

# **FIT3179 DATA VISUALISATION**

**2<sup>nd</sup> Semester, 2018**

## Tutorial Week 5: Chart Chunk and Data-ink Ratio, Visualisation Analysis, Combining Two Axes, Creating a Story

### **1. Overview**

**Submission:** Submit a PDF document at the end of this lab to Moodle. Follow this tutorial and submit a PDF of the major visualisations that you create.

**Due date:** You are required to submit the PDF at the end of your lab. The tutor will check and mark your submission immediately after the lab hour. If you are unable to attend the tutorial, contact your tutor via email.

**Marking and feedback:** This is a pass (mark 1) or non-pass (mark 0) assignment. No further feedback will be provided on your submission. Talk to your tutor during the lab hours for feedback.

### Activities

1. Chart chunk
2. Visualisation Analysis
3. Combining Two Axes
4. Dual Axis Visualisation
5. Creating a Story in Tableau

## 2. Chart Chunk and Data-ink Ratio: Part 1

Download the Excel file *ChartJunk1.xlsx* from Moodle and open it in Excel. What elements of chart junk can you identify in this graph? Create a second graph using the same data without chart chunk that maximises the data-ink ratio.

## 3. Chart Chunk and Data-ink Ratio: Part 2

Download the Tableau file *ChartJunk2.twbx* from Moodle and open it in Tableau. Improve this Dashboard to reduce the cognitive load required to read this visualisation:

- remove chart chunk
- remove unnecessary elements (For example, could you remove some of the legends? Or could you replace some of the legends with annotations on the chart?)
- increase the data-ink ratio
- use consistent colours, prefer grey for less important marks, use colour to highlight important elements.
- Use typography consistently: Similar elements should have the same size and type weight (for example, labels on axes).

## 4. Visualisation Analysis

In groups of three, pick and examine one of the visualisations in the list and answer the questions below. Prepare a mini presentation of 3 minutes. Select one visualisation from the list below:

1. [Analyzing the Gender Representation of 34,476 Comic Book Characters](#)  
<https://pudding.cool/2017/07/comics/>
2. Gapminder [Human Development](#), 2005.
3. An example from the [Tableau Public Gallery](#).

### Question

1. *Is there any chart junk? Are there ornamental elements that could be removed? Is it better to retain them?*
2. *What is the data-ink ratio? How could you increase the data-ink ratio?*
3. *Is the visualisation lying in any way?*
4. *What is the macro reading of the visualisation? (What story is the designer probably trying to tell?)*
5. *What is the micro reading of the visualisation?*
6. *Which of the seven narrative visualisation genres is used?*
7. *Which of the Gestalt Principles and Graphical Elements guide the viewer's eye?*

## 5. Combining Two Axes

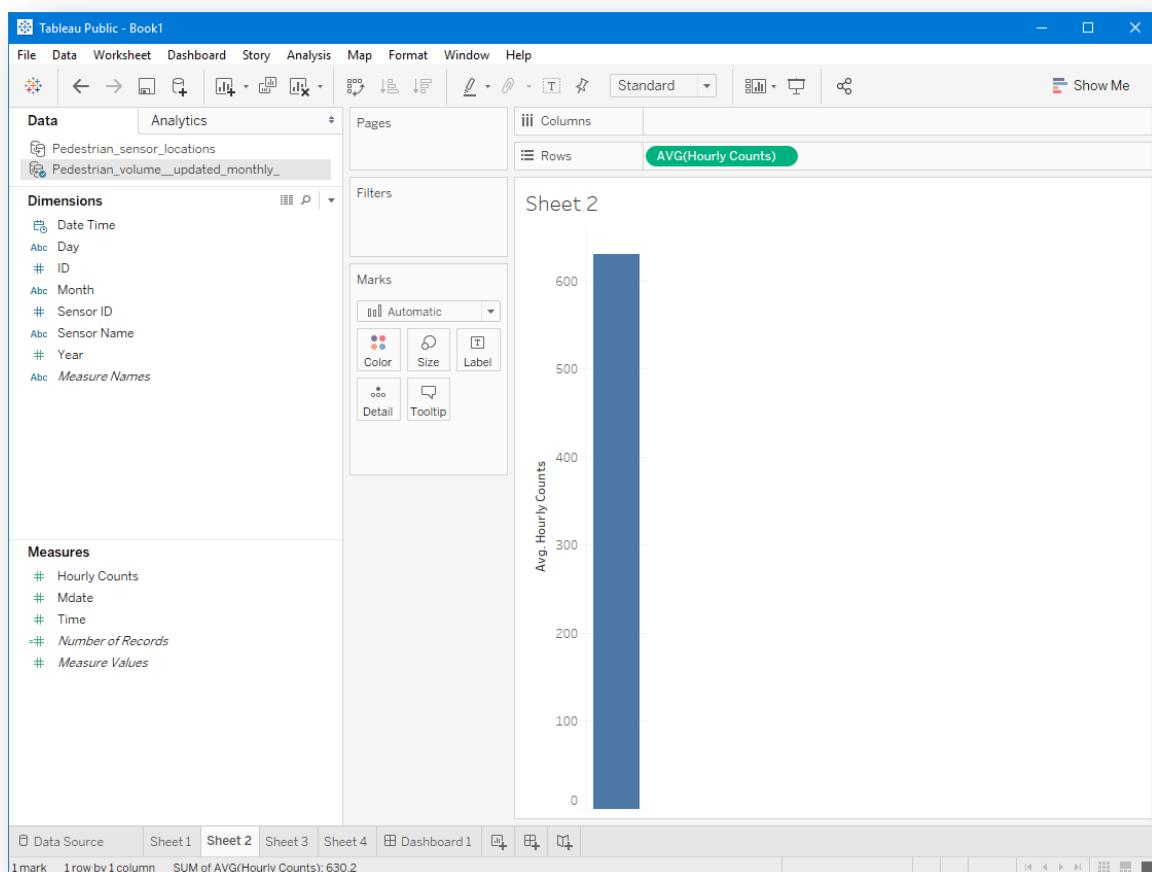
In this tutorial, you will learn how to create a meaningful visualisation by combining multiple axes. We will use the pedestrian sensor dataset of the last tutorial for this activity. Open your Week 4 tutorial, or reconnect the original dataset. Please refer to “5. Blending Data Sources” in the last tutorial if you don’t remember how to do this.

1. Create a new sheet
2. First, we want to create a **bar chart** showing the **average number of pedestrians each day**.

### WHAT YOU CAN DO

*Don't scroll don't to the next page, see if you can make it!*

3. Go to the **Pedestrian\_volume\_updated\_monthly** data source.
4. Drag and drop the **Hourly Count** measure to Rows. Then, change the measure to **average**.



5. Drag and drop the **Day** dimension into Columns. You will immediately get the expected result: a **bar chart** showing the **daily average number of pedestrians**. Please note this is the average number

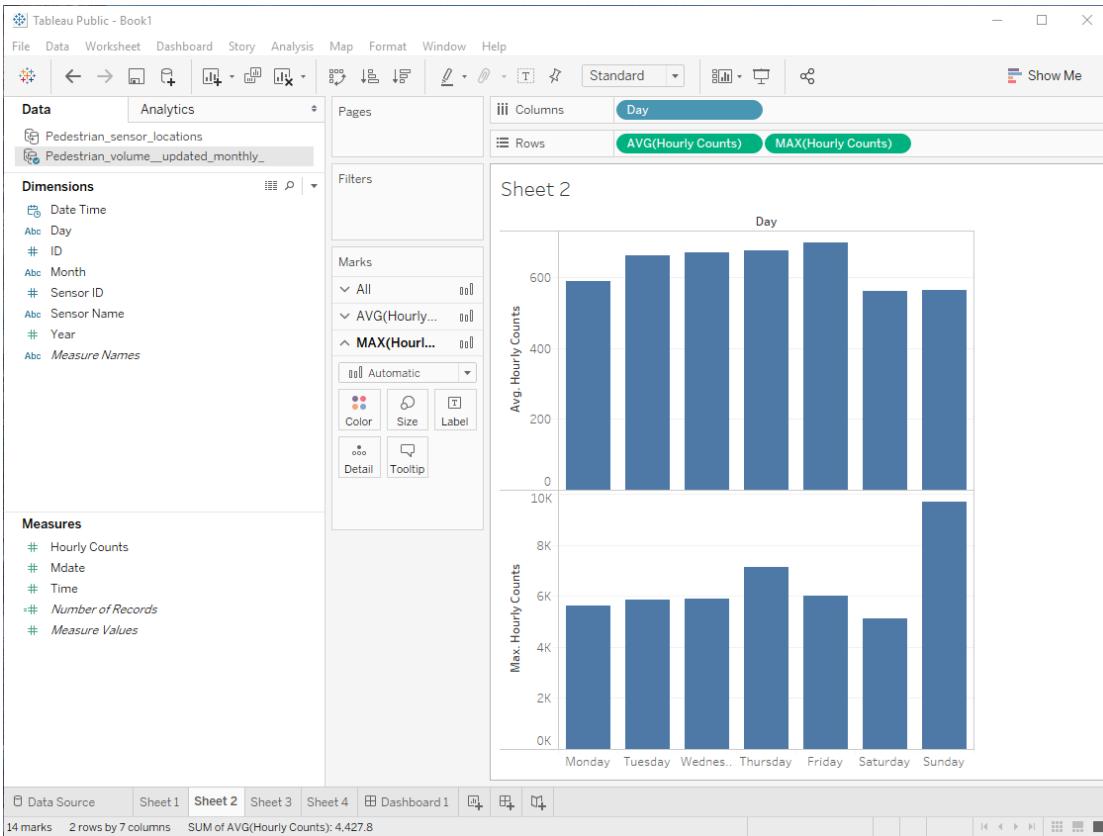
of pedestrians in all sensors. It gives you an idea of the number of pedestrians all over the city, but you might want to know the number of pedestrians in a specific area. We will do that later.

6. Now, plot the maximum number of pedestrians each day to see the difference between the **average** and **maximum** in the peak hours.

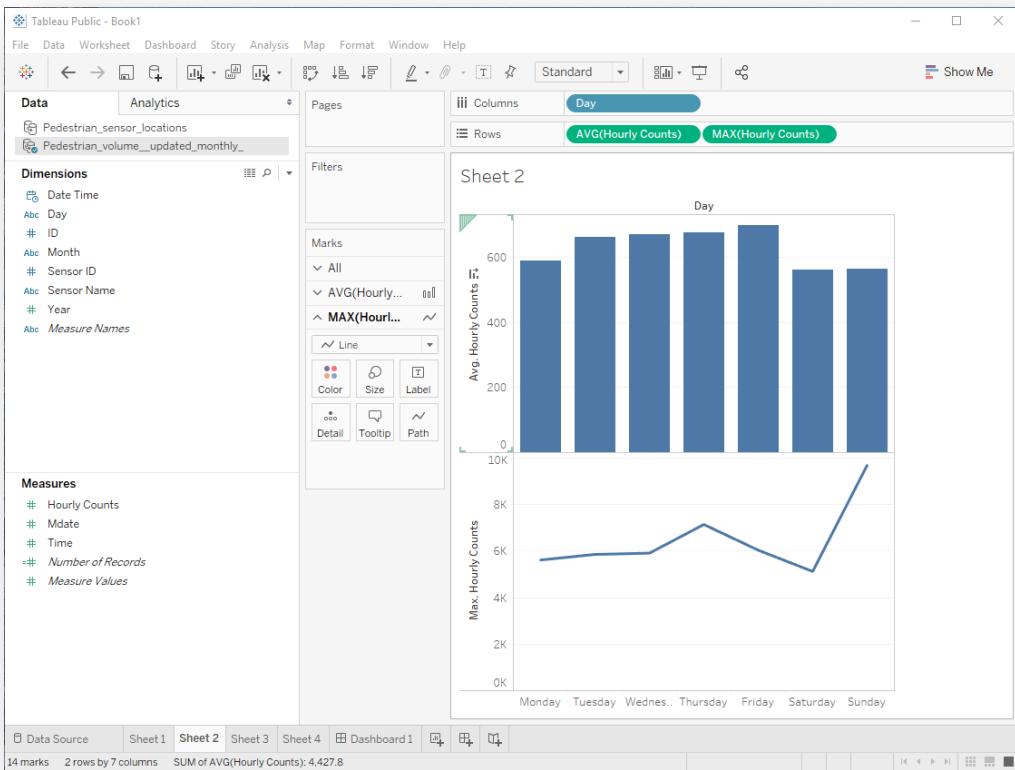
#### WHAT YOU CAN DO

*Don't scroll down to the next page, see if you can make it!*

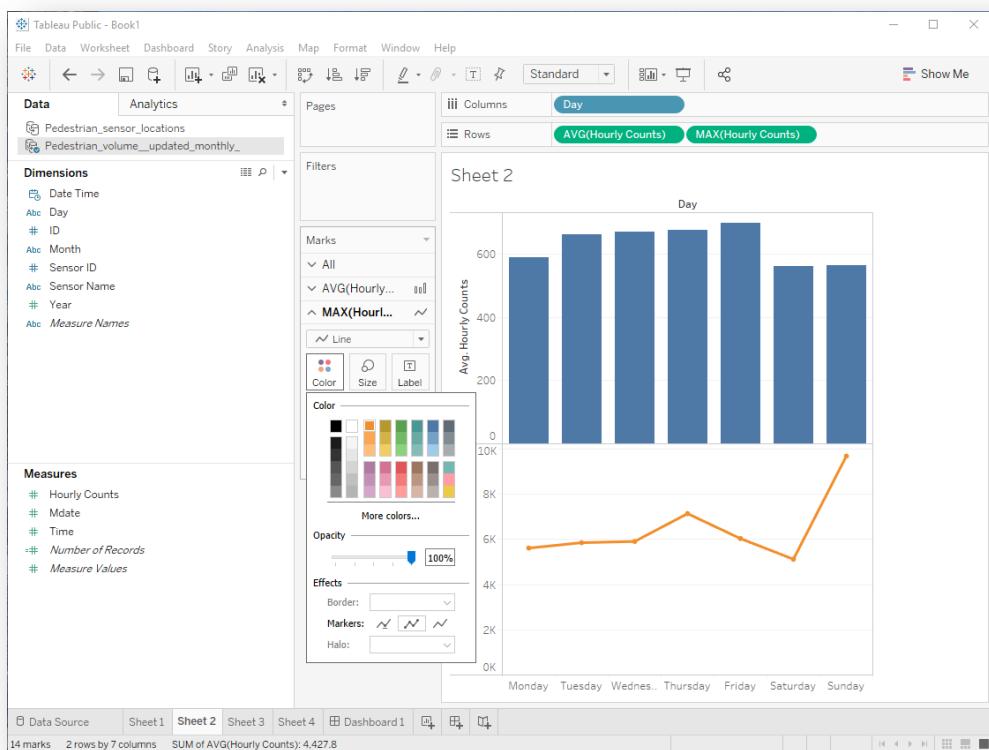
7. Drag and drop **Hourly Counts** to Rows and change the measure to **Maximum**.



8. Now you have two bar charts with different measures. You can also see there are three sections in the **Marks** panel. This means you can change the **mark properties** of each bar chart separately. For instance, you can have a **line chart** for the maximum. Let's do it and change the **Max** mark to **line**.



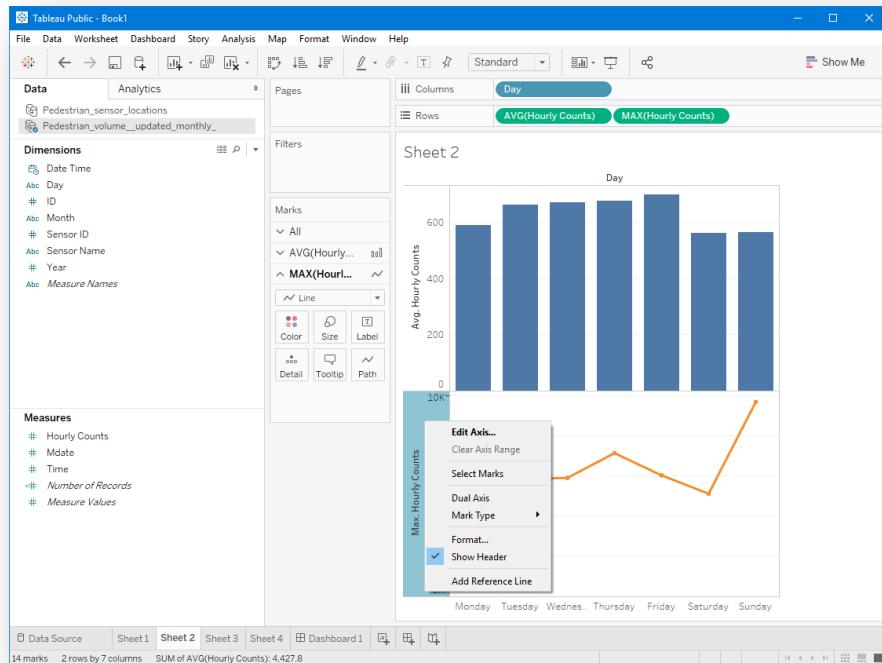
## 9. You could also change the colour of the line.



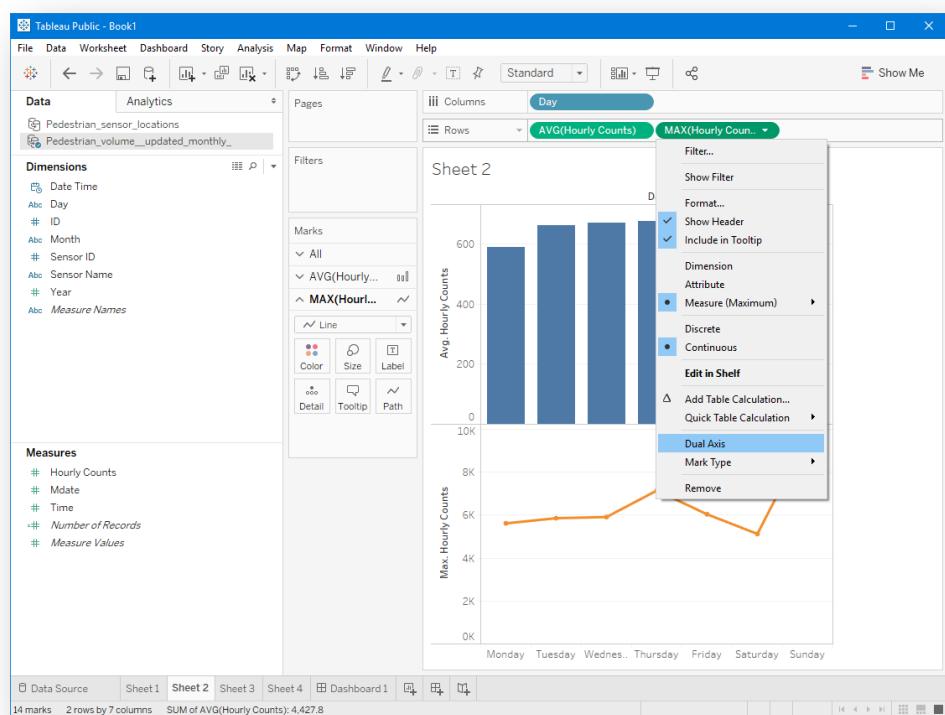
## 10. That's looking good. Now, recall the “least ink” principle. You would want to minimise the amount of ink used in your visualisation and maximise the amount of information. In this case, you can

see that both charts share a common variable: **Hourly Counts**. It obviously makes sense to combine them into a single visualisation with a **shared axis**.

11. In Tableau, we can do it by utilising **dual axis**. First, right click on **Max. Hourly Counts** axis (the line chart). You will see an option called **Dual Axis**.



12. You can also do that by clicking the **Max(Hourly Counts)** in the Rows.

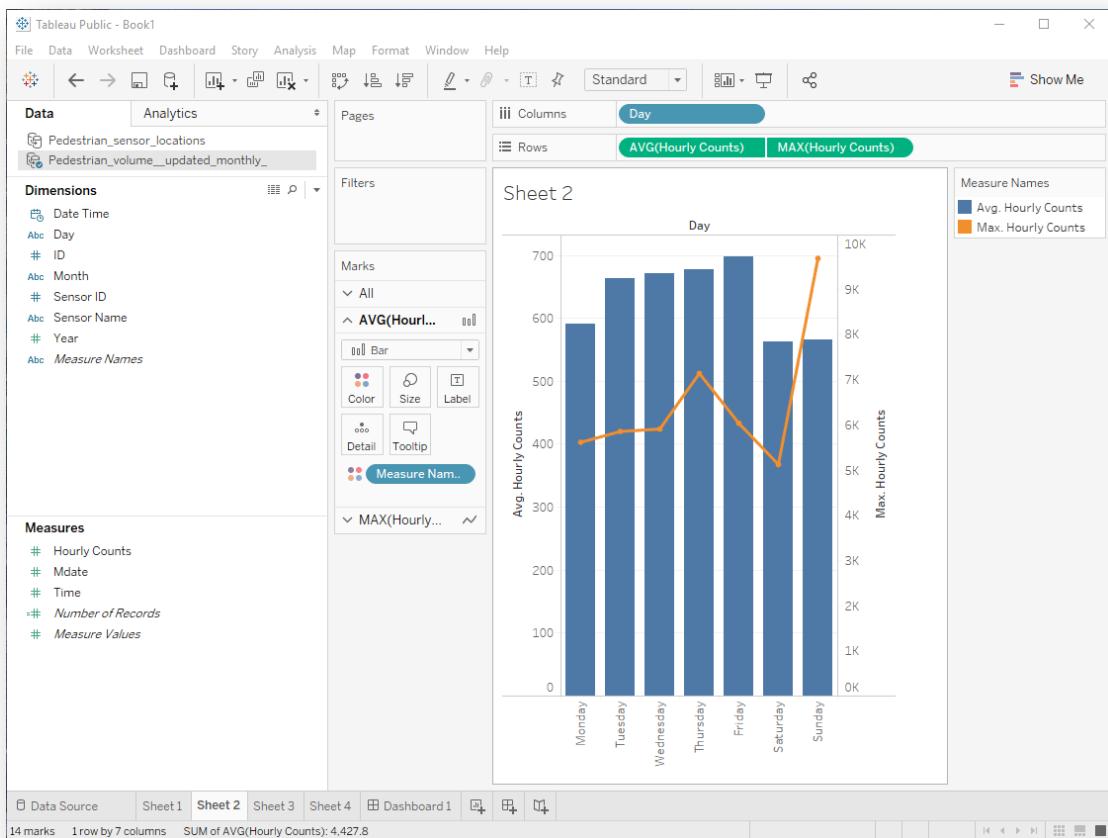


13. Once you've clicked on the **Dual Axis**, you will have a **composite chart** showing both the **Average** and **Maximum** number of pedestrians each day. You will also notice that the bar chart has turned into a **scatter plot**.

## Question

*Why do you think Tableau changed the bar chart into a scatter plot?*

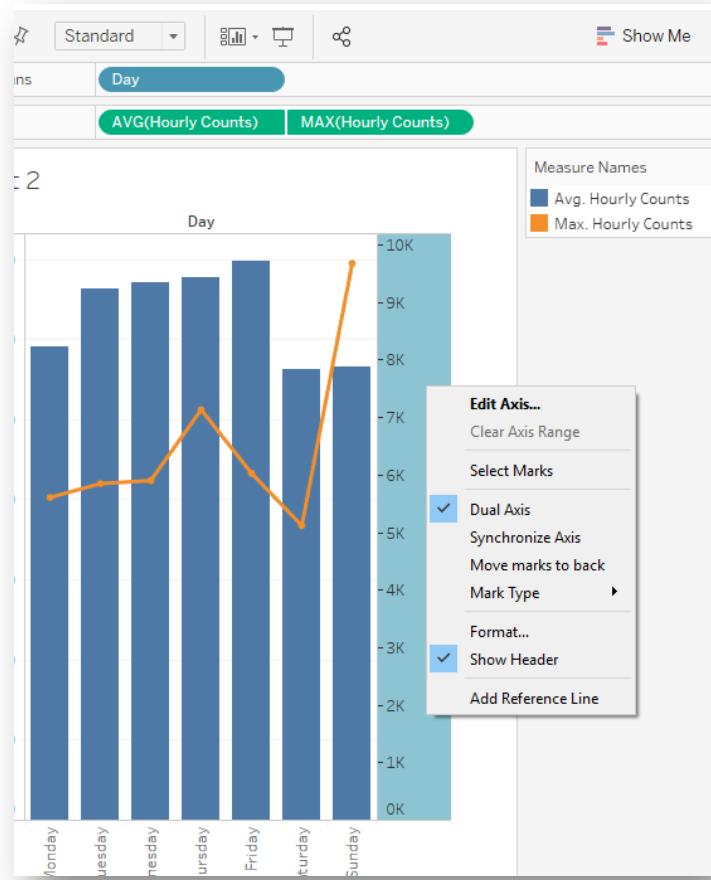
14. Let's revert to the bar chart. Change the **AVG(Hourly Counts)** mark to **bar**.



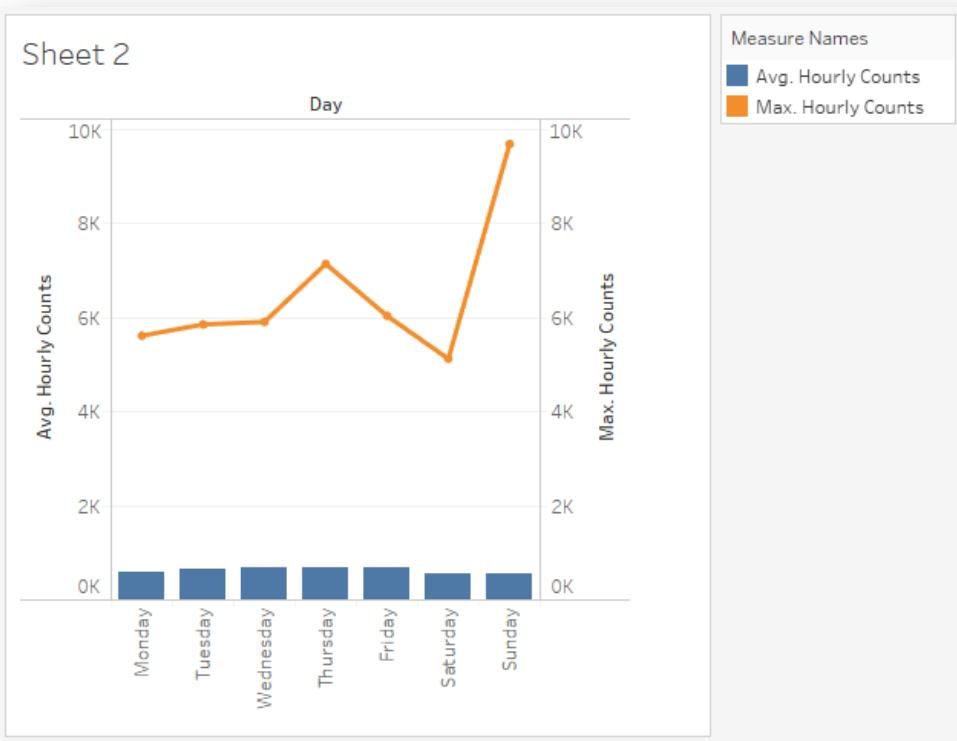
15. Nicely done! We now have a **composite chart**. But wait a minute, don't you see any problem in this chart?

## Question

*Before proceeding, discuss the problem with your peers and think of ideas on how to fix it!*



16. If you find that the problem is the maximum values being below the average values, you are right. You can tell the difference from the marks used, but this is not a good way of visualising it. You might want to **synchronise** the axis and have a **single shared axis**. To do this, right click on the axis, and click **Synchronize Axis**.

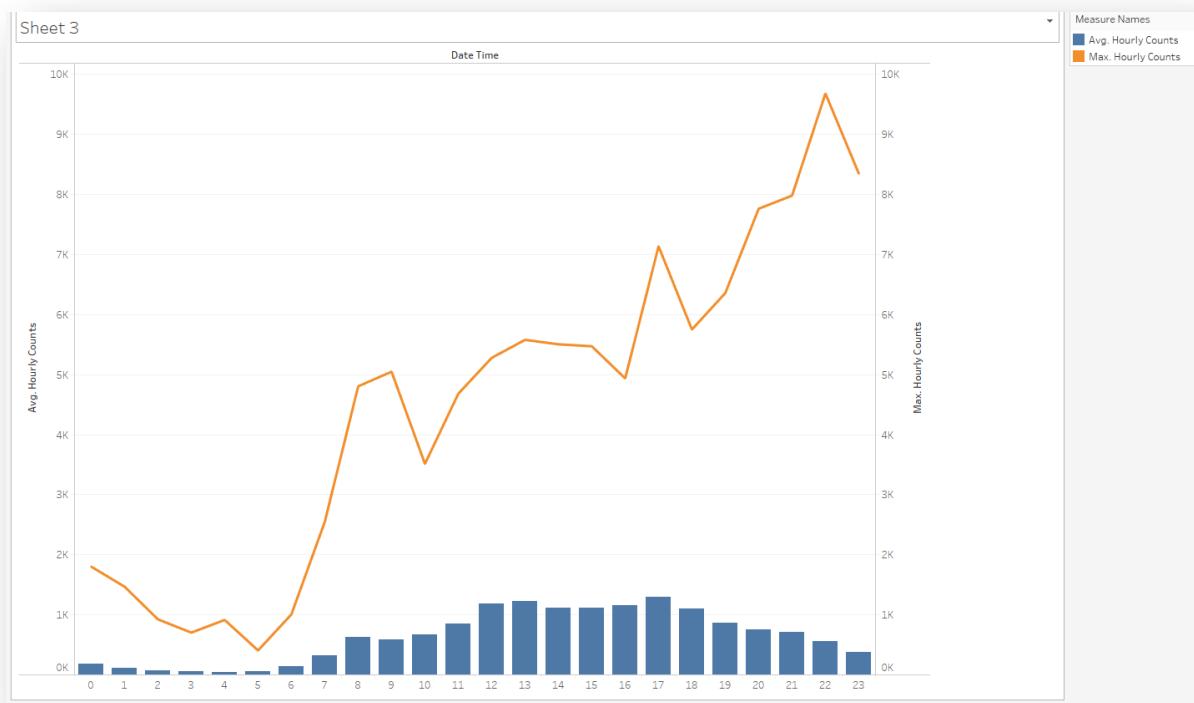


17. Our visualisation is looking nicer. Remember, it is important to **synchronise** the axis when you have **multiple measures** sharing a **common axis** (in this case, they are sharing Day axis).

## 6. Dual Axis Visualisation

In this activity, you need to apply the skills you have learned from the previous activity to create a similar visualisation (with average and maximum) using the **Hour** dimension. It will be used later to see the distribution of the number of pedestrians among different hours within a day.

Create a new sheet and go ahead. Your visualisation should look like this:



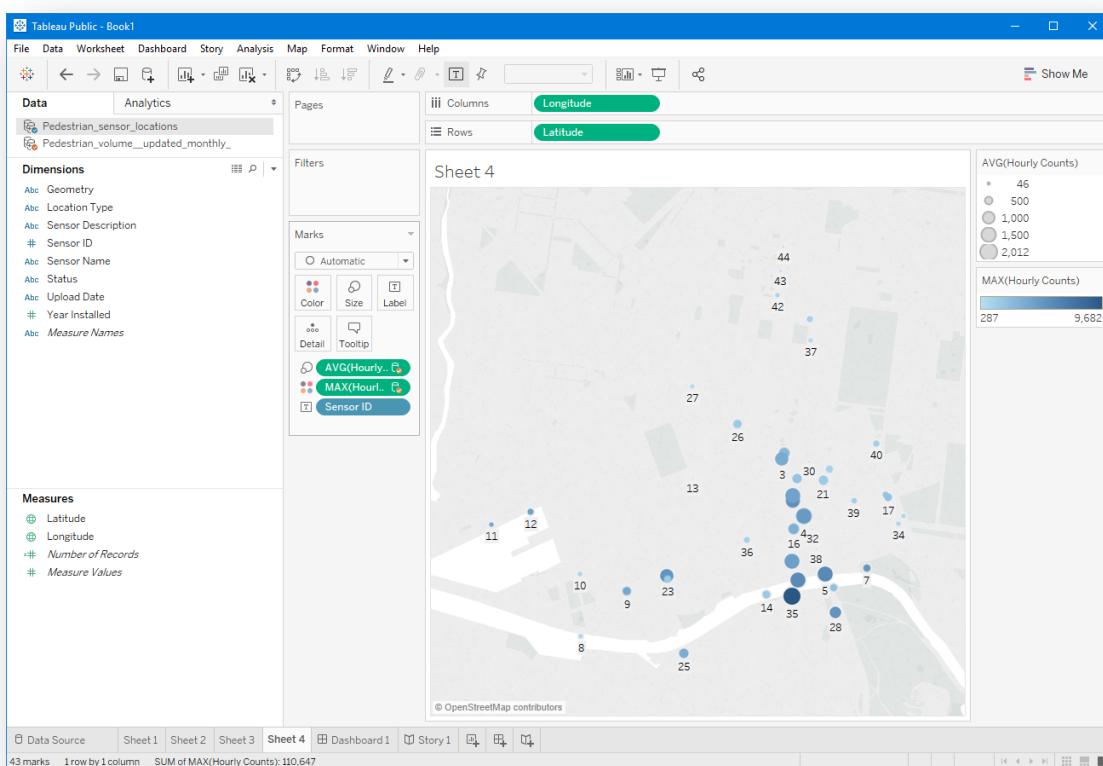
Note that the x-axis contains the **Hours** dimension while the y-axis illustrates both the **average** and the **maximum** number of pedestrians per hour.

## 7. Creating a Story in Tableau

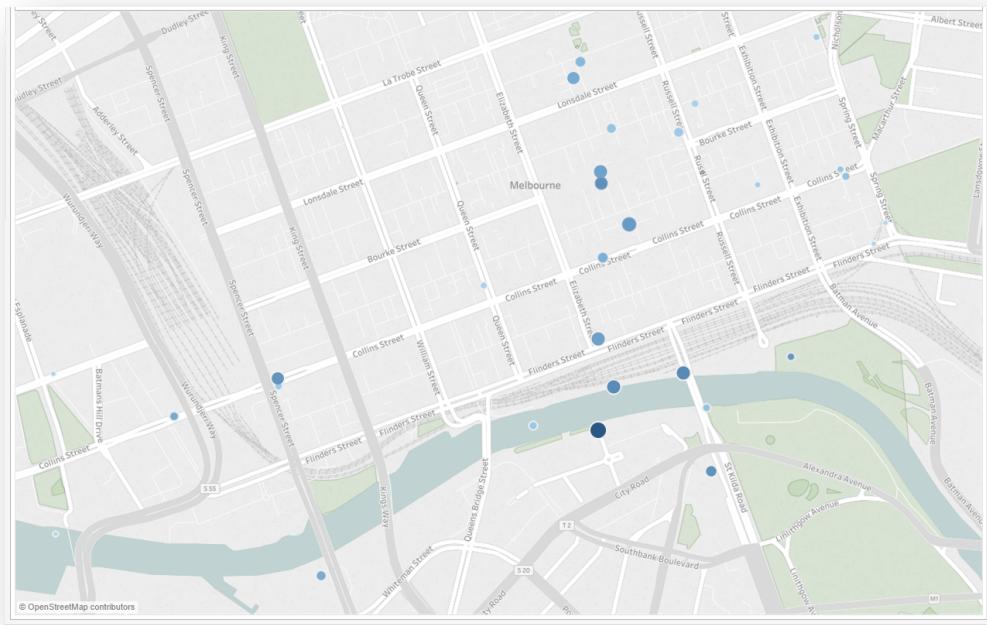
### Creating a Map

Let's create another visualisation that we can add into the dashboard. This time, we'll produce a map that locates the pedestrians and indicates the number of pedestrians per location using a circle.

1. Create a new sheet. Plot the **sensor location** on the map (by dragging **longitude** into the columns and **latitude** to the rows) and use the **average Hourly Count** as the **size** mark. Refer to the previous tutorial for detailed ideas on how to do this.
2. We also want to get information about the maximum number of pedestrians. So, map the **maximum Hourly Counts** to the colour mark.
3. Then, use **Sensor ID** from the main data source as the **label**.
4. Your visualisation and its settings should look like the image below.



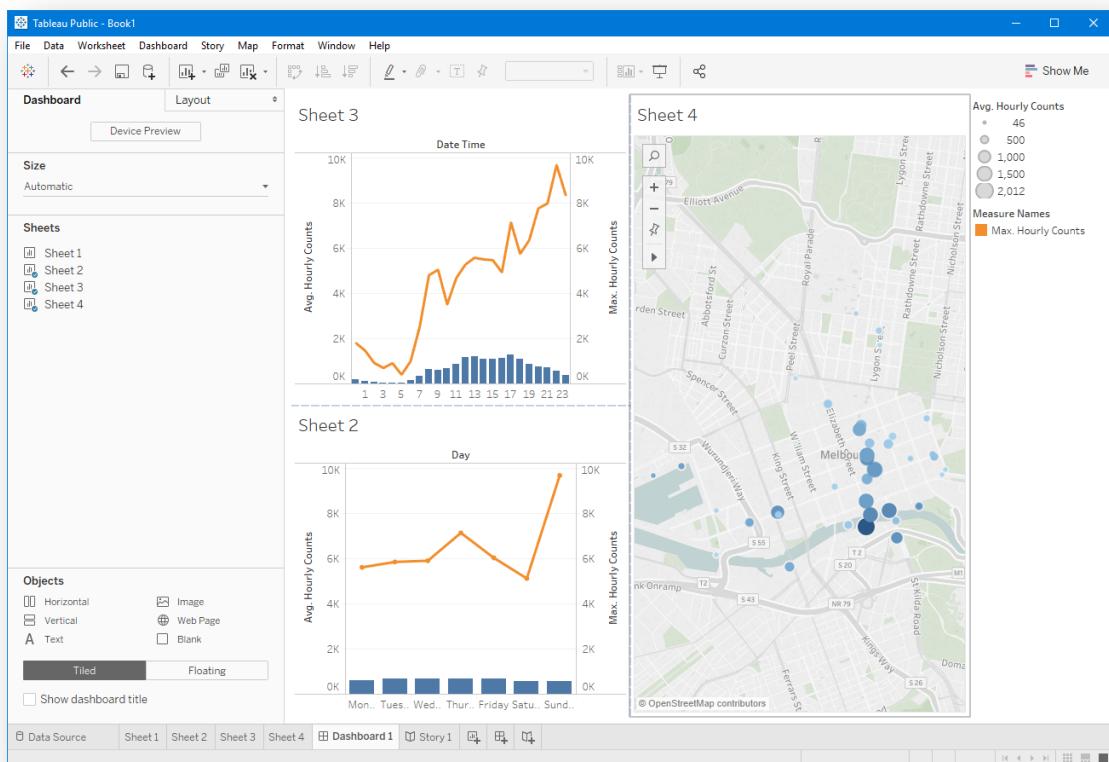
5. Make sure you link the two data sources via the **Sensor ID** dimension.
6. This map looks good. However, it does not show you the **street name**. To change the **map layer settings**, we can go to **Map → Map Layers**. Choose the **Normal Style** and check **Streets and Highways and Place Names** layers.



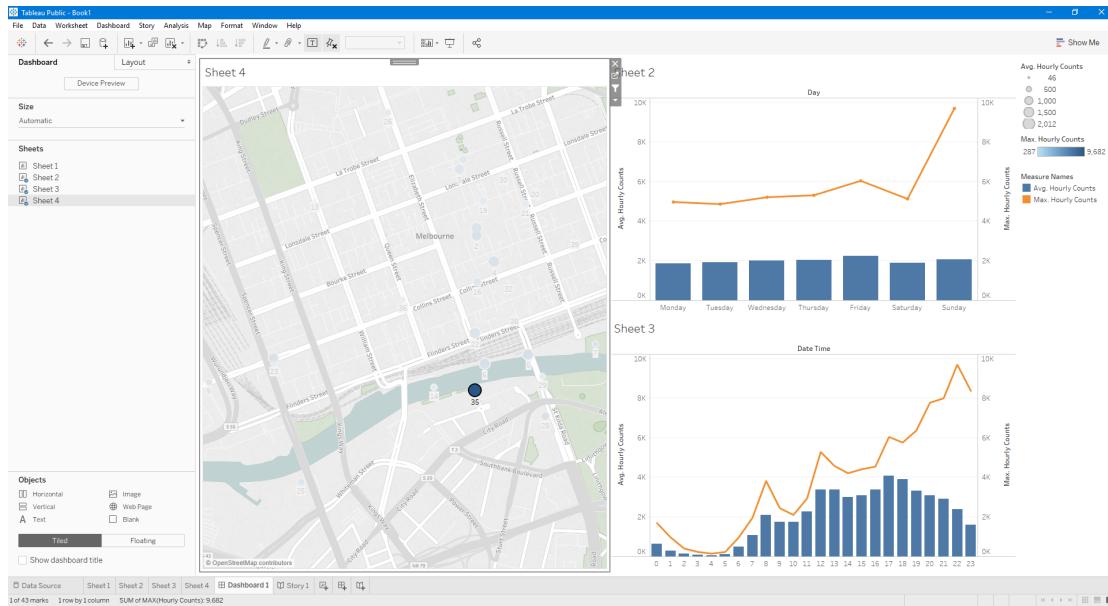
## Creating the Dashboard

Again, we will reuse the skills you have learned from the previous tutorial to create an interactive dashboard.

1. Create a dashboard.
2. Drag and drop the three visualisations you just created in any **layout** you like.



3. Then, use your map as the **filter**. Now, when you click on a **sensor** on the map, the bar chart will change.



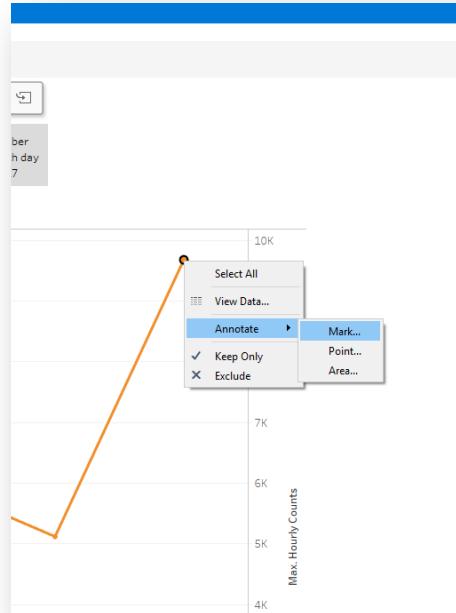
4. Let's build a short and simple story from what we have now.

## Creating a Story

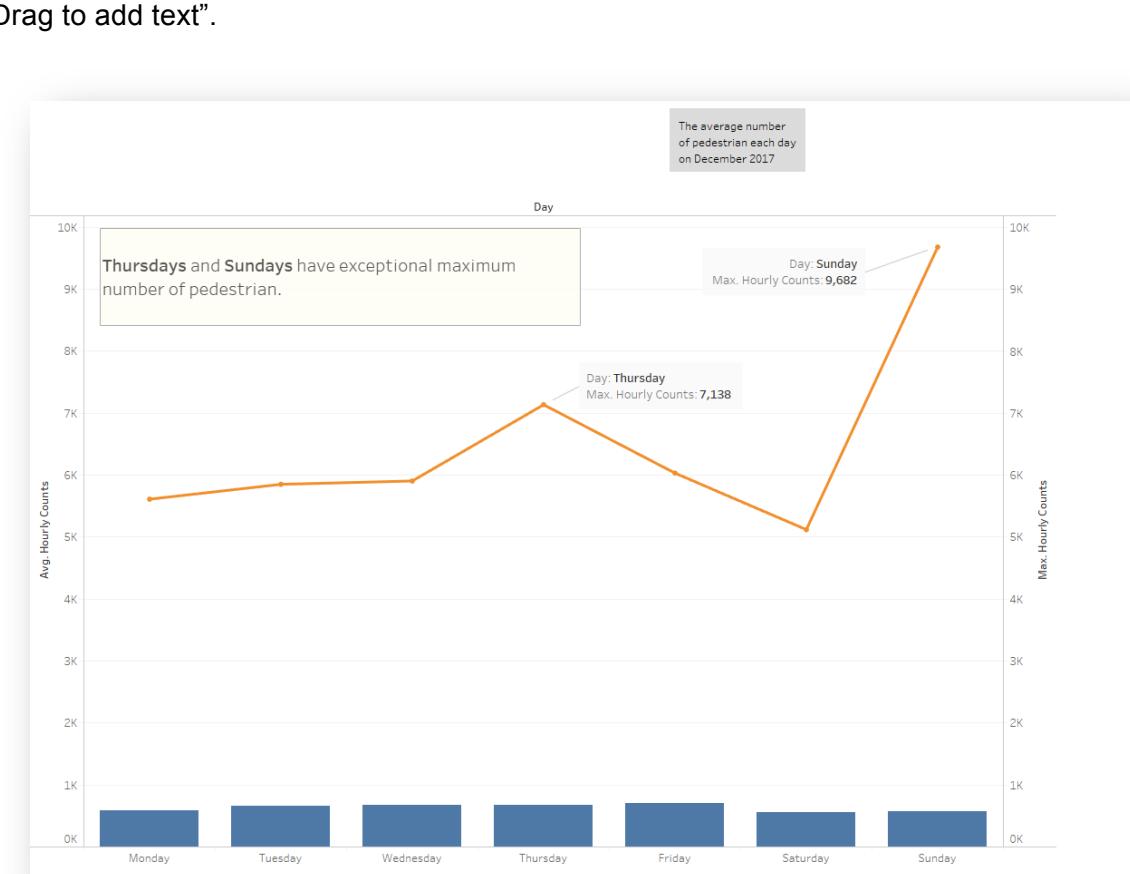
1. Creating a Story in Tableau is like presenting Power Point slides. To create a story, click on the



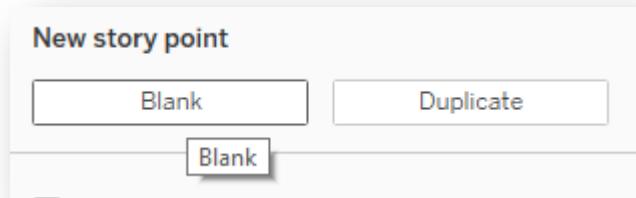
2. A story can have multiple **story points**, or **slides** if you like. However, a **single story point** can only have either **one Sheet** or **one Dashboard**.
3. First let's check out **Sheet 2**, the daily pedestrian data. You can change the caption too.
4. We can see that the maximum value is during **Thursdays** and **Sundays**. Let's annotate those values. Right click on the **max point** (Sunday) → **Annotate** → **Mark**.



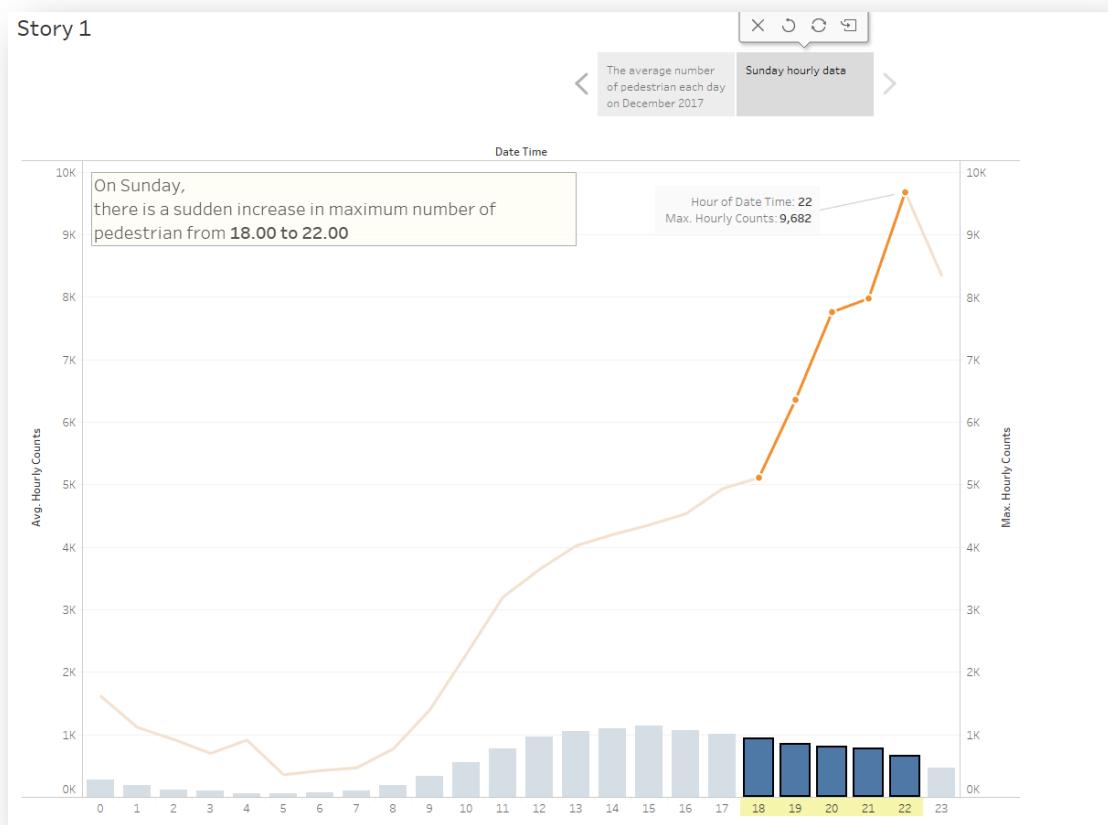
5. Do the same for **Thursday**. You could also move the annotation by clicking it and dragging it around.
6. To make it more descriptive, you can add a **text**. Look at the **Story** panel, and drop "Drag to add text".



7. Suppose we are happy with the first story point, we can create another story point by clicking the **Blank** button on the **New Story Point** panel.

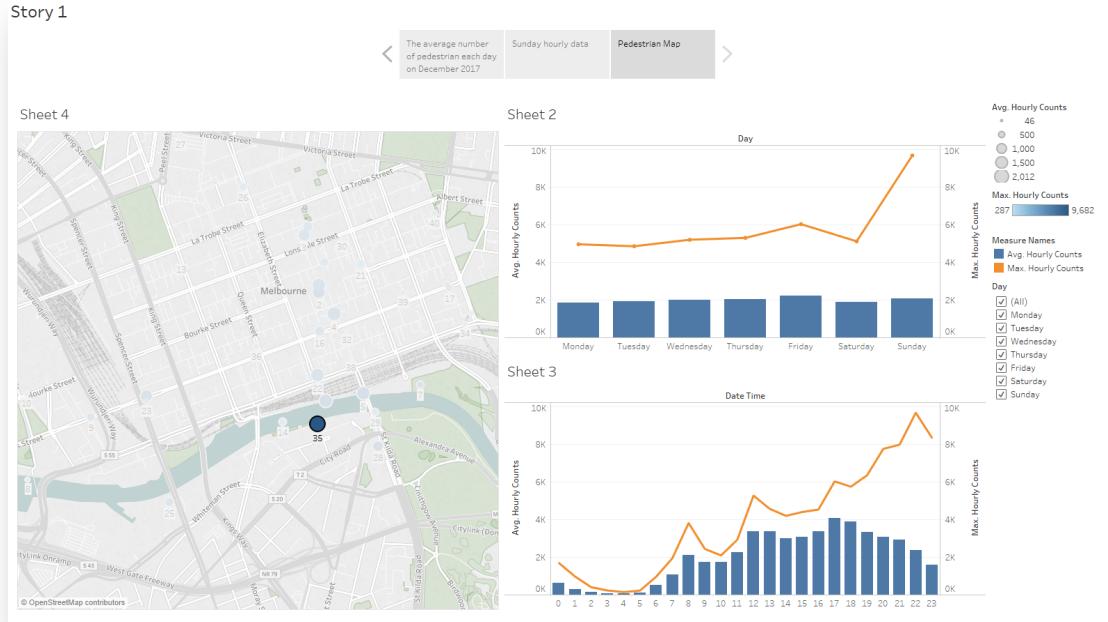


8. Use your creativity to create a nice story about the data. As an example, you could show the hourly number of pedestrians on a Sunday. To do this, you need to add a filter on **Sheet 3**.



9. You could also extend your Dashboard and use it as a story point.

## Story 1



## 8. Saving Your Work and Submission

Make sure you save your work in Tableau server using your profile!

Submit a PDF document with the major visualisations that you created on Moodle.