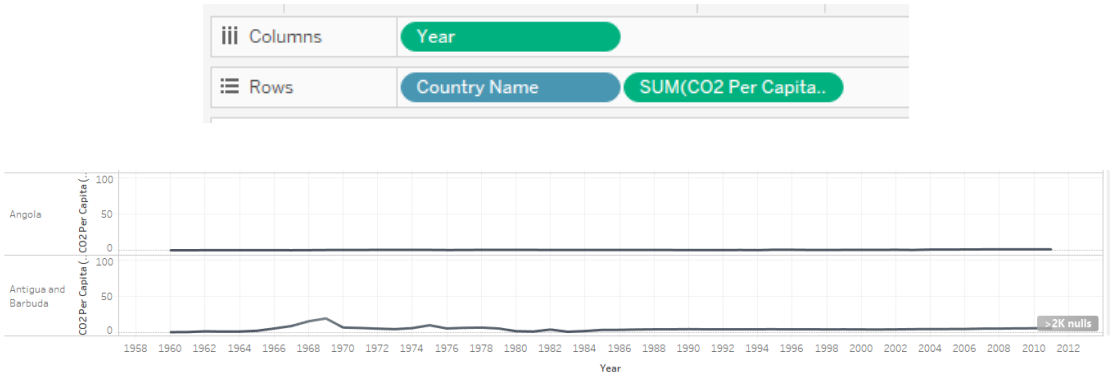
2. What would happen if we add **Country Name** to the **columns** section by <double clicking> it?



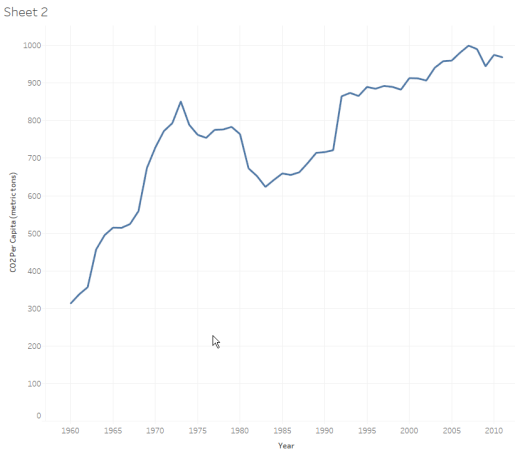
3. It is interesting, isn't it? Now, let's add <double click> **Year** as well.



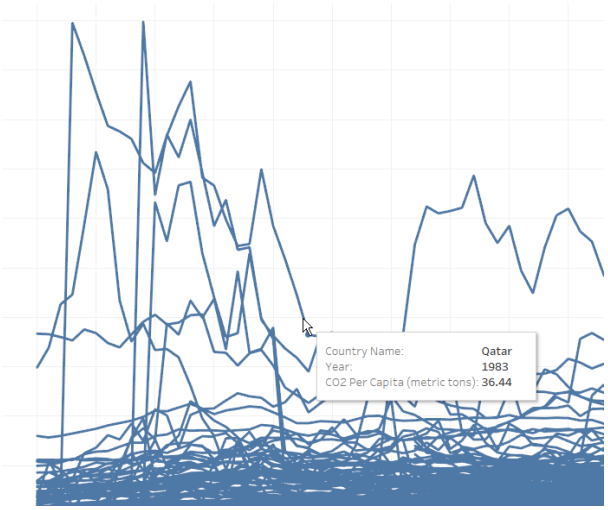
4. Cool! It adds more data to the columns. Try to move the **Country Name** to the **Rows** shelf and see how the visualisation changes. Which do you think is better?



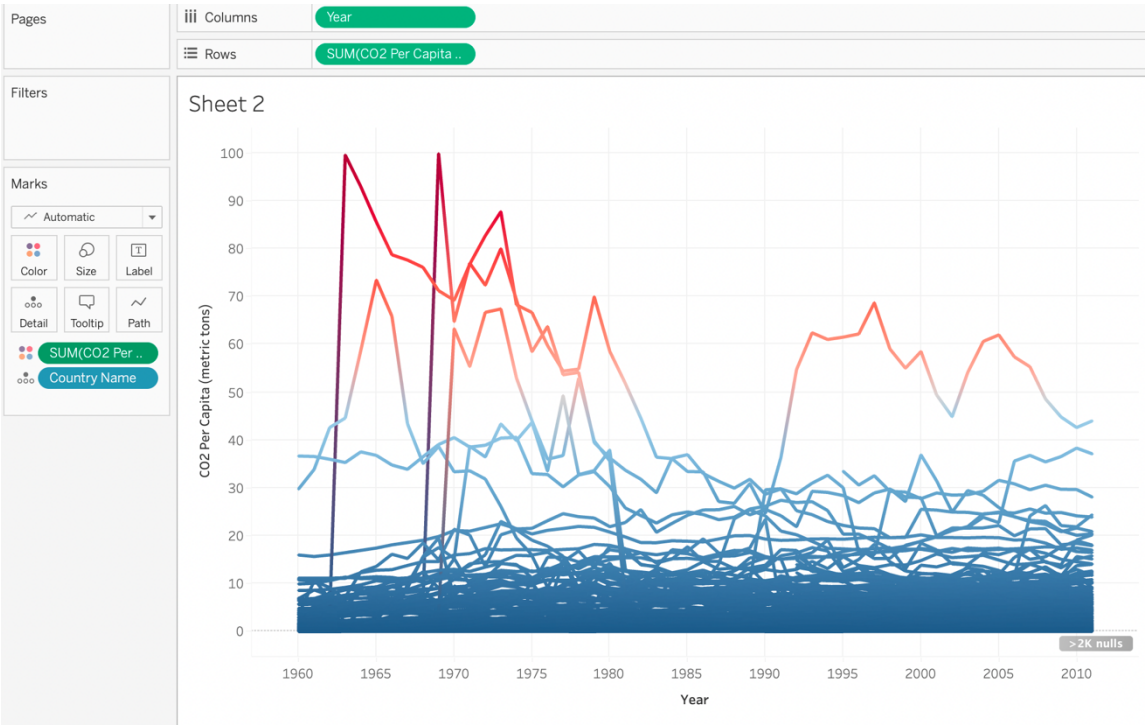
5. Adding **Country Name** to Rows and Columns makes the visualisation entirely hard to see because of the enormous number of countries. That is not what we wanted! Let's remove that by selecting **Country Name** and pressing delete.



6. The line chart now shows the **total global emission per year**, which might be useful on its own. Suppose we want to show the country data overlapping, how do we do that? We can just drag **Country Name** into the main window!



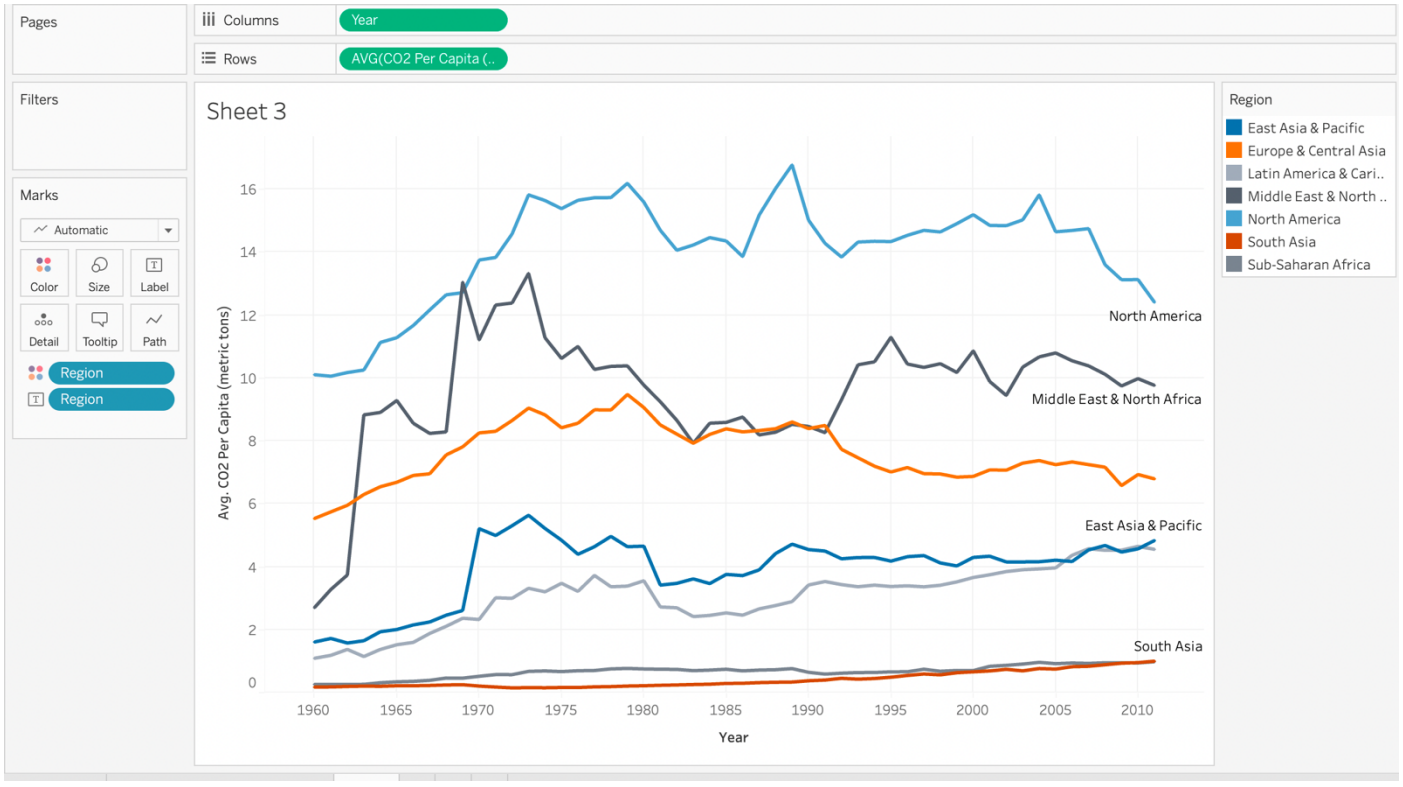
7. Now we have a visualisation showing overlapping lines representing each country. In our final visualisation, we will show this together with the map we did earlier. It would therefore be a good idea to have the colours matching (otherwise, it will be confusing!). Use the same process that we did before in adding a colour *Mark* for the **CO2 Per Capita**.



8. Our last step is to name this visualisation “World CO2 Emission – Line Chart”

1.4. World Regional CO2 Emission – Line Chart

1. It’s time to apply what we have learned from our week-1 studio activities to create a similar visualisation. This time, you need to create a line chart of 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.



2. Once you are satisfied, rename the sheet to “World Regional CO2 Emission – Line Chart”.

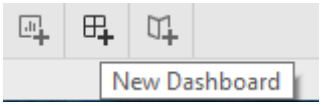
2. Part 2: Creating a Dashboard and Combining Visualisations in Tableau

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

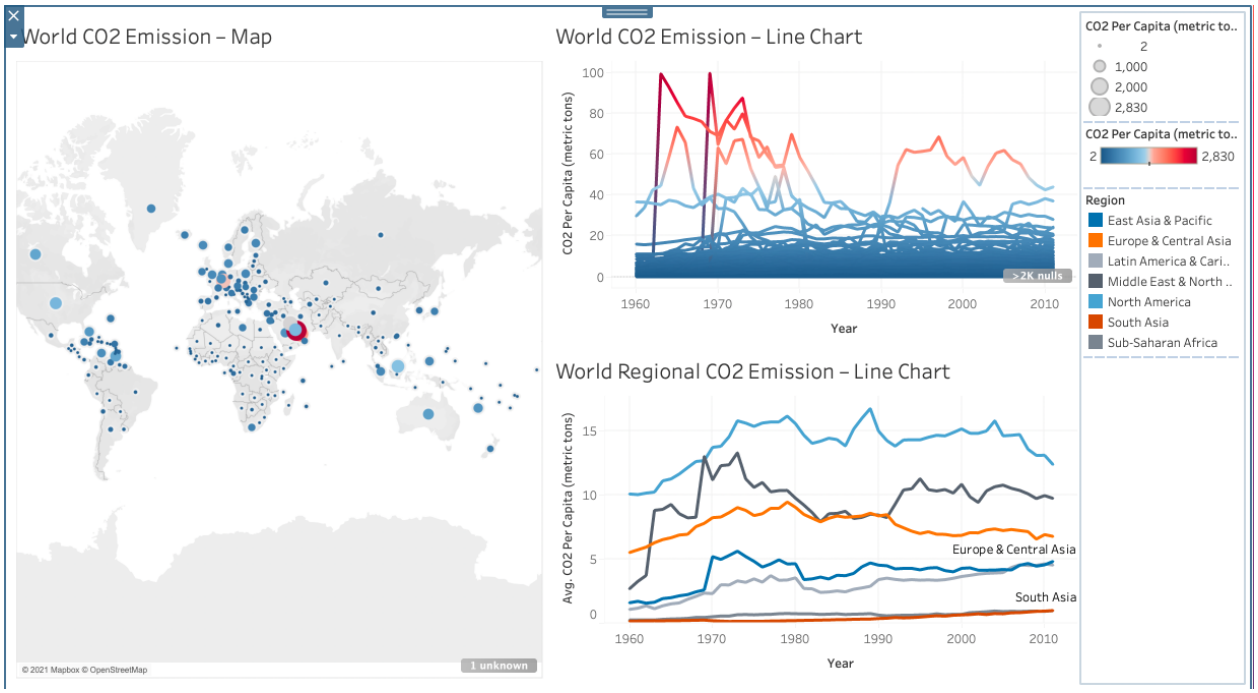
1. As the last step, we will see how to combine all of the visualisation/sheets that we have created into a single interactive visualisation *dashboard*.

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.

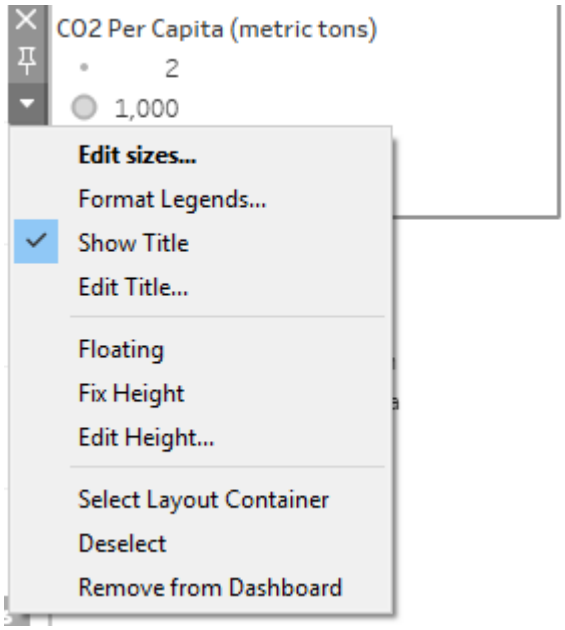
4. We can now drag the visualisations from **Sheets** into our dashboard. Choose any layout that you think is the best for all three visualisations. One of the possible layouts is shown below.



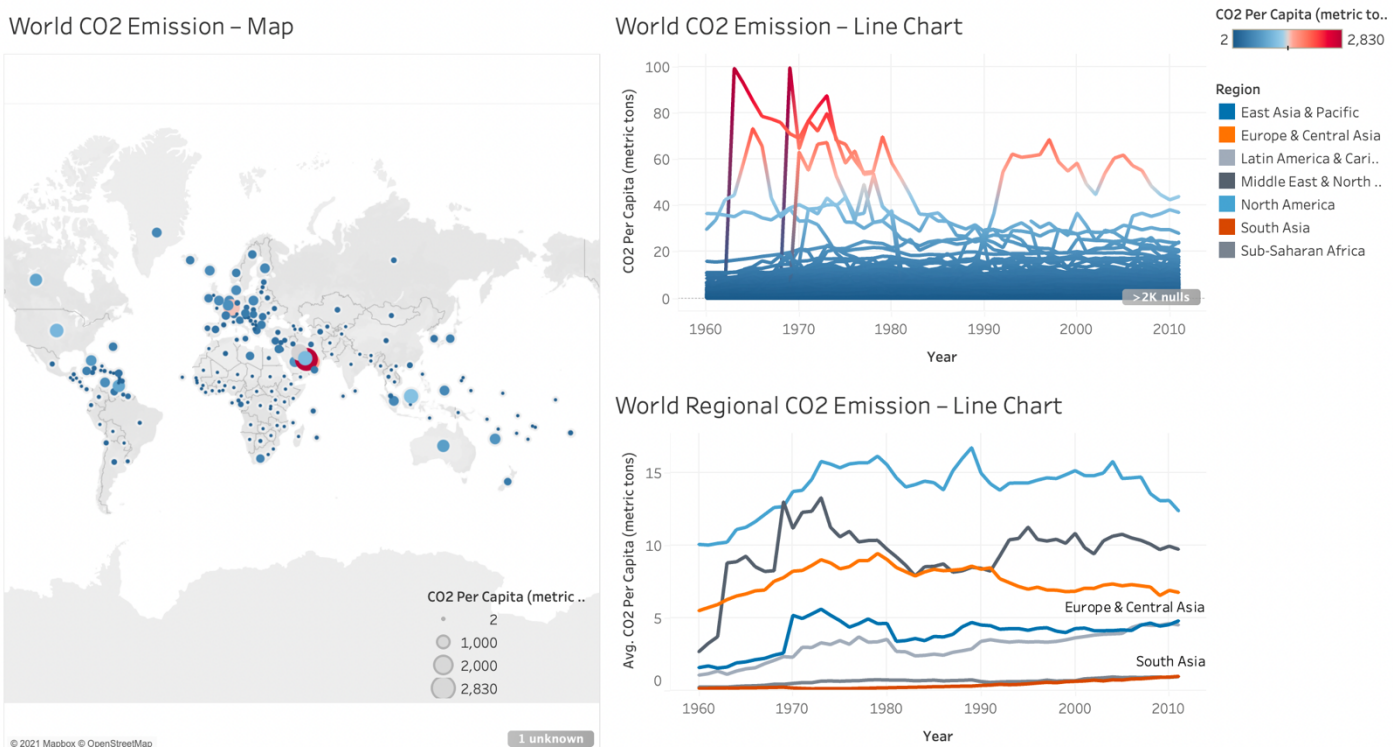
5. This looks nice. However, the legend of the map is too far from it! The viewers might need to switch focus when they want to estimate the actual CO2 per capita emission from a circle.

To minimise the focus switch, it is a good idea to move the legend nearer or on the map.

6. To do that, we need to make the legend “float”. Go to **More Options Floating**.



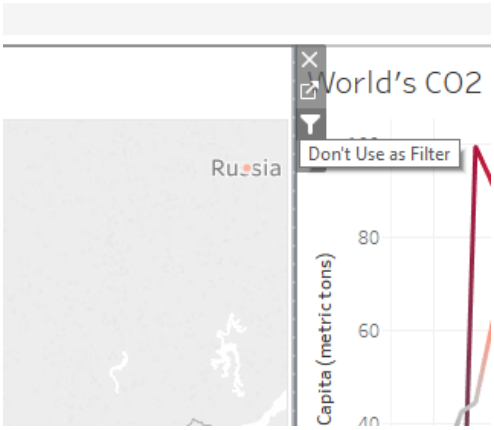
7. Now that the legend is detached from the layout, position it on the **bottom right corner** of the map.



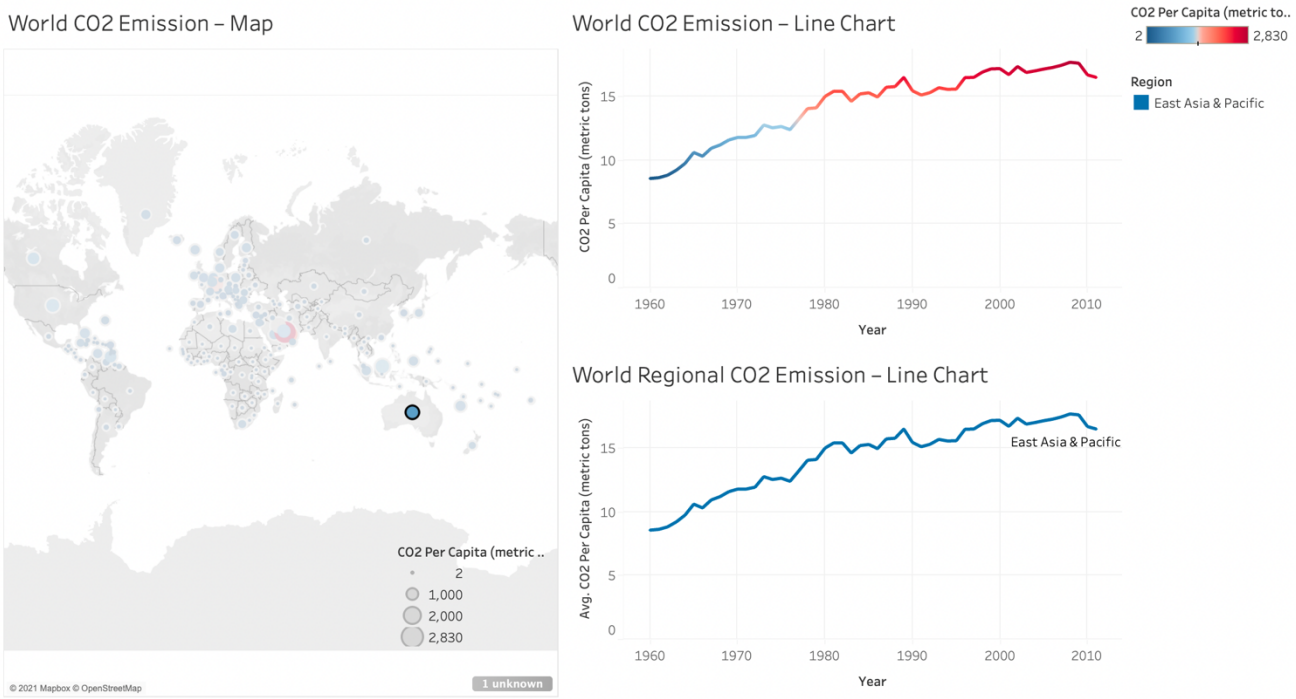
8. This is nicer, but the visualisations still do not affect each other. The **World CO2 Emission – Line Chart** is very cluttered. This is where **interactive filtering** will come into play.

Let's make the dashboard more interactive. We want to use the map as a filter for the cluttered line chart.

To do that, click the **World CO2 Emission – Map**. Click on **use as filter** icon.

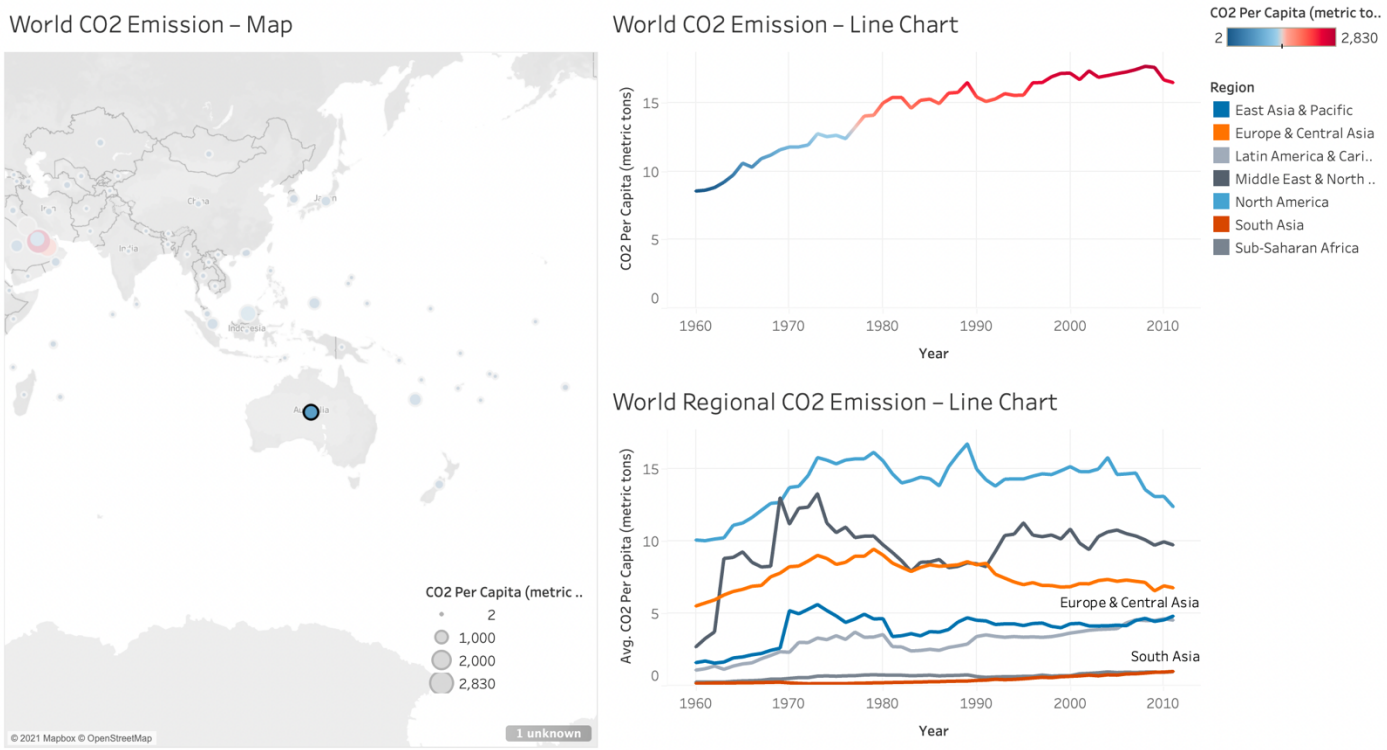


9. Now you have a **brushing and linking interaction** (this concept will be explained later in the interactive visualisation topic)! The line chart is now filtered out when you click on a country! However, it is also affecting the regional line chart **(World Regional CO2 Emission)**. This could be something you want or something you did not expect to happen.

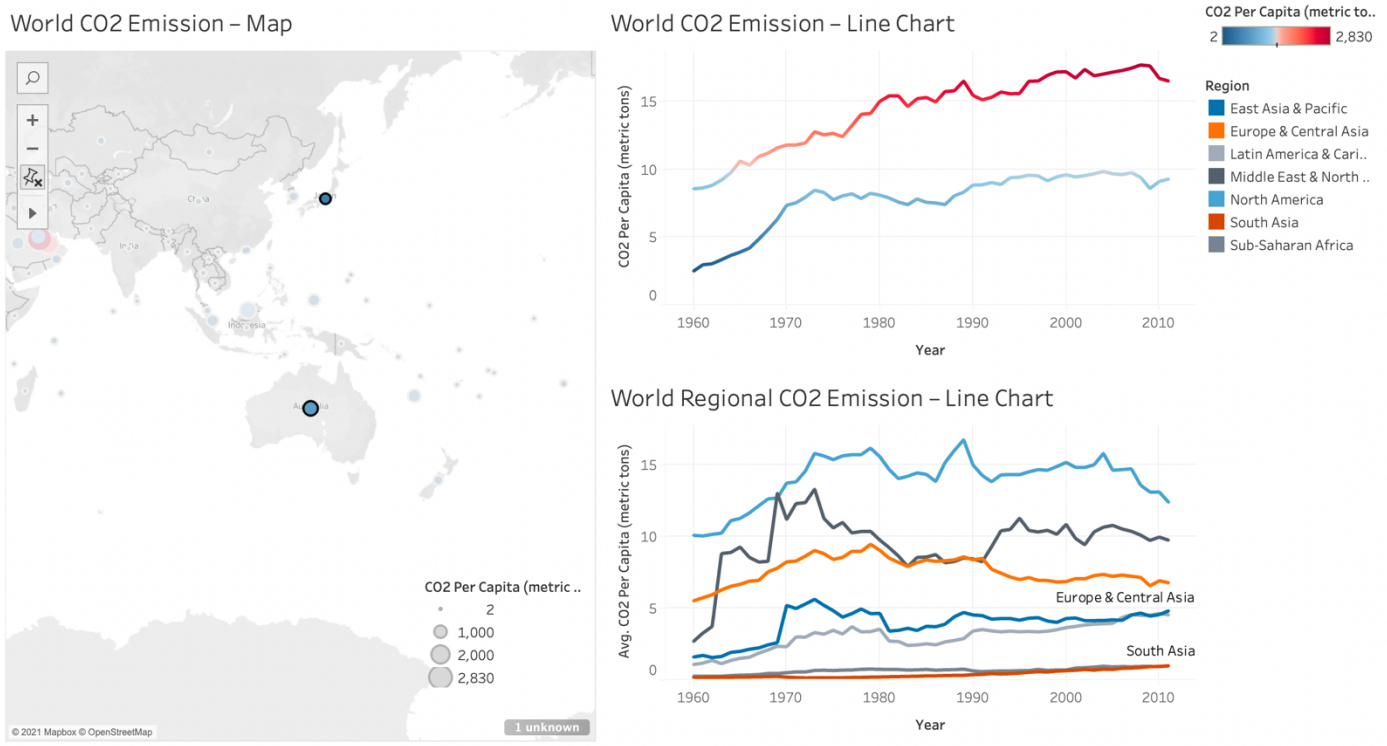


Ideally, you don't need to filter an uncluttered visualisation because it can be easily understood. Therefore, we need to modify the regional line chart so that it does not react to the map click.

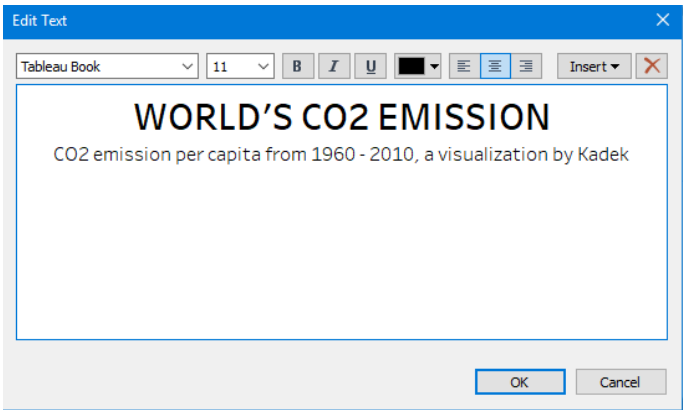
To do that, bring the regional line chart back to its previous form by **clicking an empty space** on the map. Then, click the **World's Regional CO2 Emission - Line Chart**, **More Options** → **Ignore Actions**. Now the filter will not affect it anymore!



10. If you want to compare two countries, we just need to **<Ctrl> + click** them both. For example, **Japan** and **Australia** are selected in the image below.



11. A good visualisation always has a title. Let's add some text to the visualisation by dragging **Text** from **Object** panel.



12. We are finally done! Before saving it, let's see how the dashboard looks on a different device. Click the **Device Preview** button on the **Dashboard** panel. This is how it looks on Samsung Galaxy Tab 10.