Create A Concise Line Chart for Reporting Step by Step

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Recently, I just finished a project, where we analyzed various kinds of climate risks (such as extreme wind speed, extreme precipitation, heat stress, droughts, wildfires, sea level rise, etc) at more than 15 asset sites. Each site requires a detailed data summary report, in which all analysis results are presented with charts and tables. We used the

package of **python-docx** to automatically generate the reports (mainly charts and tables) as they almost share the same presentation style. The semi-auto reporting approach really reduced our hard work to a great extent. If you are interested in python-docx, just click the hyper-link and have a look. Moreover, it is definitely worth a try.

In this practical tutorial, I'd like to talk a little bit about how we created concise charts in the whole reporting procedure. Everybody should already know "*A Graph is Worth a 1000 Words".* Moreover, visualizing data already become more and more easier than before. You have many many options: you can use Excel, you can use R, Python, D3.js, you can use Tableau or Matlab, etc. Everybody can do visualization. So the following tutorial is presented only from my own experience.

Original chart

Let's start from an original presentation. It is good and it expresses all important information. Everybody understand what the line chart is about. Oh, the maximum temperature occurs in July, while the minimum temperature is in February.

However, take another look at this visual with an eye. You will find the chart contain too many elements that may distract our concentration on some key information. In another word, some visual elements take up space but don't increase understanding.

Next, let's clear these elements to make a concise line chart.

Temperature Climatology
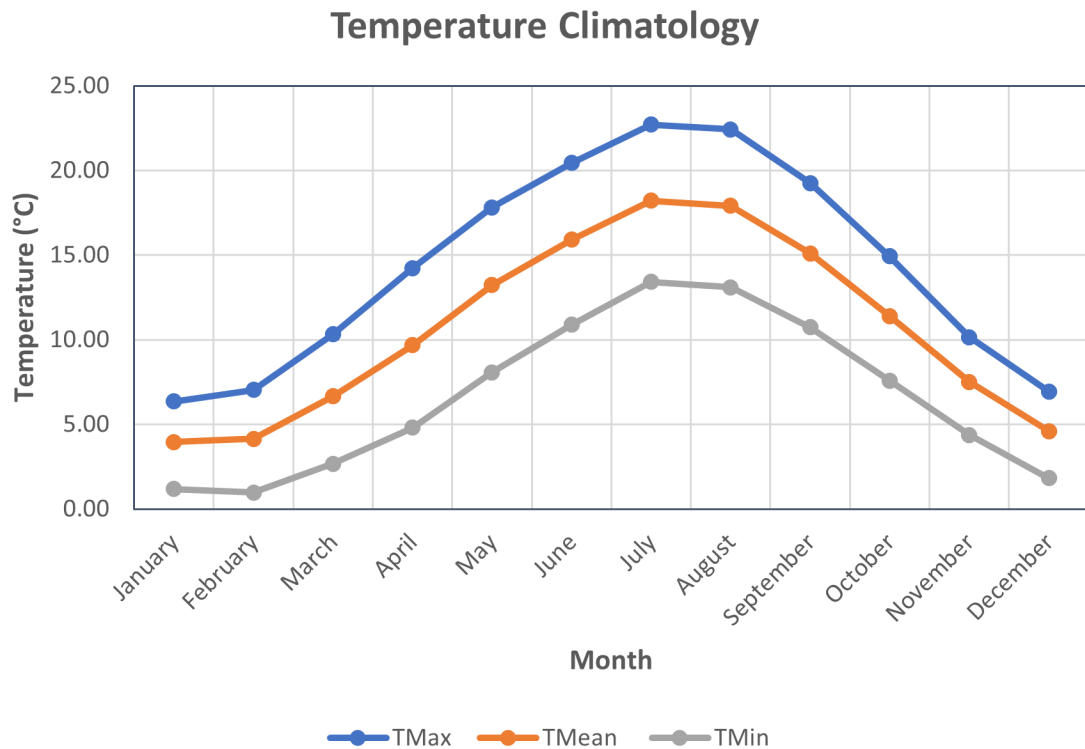
Step 1: Remove chart border

Chart borders are usually unnecessary. Instead, it is usually a good idea using white space to differentiate the visual from other elements on the page. However, it seems not working very well because of the gridlines of x-y axis. Let's move next step.
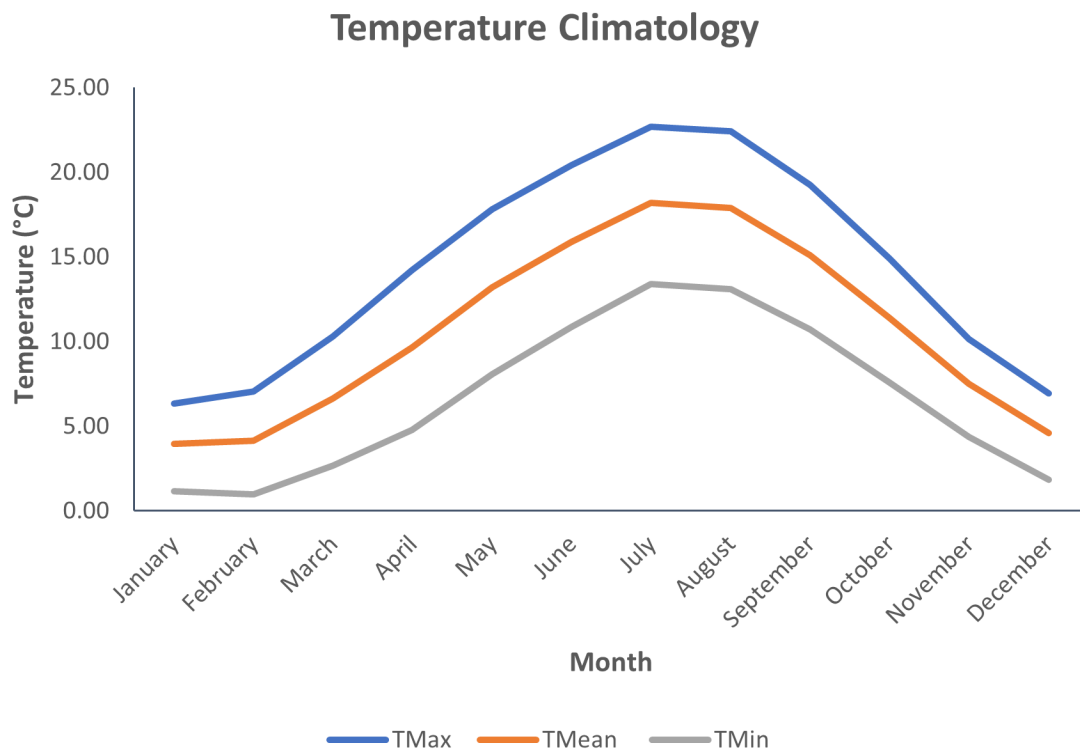
Temperature Climatology
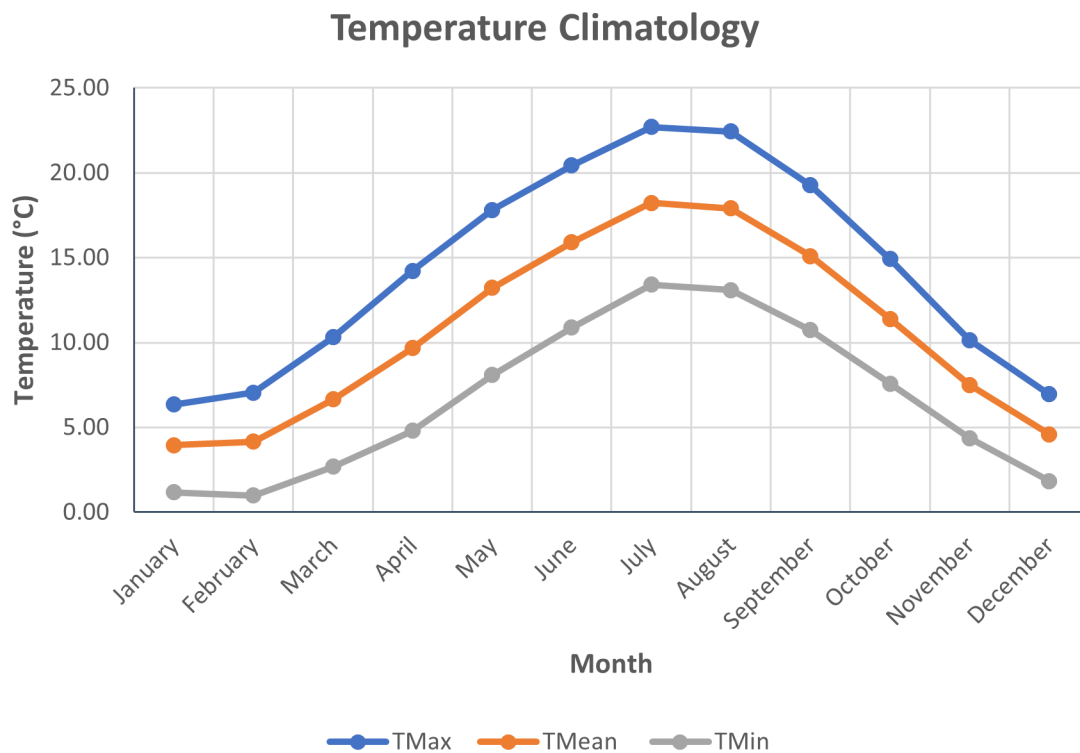
Step 2: Remove x-y axis gridlines

We can further remove gridlines, which can give more spaces for the lines and allows for greater contrast. As a result, our three temperature lines stand out more. However, you can leave the gridlines, if you think they will be helpful for your audience to accurately check the values on the chart. But make them thin and use a light color like grey. Do not let them compete visually with your data.

Temperature Climatology
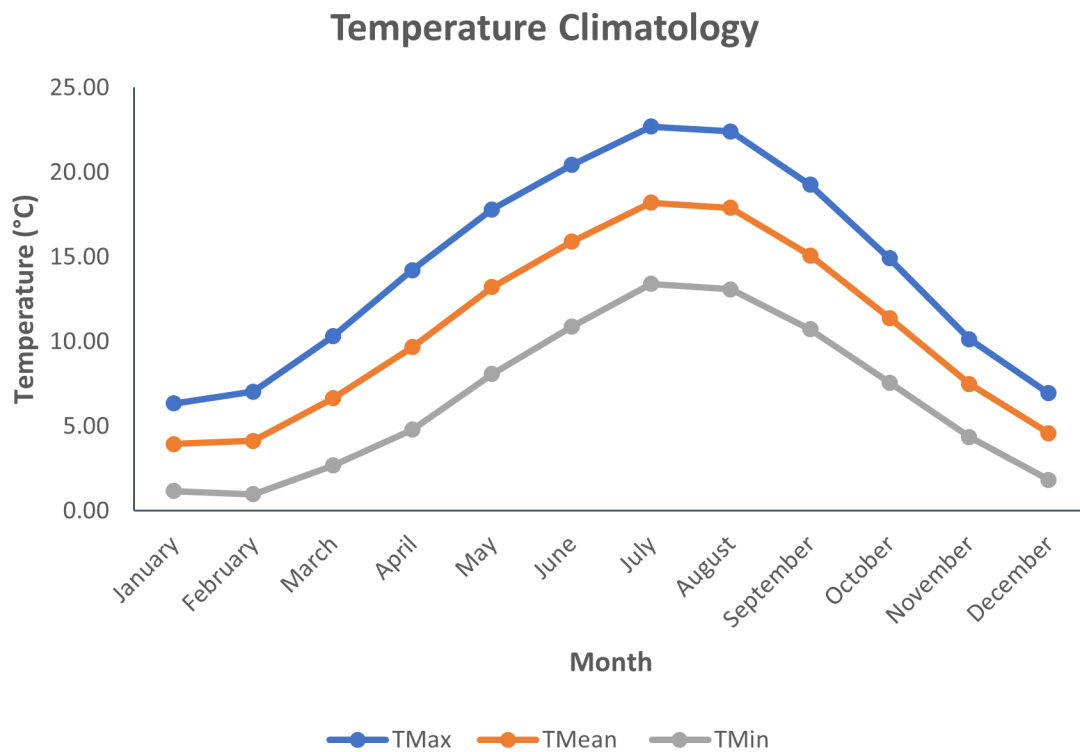
Step 3: Remove data markers

The data markers seems not to provide more helpful information, as all data are already depicted visually with the lines. So we can remove these data markers. However, this isn't to say that you should never use data markers. They should be used with some kind of specific purposes, rather than because their inclusion is your graphing application's default (e.g., a kind of line type in Excel).

Temperature Climatology

Step 4: Clean up axis titles

It is quite clear the charts is used to visualize monthly climatology of temperature. The x-axis is for month, while y-axis is for temperature. Moreover, the chart title also tell the story. So we can get rid of the axis titles (or labels).

Temperature Climatology
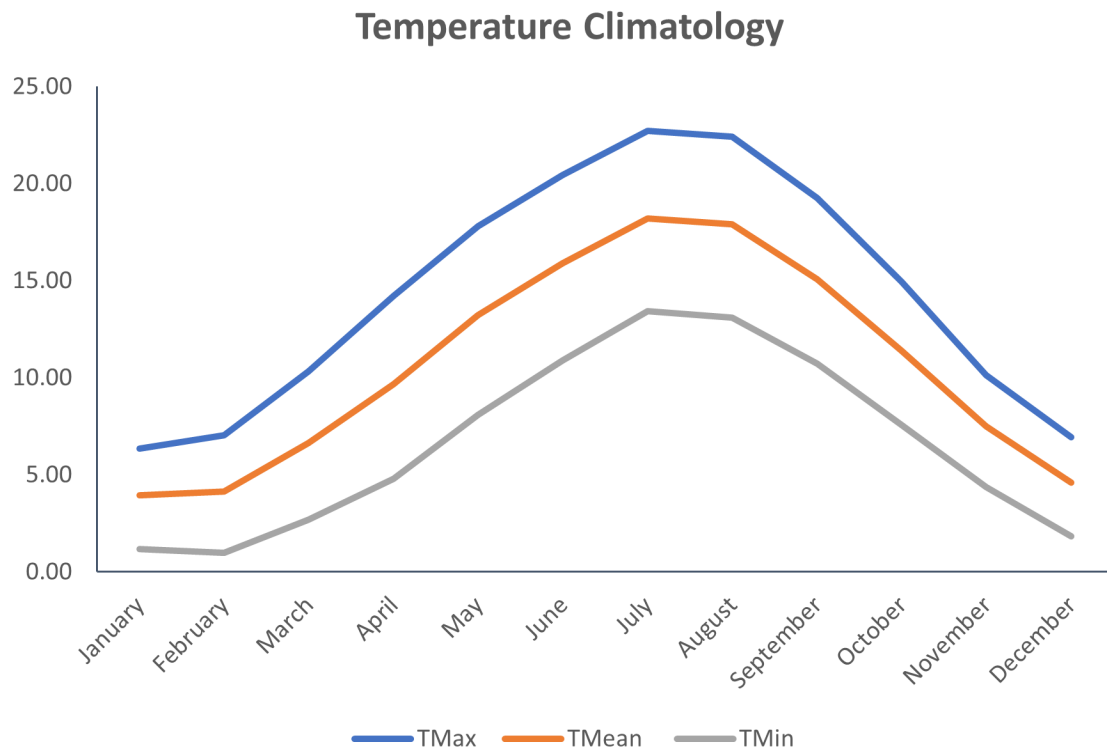
Step 5: Trim trailing zeros of y-axis tick labels

The trailing zeros on y-axis labels carry no informative value, and yet make the numbers look more complicated than they are! Trimming (or round) them to integers does not affect any other elements and make them more concise and easy to read.

Temperature Climatology
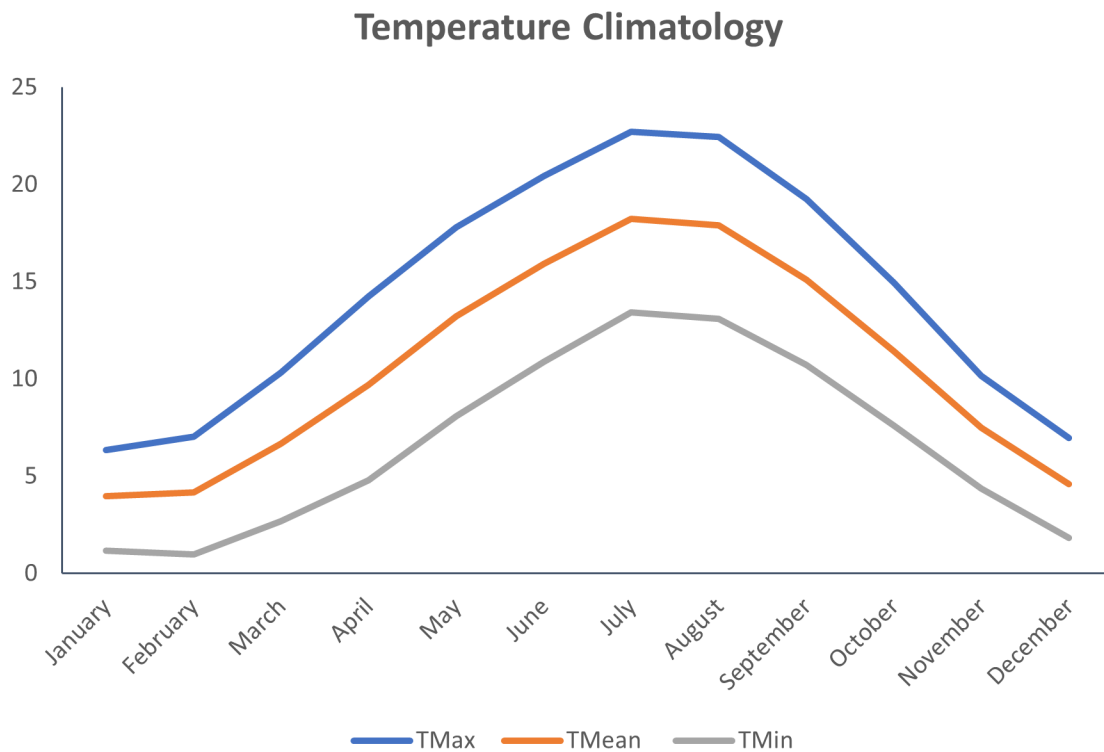
Step 6: Add major ticks and create a meaningful title

We deleted axis gridlines and dropped axis titles in the previous step. The major axis ticks and the unit for temperature all vanished. However, they contains some information, we should present these information clearly. We can give the unit in the title, while adding major ticks to help the audience to accurately locate the major ticks (i.e., key values). In this chart, I also moved the title to the left, instead of center (default). It is just my own habit.

At the end of this step, the chart looks already quite concise and also contains all necessary information. However, we can take another three further steps to make the chart more concise.

Temperature Climatology (°C)
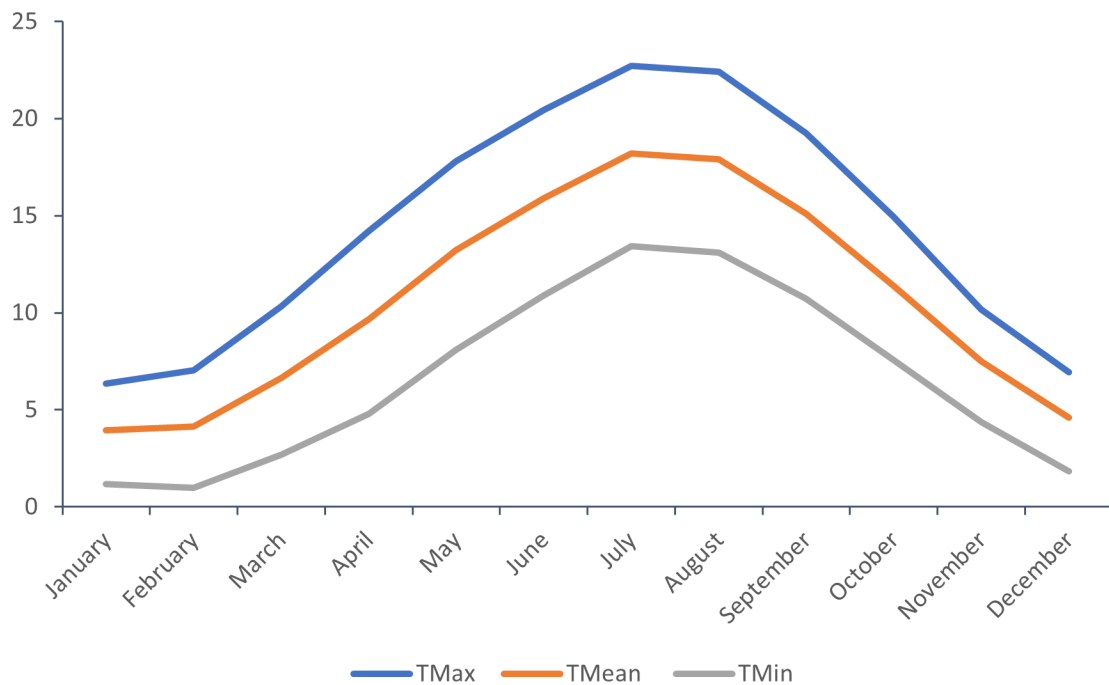
Step 7: Move legend

Take another look at this visual with an eye. we should find the legend is far from the lines. We have to move our eyes down to check what each color or line stands for. So we can move it upwards. Here, the legend is quite simple (only 3 elements). So I move it under the title.

Temperature Climatology (°C)
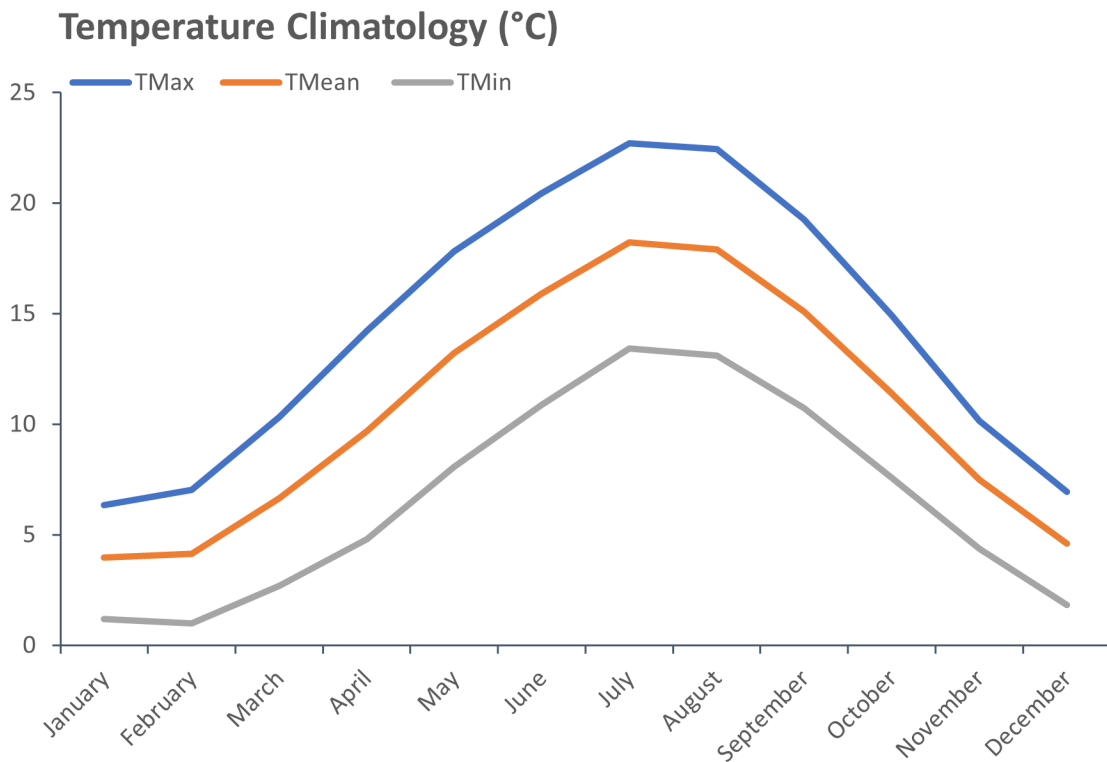
Step 8: Do not rotate x-axis tick labels

Rotated axis tick labels tend to be difficult to read and require awkward space use underneath the plot. For these reasons, I generally consider plots with rotated tick labels to be ugly. We can apply abbreviated the months to present the same months (everyone will still understand). Such an extra operation allows the tick labels to fit horizontally on the x-axis, eliminating the diagonal text.

Temperature Climatology (°C)
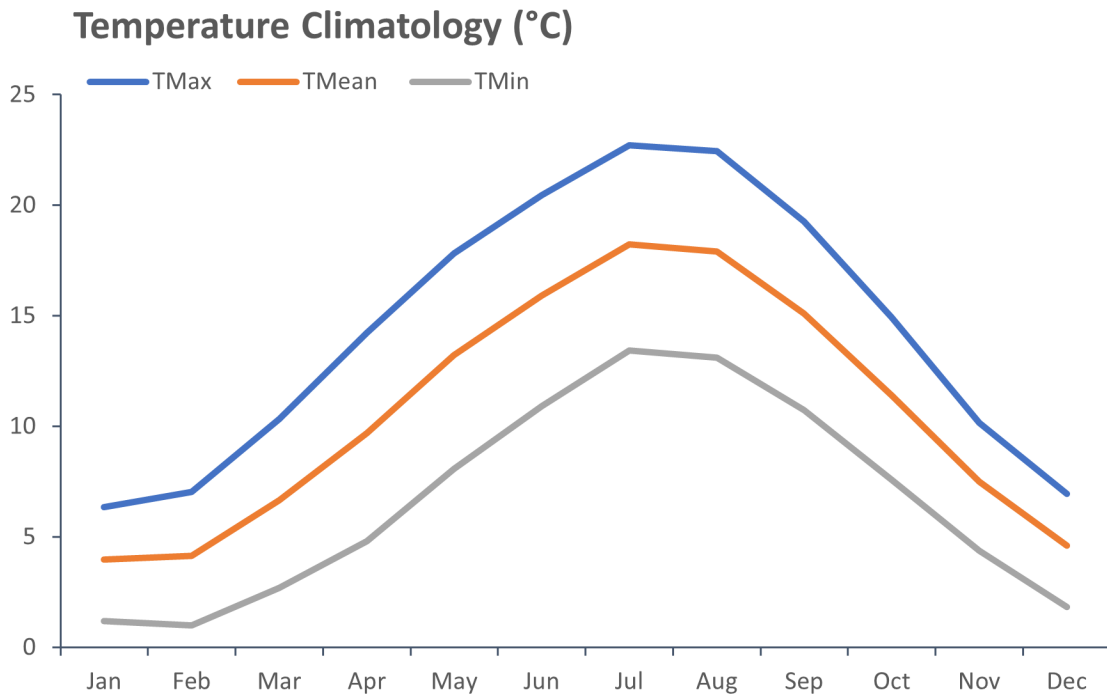
Step 9: Start from start, end at end

With the previous two steps, our chart looks more concise. Many people may stop here. However, if we carefully look at the chart, we should find the temperature value for a specific month is put at the middle of its own month and a neighbour month. That is, the month starts from zero and ends at 12 (i.e., 13 ticks in total). I do not like that, so I changed the major ticks "*start from start, end at end*".

Temperature Climatology (°C)
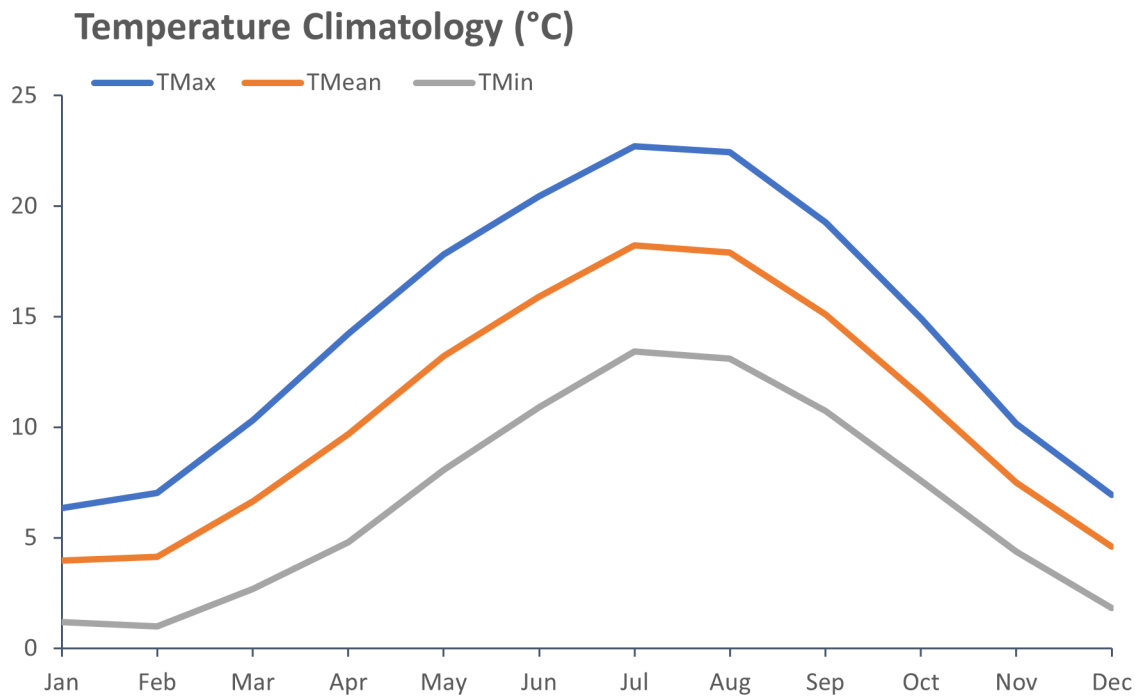
Summary

Until now, we finished the steps to simplify our line chart to make it more concise. The chart also presents all necessary information. In fact, you can do more. You can use specific colors or styles for the lines, specific fonts (size and style) for the title and tick labels, specific size for the major ticks, figure size, output format, and dpi, etc. Although visualization looks easy, it is really hard to authentically master. It is a half art and a half science. The best way always is ***JUST DO IT***.

References

https://www.economist.com/christmas-specials/2013/10/07/worth-a-thousand-words

Knaflic, Cole Nussbaumer. Storytelling With Data: A Data Visualization Guide for Business Professionals. Hoboken, New Jersey: John Wiley & Sons, Inc, 2015.