DATA VISUALISATION 1

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Unit name: FIT3179 Data Visualisation-S2 2021
Lab: 27_OnlineRealTime Wed 12:00pm-2:00pm
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Word count: 927
URL:
https://public.tableau.com/app/profile/hongnuo3278/viz/Visualization1_16301476049480/Dashboard1?publish=yes

Visualization of Australian weather

- ## Introduction

Since Australians require a good cognition of weather to make decisions on other weather-related issues, this visualization depicts weather in Australia from 2008 to 2017.

- ## What

Dataset used in this visualization downloaded from website named Kaggle whose author is Mohammad Aris Darmawan. The processes of processing data contain calculation, classification, and creation. For classification and creation, the data set called location, which represent various city in the original data is grouped to form a new data set whose hierarchy is administrative regions. Some numeric data are used to create a new calculation such as the daily average temperature is calculated using both morning and afternoon value. Even character data are added into new calculation to create logical statement.

- ## Why+ How

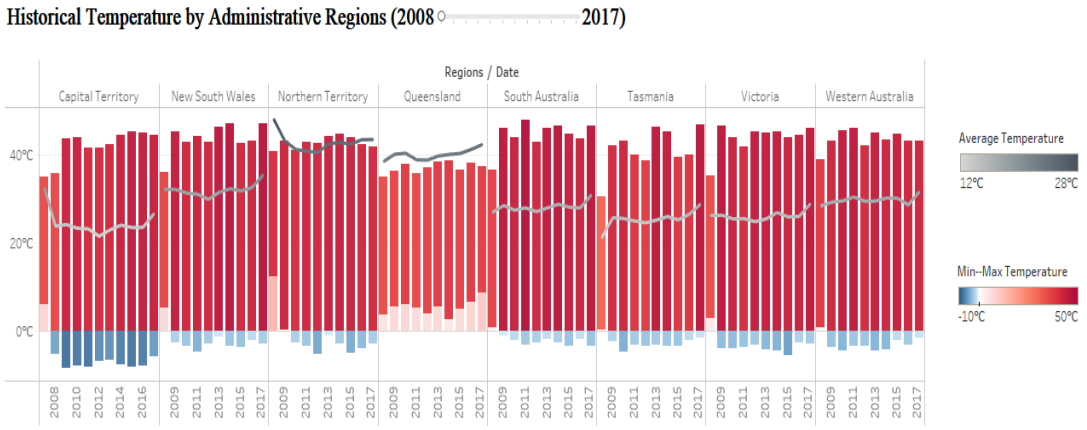


Figure 1. Historical temperature by administrative regions in 2008-2017 (dual combination)

According to Figure 1, the combination of bar chart and line chart depict the maximum, minimum and average temperature for each administrative region from 2008 to 2017. The reason for selecting this combination is that lines with position upper and lower x-axis can display the difference between highest and lowest temperature, points with position and line connection can show the average temperature and how it changes over time and color hue can (red-blue diverging and gray) distinguish three groups of temperature. Furthermore, each hue along with its luminance more intuitively illustrates the degree of heat. In addition, time filter in the title can be used to monitor the condition of each region during the year.

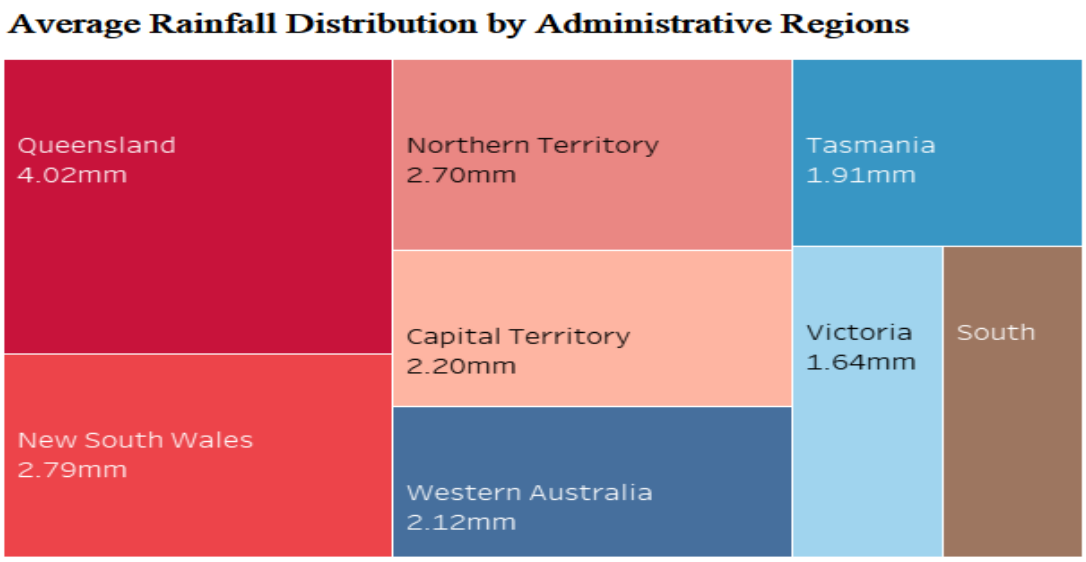


Figure 2. Average rainfall distribution by administrative regions (tree map)

According to Figure2, using tree map for analyzing rainfall distribution is much easier to reflect the hierarchical part-to-whole relationship, which means it is a good performance to obtain the average rainfall value directly and show which administrative area has more rainfall in Australia as a unit by using the size of area. Furthermore, color hue differentiates between various regions with ease. It is worth noting that by clicking on a specific region, the tree map can be drilled down to the precipitation distribution of this region, and the time filter in previous visualization also can have an influence on this visualization to explore the rainfall distribution throughout the year.

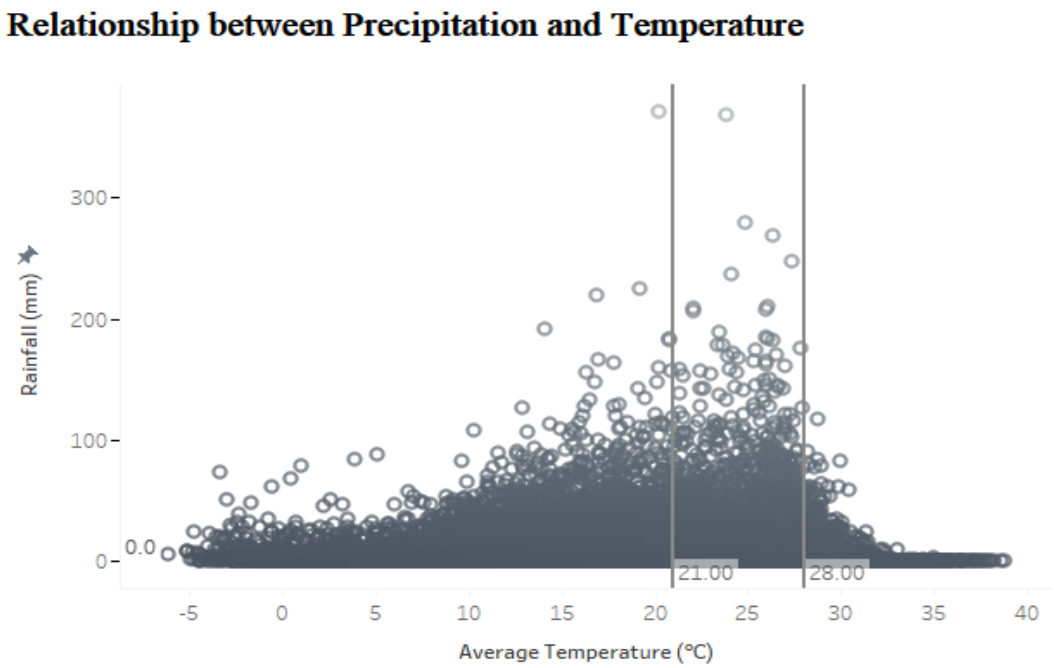


Figure 3. Relationship between precipitation and temperature (scatterplot)

The scatter plot is an excellent choice for assessing the relationship between two variables, figure 3 used the distribution of points in the scatter plot, given as horizontal and vertical positions, to explore the relationship between precipitation and temperature. Moreover, two auxiliary lines are to highlight a specific temperature zone.

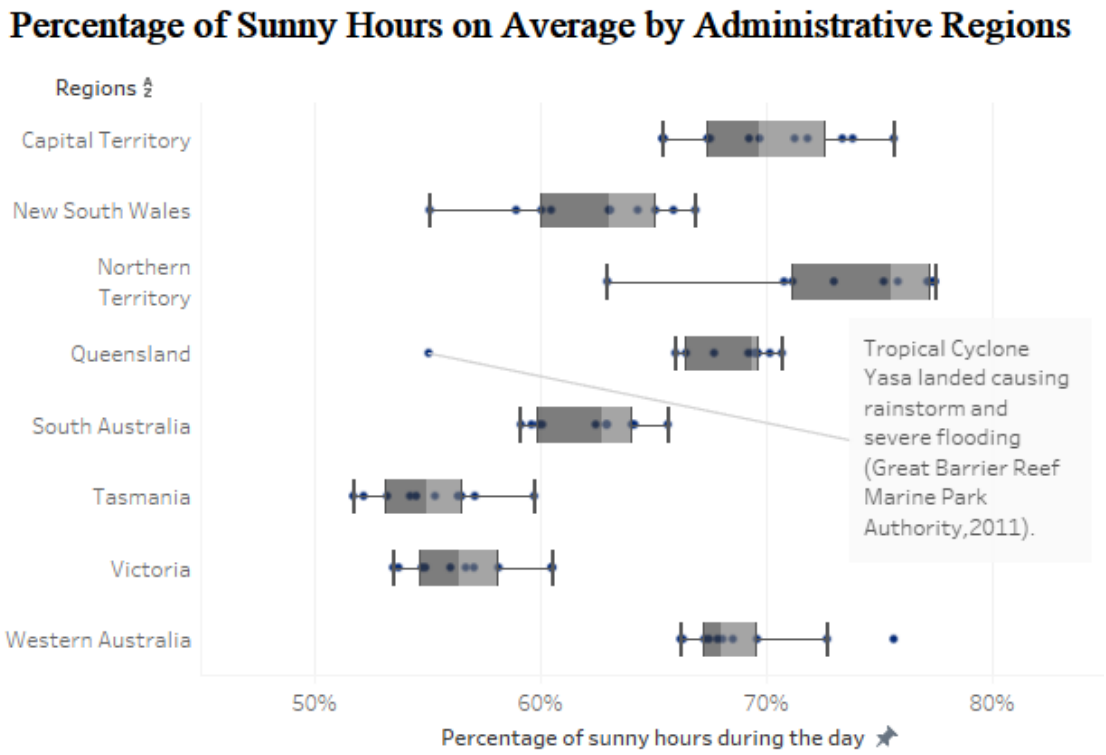


Figure 4. Percentage of sunny hours on average by administrative regions (box-and-whisker plot)

The purpose of Figure 4 is to explore the distribution of the proportion of sunshine hours in each administrative region in 2008-2017, so utilizing box plot helps standardize the distribution and figure out outliers. In the distribution of each administrative region, the length of the line indicates the range, and the position of points presents the value of the specific year. What's more, the proportion of two grays with different saturations in the entire shadow area can be used to determine the position of median thereby determining the characteristics of distribution, which means most values of year are distributed in the large-shaded areas. Time filter still applicable.

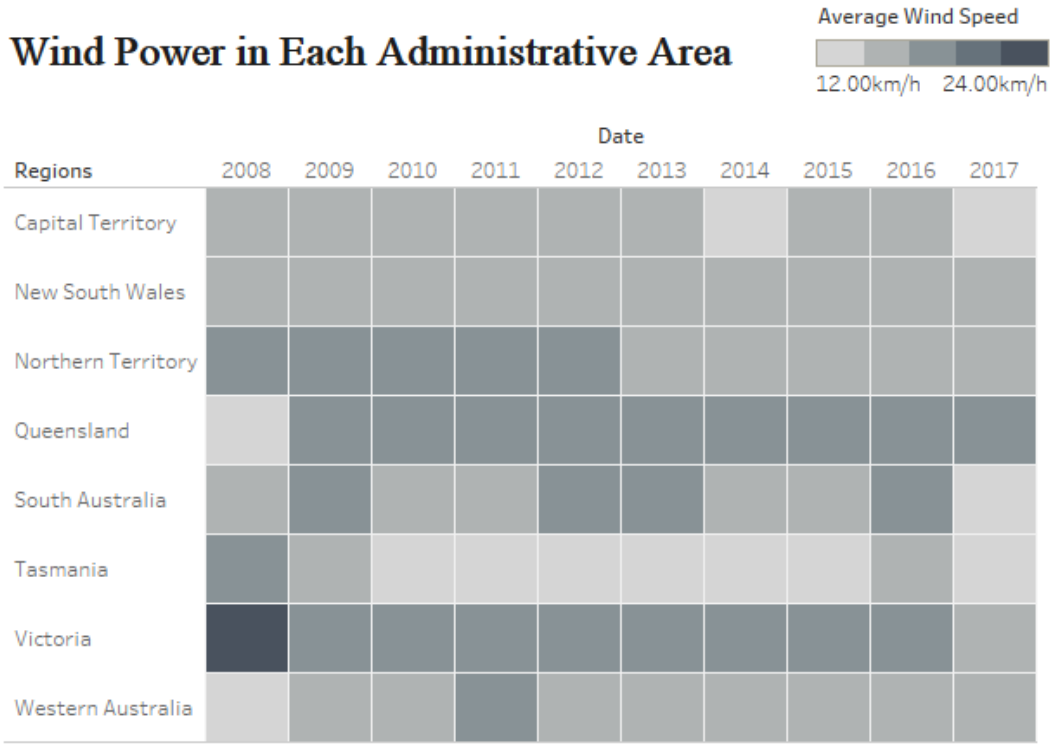


Figure 5. Wind power in each administrative area (heat map)

Heatmap can perform precision in quantity with temporal patterns, so in Figure 5, it uses the different saturation of gray of areas corresponding to the year and administrative regions to reflect wind speed. Dividing wind speed into five levels to finally present wind power.

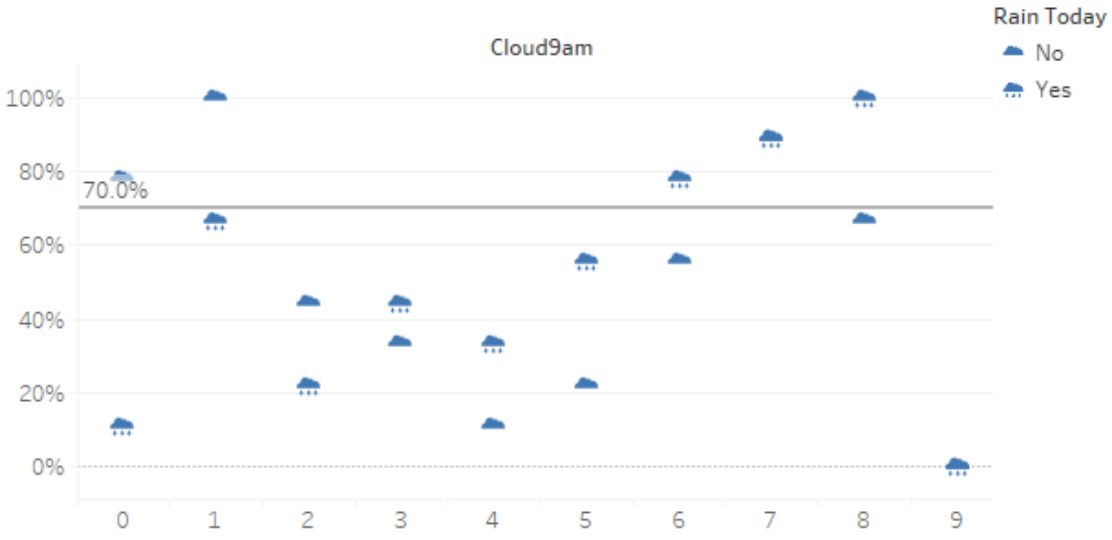


Figure6. Evaluating by the degree of cloud cover (scatter plot)

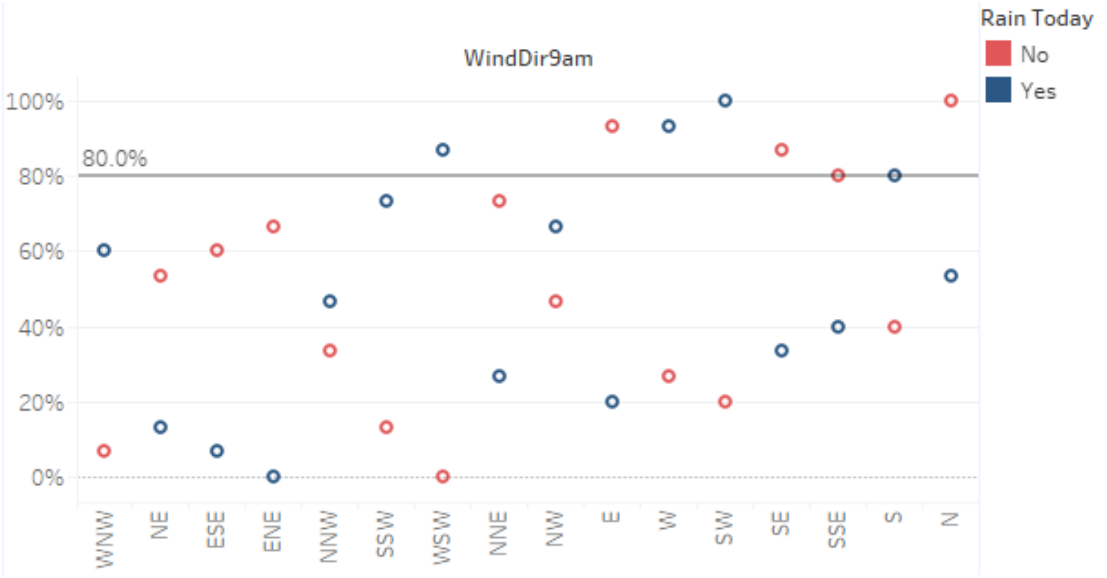


Figure7. Evaluating by wind direction (scatter plot)

Scatter plot is a better choice when explain the correlation between two variables so that using scatter plot in both figure6 and figure 7 are trying to figure out the relationship between rain-causing factors and whether it rains. In figure6, the usual mark, points, are changed into different shape to differentiate “yes” and” no”, however, in figure 7, it distinguishes by color hue. It's important to note that under the same rain guidance variables, the difference between whether or not it is raining can be observed immediately through the position of the point in these two figures, and audience could acquire the probability of raining just by reading.

- ## Design

This visualization uses two columns and four rows layout, which follows visual guide structure, from top to bottom, from left to right. Moreover, the context structure form whole to the part, which means, this visualization introduces and analyze the weather in Australia each year each administrative region and each demission (temperature, wind power, and rainfall) at the beginning. And then it specific to the assessment of the special weather on a certain day.

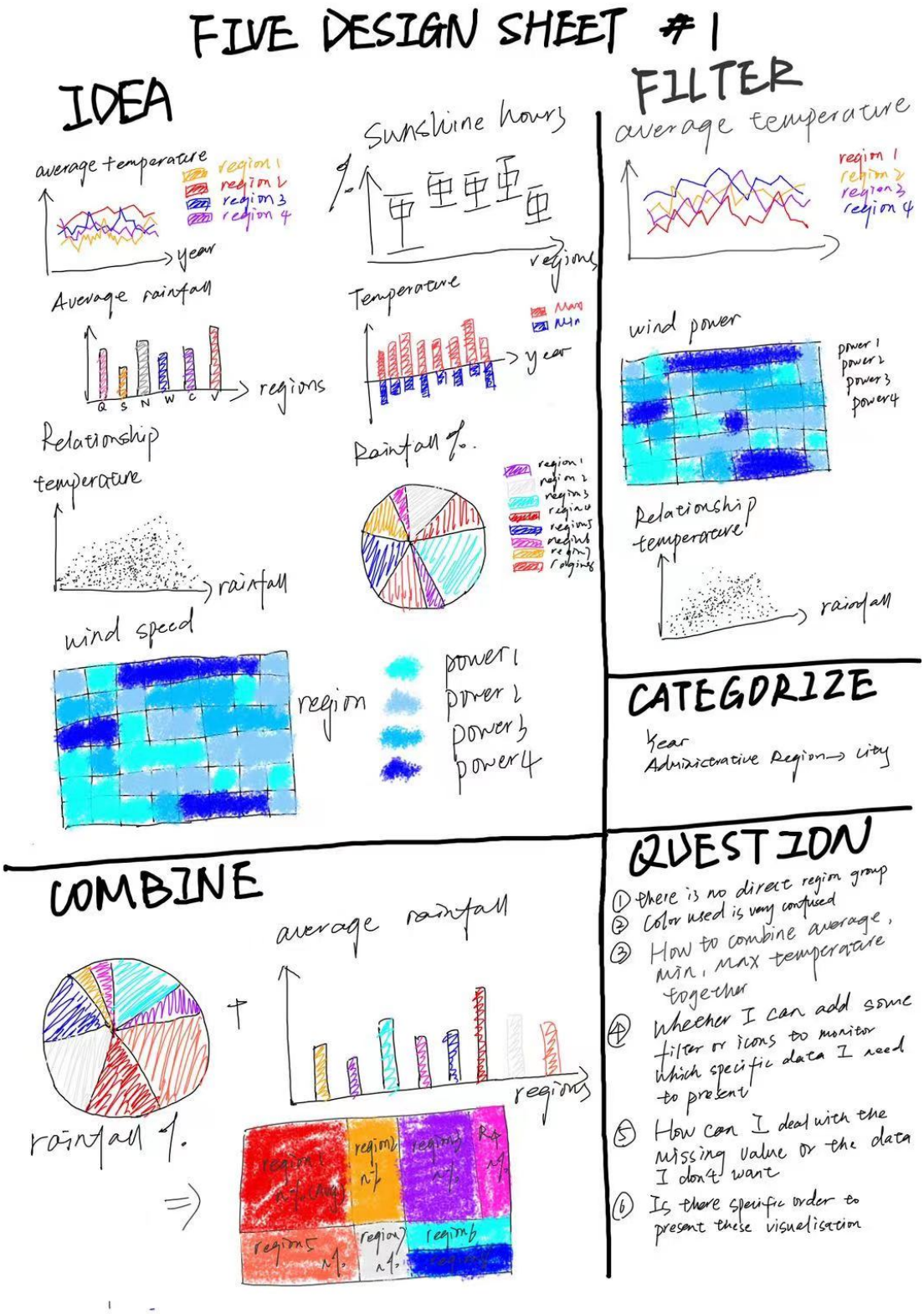
In addition, the theme color used is blue because this is the color close to sky. In order to highlight the title, text and chart, this visualization use dark blue as background for the title and white as background for the chart and text to contrast with the light blue of the background of dashboard. Meanwhile, to show the hierarchical relationship, the headline, title, and subtitle use dark blue with different transparency. Furthermore, the usage of typography in headline and title is “Times New Roman Uni”, one type of serif, which is more serious and fits the overall purpose, however, since the font size in text, visualization and annotation are small, so using one sans serif type make more easier to read.

Reference

Darmawan, M.A. (2021). Australian Weather Dataset: Predict If It Will Rain Tomorrow Based on Weather Conditions. Retrieved from https://www.kaggle.com/arisdarmawan/australian-weather-dataset

Great Barrier Reef Marine Park Authority. (2011). *Extreme Weather and the Great Barrier Reef.* Retrieved from https://www.gbrmpa.gov.au/__data/assets/pdf_file/0016/14308/GBRMPA-ExtremeWeatherAndtheGBR-2010-11.pdf

Appendix

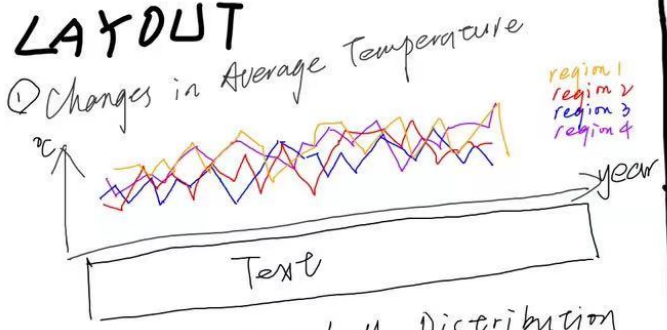

FIVE DESIGN SHEET #1
IDEA
average temperature
region 1
region 2
region 3
region 4
year
Average rainfall
regions
Q S N W C V
Relationship
temperature
rainfall
wind speed
region
power 1
power 2
power 3
power 4
Sunshine hours
regions
Temperature
year
Rainfall %.
FILTER
average temperature
region 1
region 2
region 3
region 4
wind power
power 1
power 2
power 3
power 4
Relationship
temperature
rainfall
CATEGORIZE
Year
Administrative Region → city
COMBINE
average rainfall
regions
rainfall %.
QUESTION
① there is no direct region group
② Color used is very confused
③ How to combine average, min, max temperature together
④ Whether I can add some filter or icons to monitor which specific data I need to present
⑤ How can I deal with the missing value or the data I don't want
⑥ Is there specific order to present these visualisation

FIVE DESIGN SHEET #2

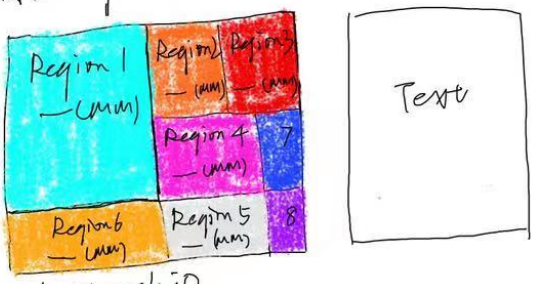
Title = weather in Australia
Author = Hongmo Lyu
Time = 23/08/2021
Sheet 2
Task: make an overall layout complete interactivity

LAYOUT

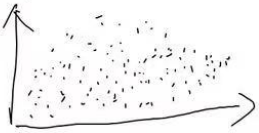
① Changes in Average Temperature



② Average Rainfall Distribution

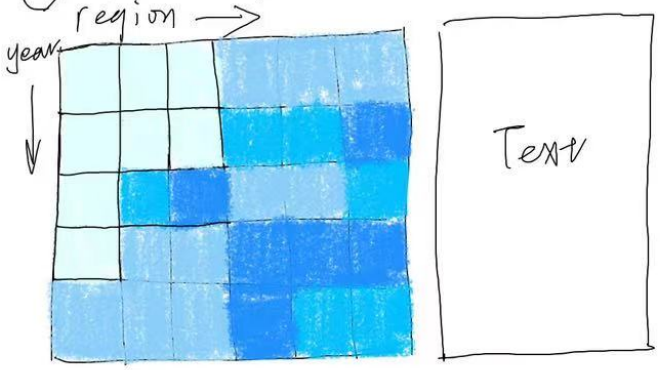


③ Relationship rainfall / temperature



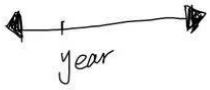
Text

④ Wind Power

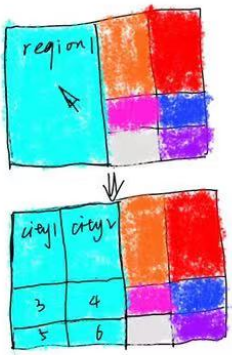


OPERATION

① set a filter to select year and make an action on it



②



FOCUS

① group and calculate data
② finishing the tree map
③ add units to data
④ set time filter

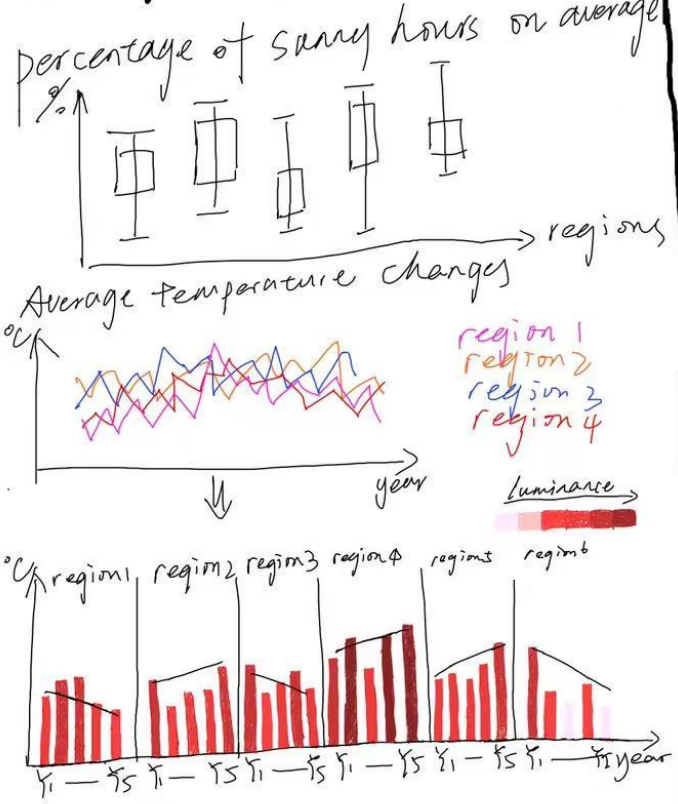
Discuss

Using line chart to show changes in average temperature is not effective because there is no big changes close to horizontal => need to change to dot

Description of the weather is not complete => need to add the sunshine hours back to reflect the situation of weather

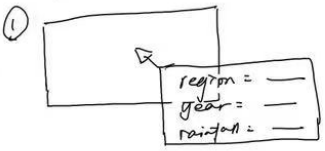
FIVE DESIGN SHEET #3

LAYOUT



Title: Weather in Australia
Author: Hongmo Lyu
Time: 27/08/2021
Sheet 3
Task: Add a visualisation
Change an idiom

OPERATION



- New South Wales
- Capital Territory
- Queensland
- South Australia
- Western Australia
- Northern Territory
- Victoria
- Tesmania

FOCUS

1. Add an new visualisation
2. Change the idom used in average temperature changes
3. Put all visualisation in to dashboard followed the design sheet 1
4. Change color used in every visualisation
5. Set tooltips in all visualisation
6. Add two auxiliary lines in the scatter plot

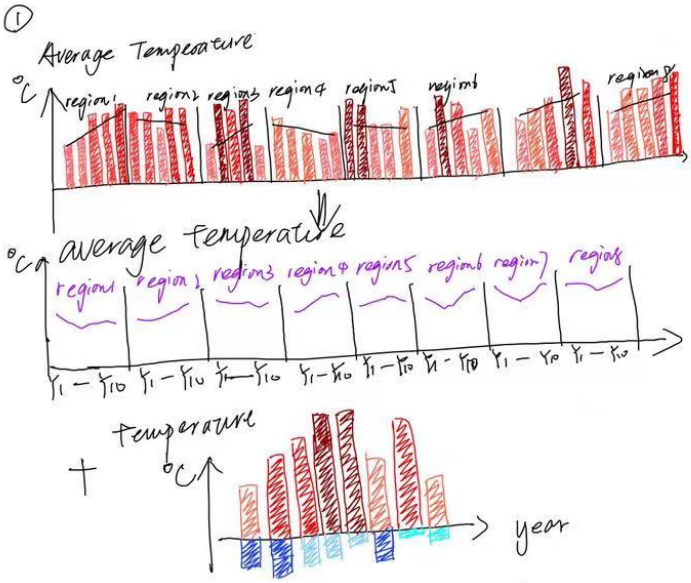
DISCUSSION

1. After adding visualisation and changing idom, the structure is disorded => need improve
2. the visualisation of average temperature change still has the low data-ink ration
3. Storytelling is not guided enough Seem that it needs to add some specific situation to visualise

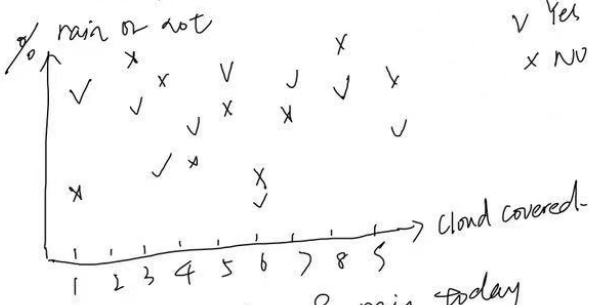
FIVE DESIGN SHEET #4

FOCUS

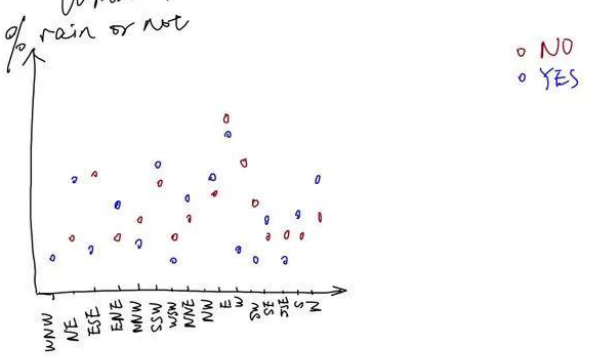
①



②

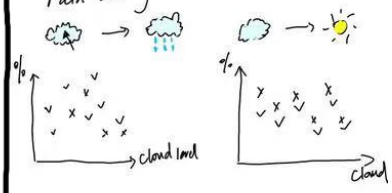


③



Title: Weather in Australia
Author: Hongwei Liu
Time: 01/09/2021
Sheet 4
Task: Change another way to present temperature.
select theme of dashboard
Add another two scatter plot into dashboard

OPERATION



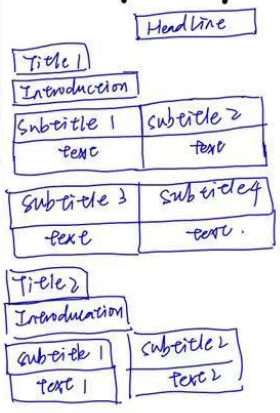
DISCUSSION

① After adding new visualisation whether I should reorder one

② Whether the icon is necessary seems that they are redundant

③ Can the color used in average temperature change? because most of the bar are in dark red, which is not slinky

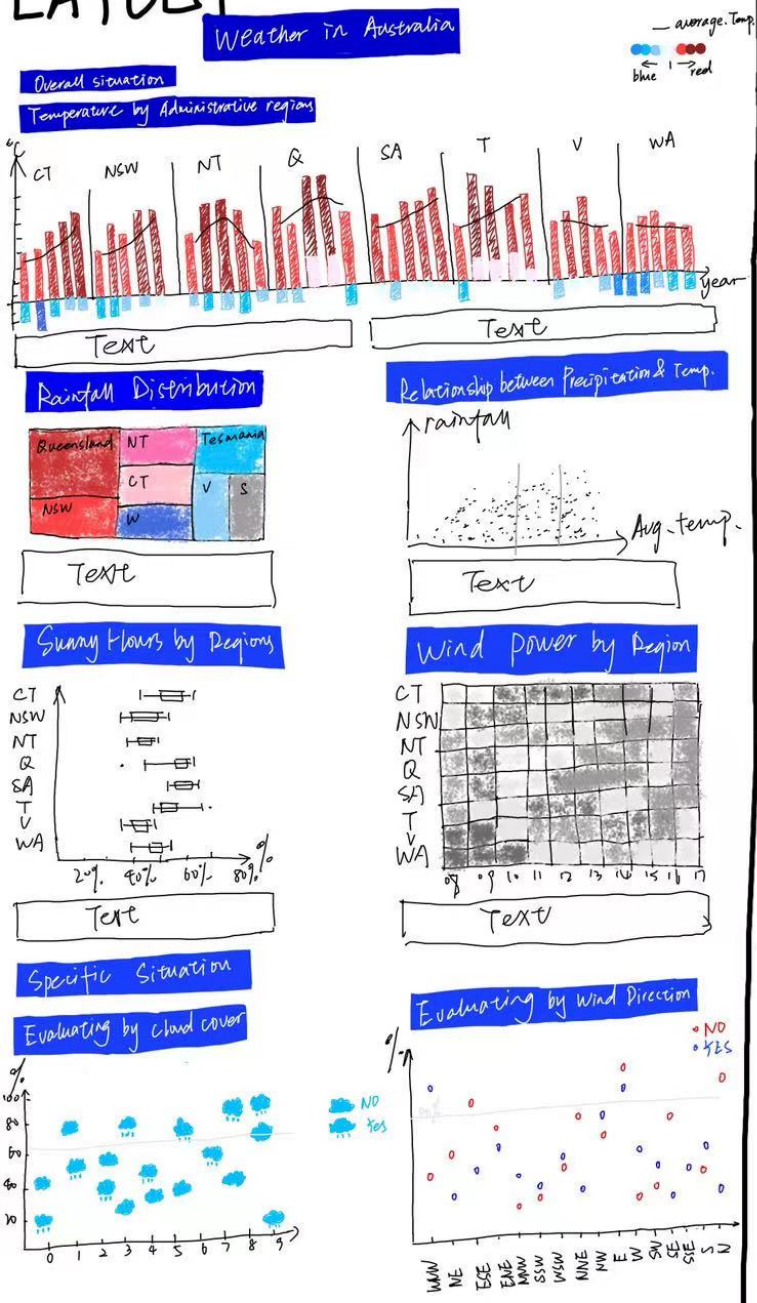
LAYOUT



FIVE DESIGN SHEET #5

Title: Weather in Australia
Author: Hongmo Lyu
Time: 03/09/2021
Sheet 5
Task: adjust the theme color
align items in dashboard

LAYOUT



OPERATION

DETAIL

- Data from kaggle.com.
- Only using desktop is enough
- The whole visualisation may take two weeks to finish
- Some detail about how to use tableau need to search on website
- Some of original data need to be recalculated & grouped in order to achieve the goal which I would like to realize.