Monash University: Assessment Cover Sheet

Student name	Zhou	Minhua	
School/Campus		**Student's I.D. number**	31389171
Unit name	FIT3179 Data visualisation - S2 2023		
Lecturer's name		**Tutor's name**	Clair Pan
Assignment name	Data Visualisation II Report	**Group Assignment: No** **Note, each student must attach a coversheet**	
Lab/Tute Class:	**Lab/Tute Time:**	**Word Count:**	
Due date: 15-10-2023	**Submit Date:** 17-10-2023	**Extension granted** ☑	

If an extension of work is granted, specify date and provide the signature of the lecturer/tutor. Alternatively, attach an email printout or handwritten and signed notice from your lecturer/tutor verifying an extension has been granted.

Extension granted until (date): ...../...../..... Signature of lecturer/tutor: .....

Late submissions policy	**Days late**	**Penalty applied**
Penalties apply to late submissions and may vary between faculties. Please refer to your faculty's late assessment policy for details.		

Patient/client confidentiality: Where a patient/client case study is undertaken a signed Consent Form must be obtained.

Intentional plagiarism or collusion amounts to cheating under Part 7 of the Monash University (Council) Regulations

Plagiarism: Plagiarism means to take and use another person's ideas and or manner of expressing them and to pass these off as one's own by failing to give appropriate acknowledgement. This includes material from any source, staff, students or the Internet - published and unpublished works.

Collusion: Collusion means unauthorised collaboration on assessable written, oral or practical work with another person. Where there are reasonable grounds for believing that intentional plagiarism or collusion has occurred, this will be reported to the Associate Dean (Education) or nominee, who may disallow the work concerned by prohibiting assessment or refer the matter to the Faculty Discipline Panel for a hearing.

Student Statement:

- I have read the university's Student Academic Integrity Policy and Procedures
- I understand the consequences of engaging in plagiarism and collusion as described in Part 7 of the Monash University (Council) Regulations (academic misconduct).
- I have taken proper care to safeguard this work and made all reasonable efforts to ensure it could not be copied.
- No part of this assignment has been previously submitted as part of another unit/course.
- I acknowledge and agree that the assessor of this assignment may, for the purposes of assessment, reproduce the assignment and:

  i. provide it to another member of faculty and any external marker; and/or

  ii. submit to a text matching/originality checking software; and/or

  iii. submit it to a text matching/originality checking software which may then retain a copy of the assignment on its database for the purpose of future plagiarism checking.

- I certify that I have not plagiarised the work of others or participated in unauthorised collaboration or otherwise breached the academic integrity requirements in the Student Academic Integrity Policy.

Date: 17/10/2023 Signature: MINHUA

Privacy Statement:

For information about how the University deals with your personal information go to http://privacy.monash.edu.au/guidelines/collection-personal-information.html#enrol

MONASH UNIVERSITY
FACULTY OF INFORMATION TECHNOLOGY

Australian Overseas Traveller and International Aviation

FIT3179 Data Visualization 2 Report

Minhua Zhou
31389171

DATE: 17TH OCTOBER 2023

Visualization URL:
https://tonyz1260.github.io/FIT3179/DV2/index.html
GitHub URL: https://github.com/tonyz1260/FIT3179/tree/main/DV2

Word Count: 1000

TUTOR: CLAIR PAN

CE/LECTURER: ASSOCIATE PROF. BERNHARD JENNY

Content

Domain

The visualization focuses on Australian Aviation and Onverseas Travellers current status and compared with the status pre-COVID. This intends to allow Australian aviation and tourism stakeholders to understand the affect of current recovering and what aspect they could possibly improve on based on the statistics. The overseas traveller visualization also allows the government to understand the residence country of tourists that Australia is attracting and how they can aim for more.

What

The Australian international flight data set is from Kaggle (*Australian Flight Dataset [2003-2022]*, 2023), created by Gaurav Pandey, original data source is from Australian Government. The Overseas Traveller data is from Australian Bureau of Statistics (*Overseas Arrivals and Departures, Australia, August 2023*) which is gathered by the Australian Border Force. These 2 data helps showing the current status of Australian aviation and tourism.

Why and How

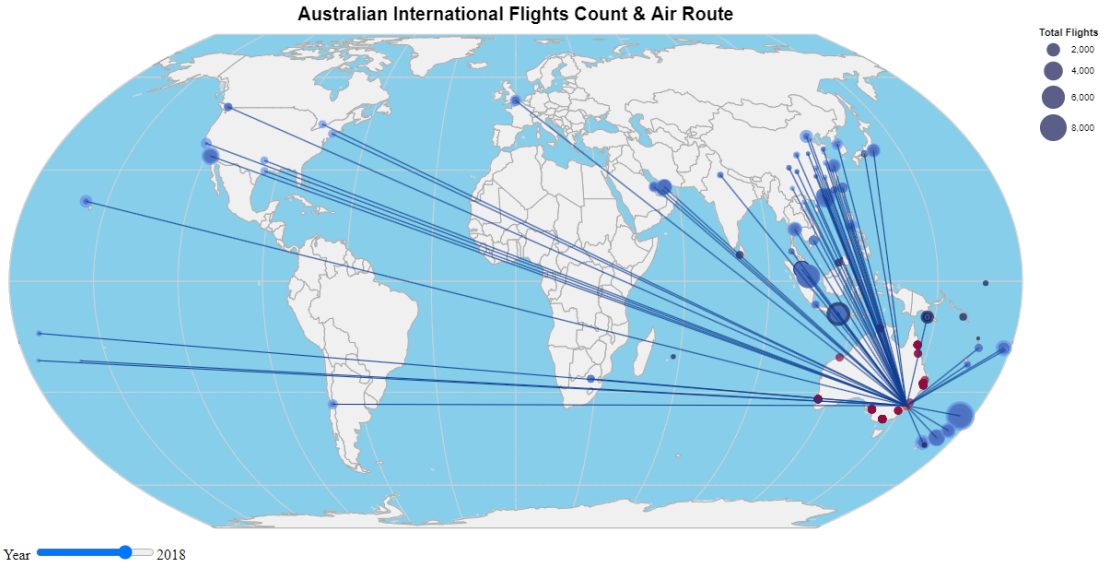


Figure 1. Proportional Symbol Map of Australian International Flights and Air Routes (by connections)

Figure 1 is intended to show the audience the overview of Australian International aviation. With the symbol showing the count of total flights to/from that city every year. The Year slider at the bottom allows the audience to see the status for each year. The marks used here are points and lines. Channels such as position, colour, length are used to convey information such as where the city is and how many flights goes to each city.

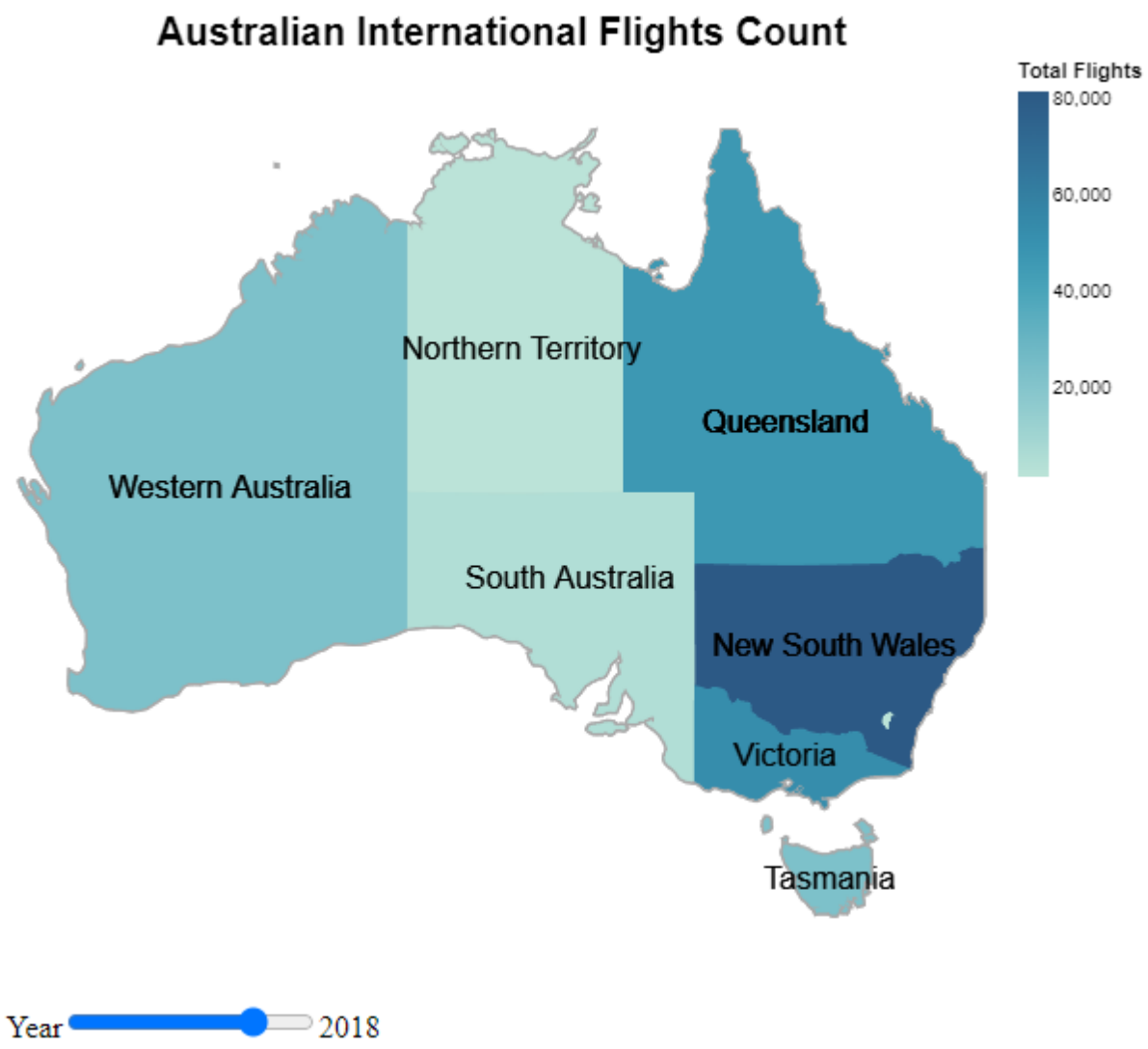


Figure 2. Choropleth map of flight count for each Australian state

Figure 2 shows the flight count for each Australian state. The marks used are area which covers the corresponding state. The channels used here are color saturations. The colours are used to demonstrate the flight count which allows the audience to see which state has the most flights based on the shade.

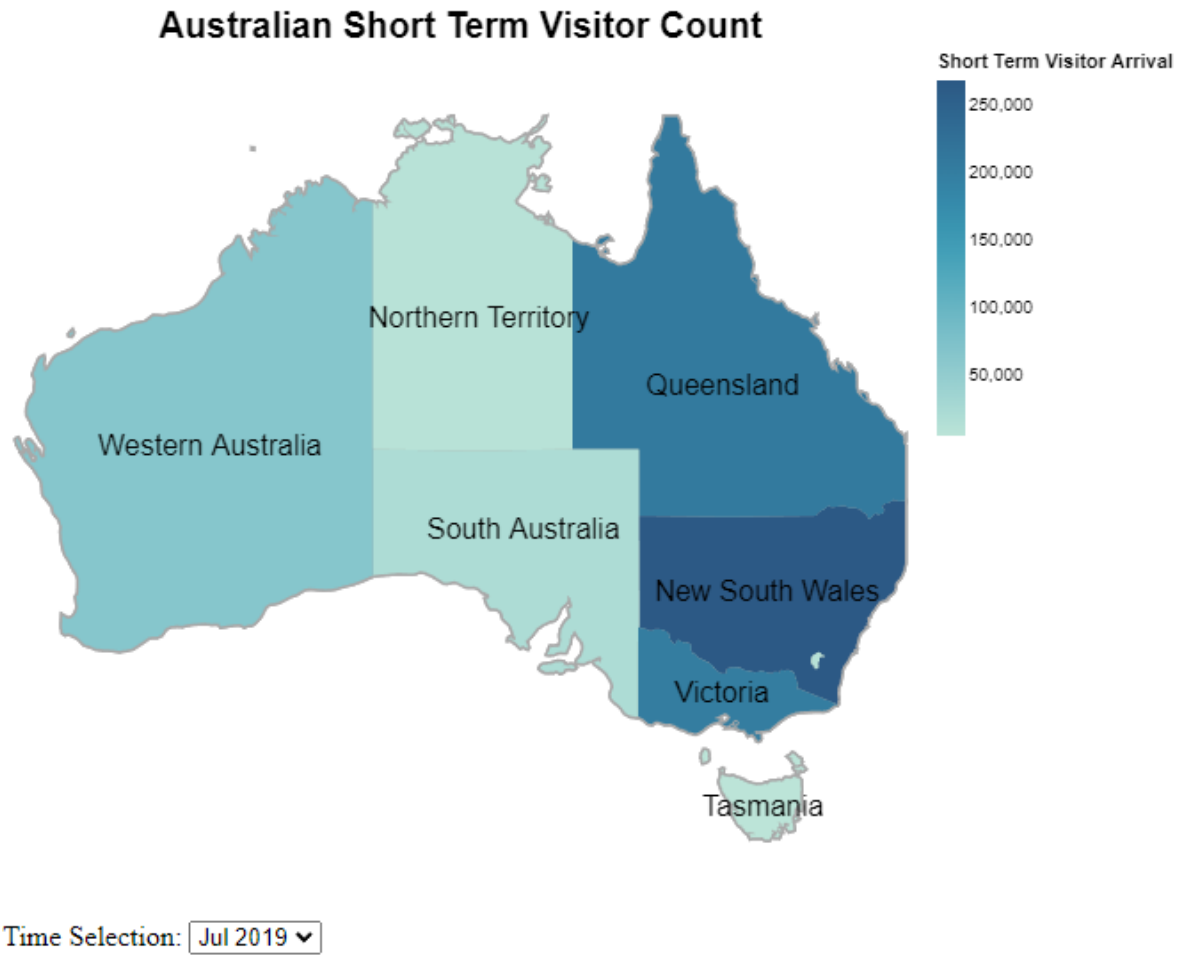


Figure 3. Choropleth map of visitor count for each Australian state

Figure 3 has a similar design as Figure 2. The difference is with the time selection, the time is selected via drop down menu instead of the slider as we have limited data points that's not considered continuous.

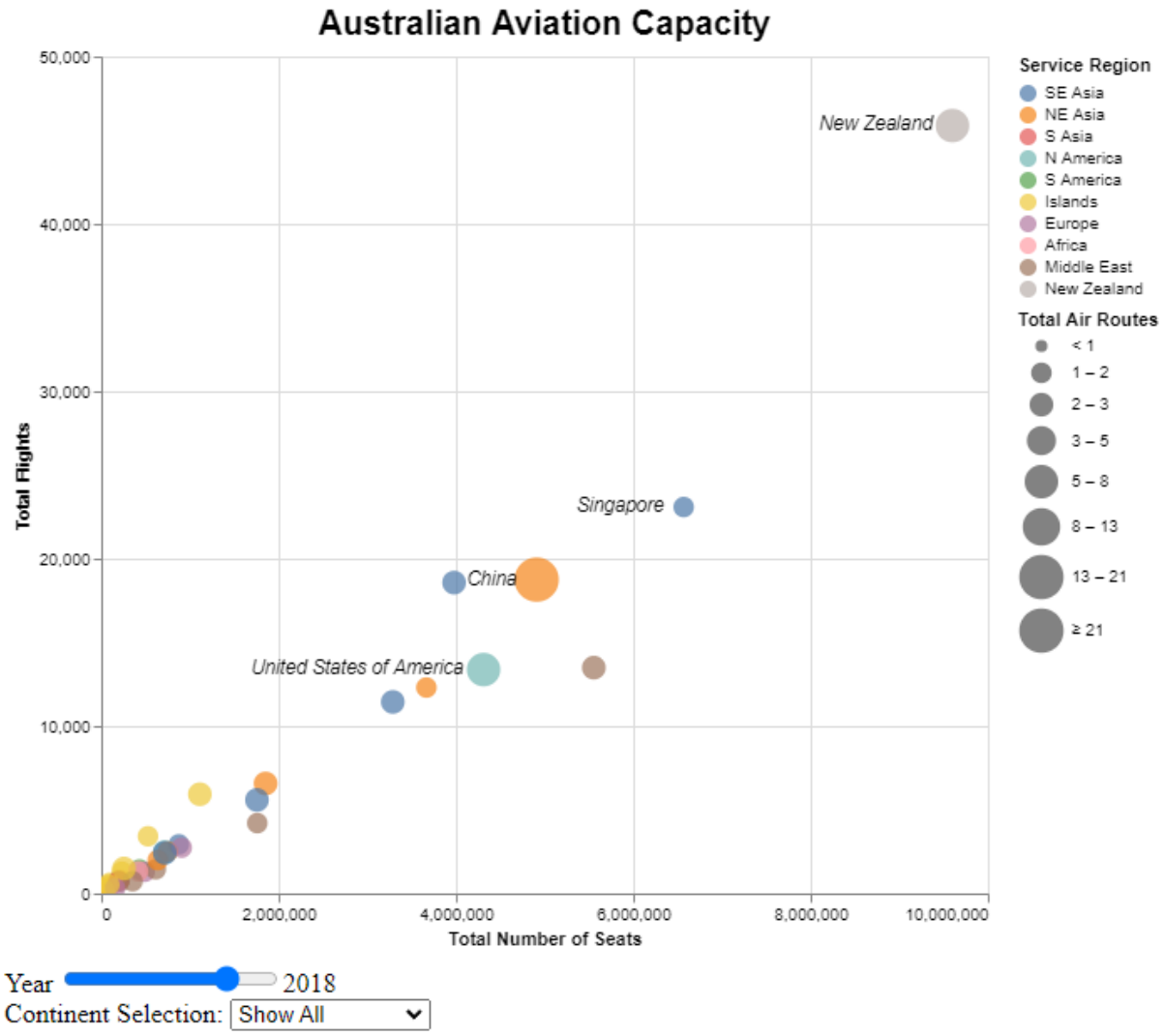


Figure 4. Scatter plot of Australian International Aviation Capacity

Figure 4 shows the Australian International Aviation Capacity. It encodes 4 attributes, the total number of flights, total number of seats, total number of air routes, service region. It uses the point mark and it uses color hue, position and length channels. These color hue allows the audience to see which service region it belongs to, the size allows the audience to understand the air routes availability. The position allows the audience to see the actual capacity of international flights to these countries. There's text annotation denoting some famous countries that Australia has direct flight with and we can clearly see the New Zealand being placed at the top right indicating the Australian-New Zealand travel relationship. You may also zoom in/out for this plot.

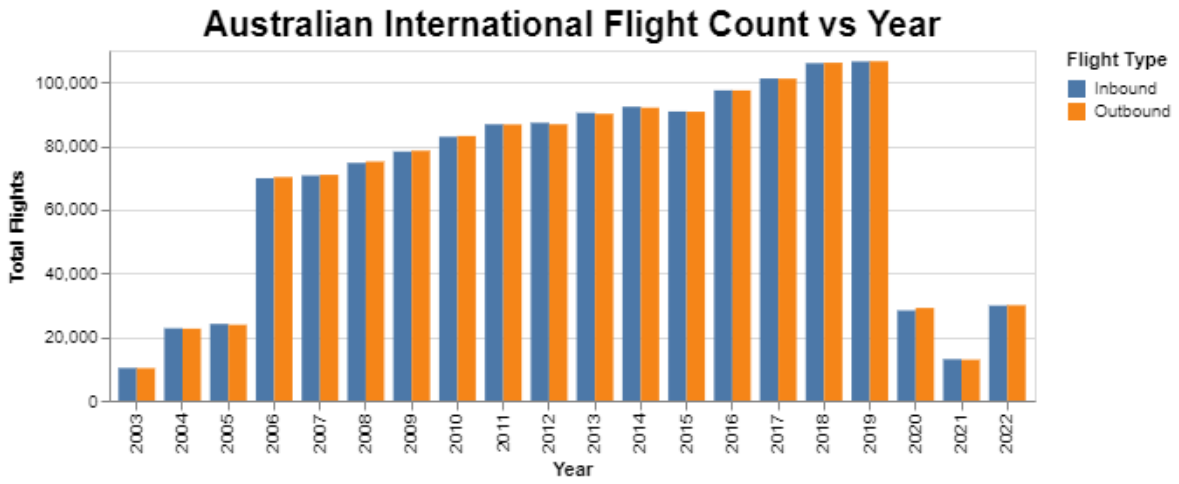


Figure 5. Grouped bar chart of Australian International Flight Count vs Year

Figure 5 intends to show the Inbound and Outbound international flights over different years. The mark used is point and the channels used are position and colour. The position intends to demonstrate the comparison between different years, especially the drop in 2020 and 2021 and then how it recovers in 2022. The colours used are intended to show either inbound or outbound.

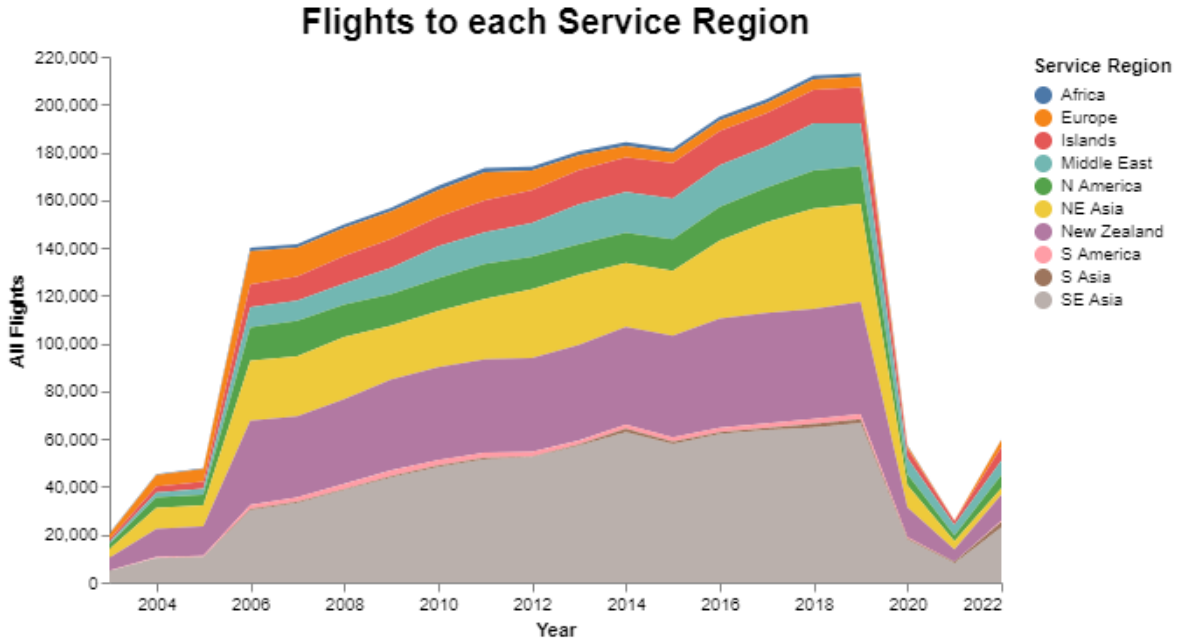


Figure 6. Stacked Area Chart of Australian International Flight to each region

Flight 6 shows a general comparison between flights to different destinations/regions. The mark used is area and the channels used are position and colours. The position is used to show the comparison and tell the

audience which region takes more Australian international flights. Colours are used to encode service regions.

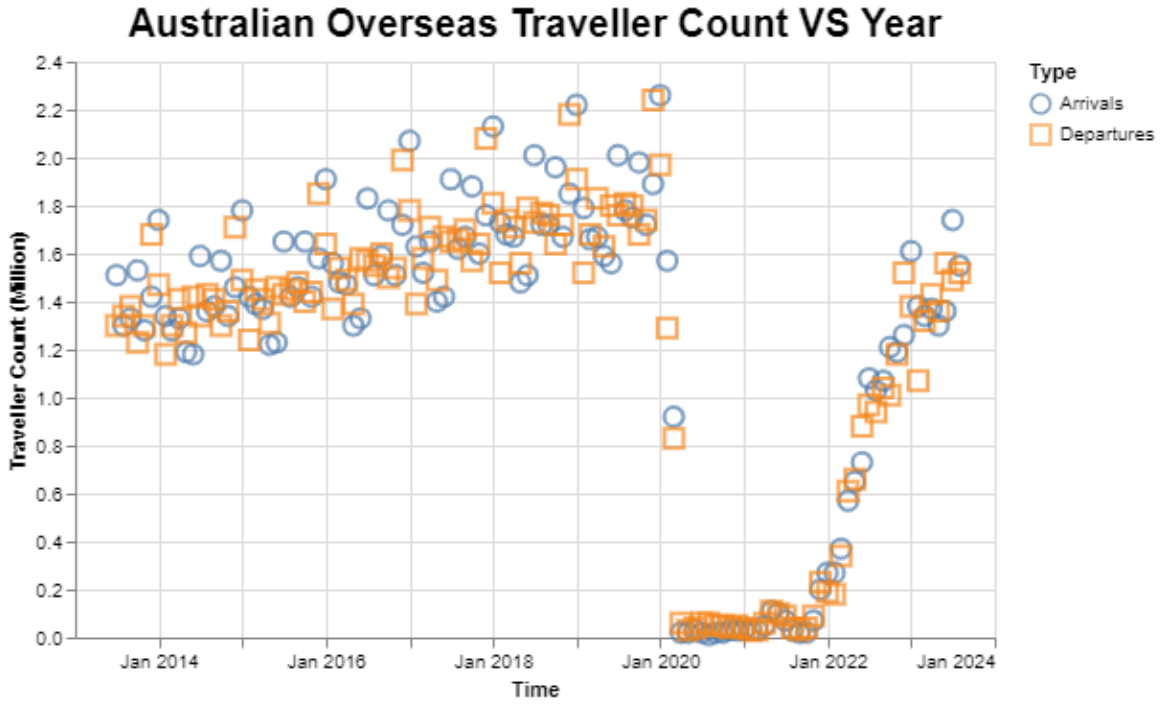


Figure 7. Dot Plot of Australian Overseas Traveller Count vs Year

Figure 7 shows the overall trend of Australian traveller count vs year. The mark used is point and the channels used are position and shape. The position is to show the trend of traveller count at certain time points. The shape is used to encode the travellers type.

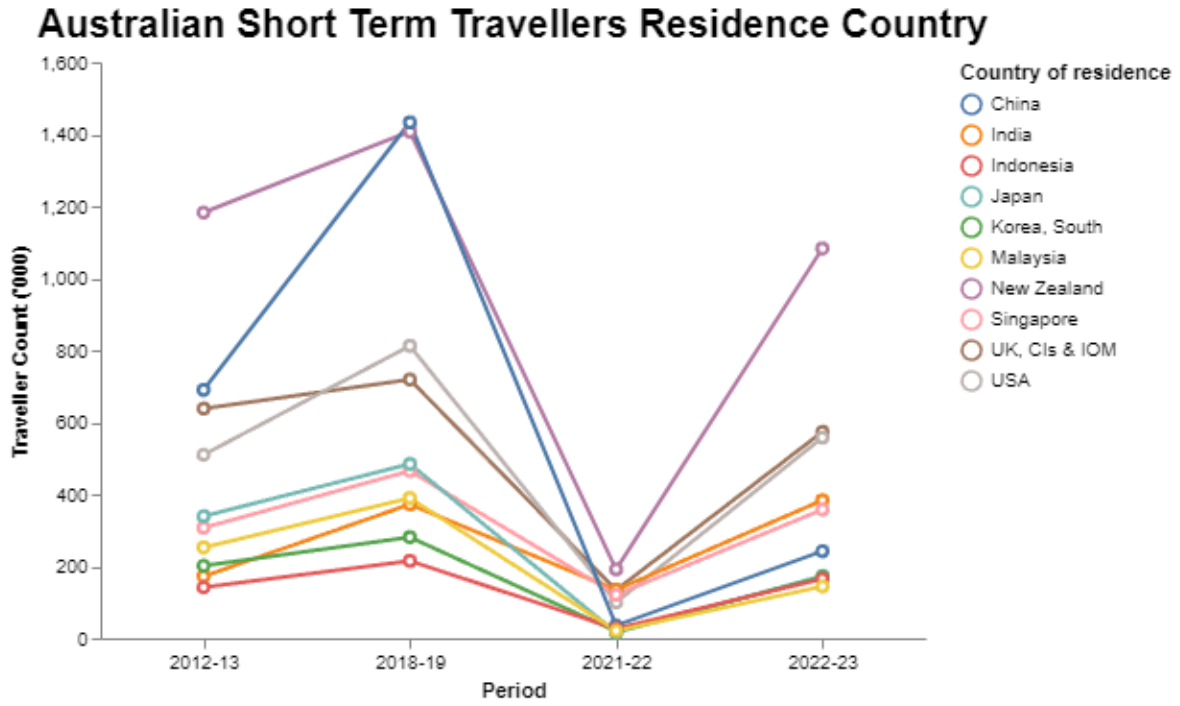


Figure 8. Line chart of Australian Short Term Travellers Residence Country

Figure 8 shows the traveller count vs year based on the residence of country. This only picks up the top 10. The mark used is point and line. The channels used color and angle. The color is used to encode country of residence which helps the audience to see which country has most visitors visiting Australia. The angle is used to show the trend of visitor counts from these 10 countries, intended to allow the audience to see whether visitors from these companies are coming and going as usual.

Design

Layout

The overall layout is structured in multiple rows within different containers. On the 2 sides of the overall webpage, I have left the same amount of margin area. The main sections will take 60% of the area. Based on it, each container will have 2 columns and a similar size to ensure symmetry and visual balance. The webpage is also created from top to bottom. Each section size depends on the actual information contained but generally won't contain more than 3 containers.

Colour

The colours used in this visualisation are employed based on the color blind scheme. Colour combinations such as red and green are not used closely. Colours for the map are used for consistency. Colour schemes are intentionally selected, such as categorical scheme for categorical attributes, quantitative scheme for quantitative attributes. So for instance the choropleth map colours are quantitative.

Figure-ground

In order to demonstrate the key sections more transparently, I have decided to use a skyblue background image and the white background for all sections. The section is also using a 3D border to make the screen more depth. The proportional symbol map also contains connections between different cities. The colours for the points will change over mousehover which makes the emphasizes the points for the audience. Also, there are texts shown above coloured background such as "Australia and New Zealand are like siblings across different nations", this is particularly important to enable a more cohesive storytelling.

Typography

There are 2 non-default typefaces used. First is used by the dashboard title and section titles. These are used to inform the audience about a new section of information. The other one is used across text which used to display information solely. For important information, text are encoded with bold text. For information that is closely associated with the chart, information is encoded with either underlined or italics text.

Storytelling

For the storytelling, this is done with all design elements aforementioned. A key factor of the storytelling is the cohesion of the 2 topics. This is done via the section which shows the comparison between pre-COVID and current status of Australian international aviation. Then the overseas traveller comparison is shown by using dot plot and line charts thus the final map is used to wrap up and throw the THINK. Also the very first chart is the proportional symbol map with the connections between cities at the very top which enables the audience to start thinking about the flights and aviation directly.

References

1. *Australian Flight Dataset [2003-2022]*. (2023, May 17). Kaggle. https://www.kaggle.com/datasets/pandeyg0811/australian-flight-dataset-2003-2022
2. Australian Bureau of Statistics. (2023, August). *Overseas Arrivals and Departures, Australia*. ABS. https://www.abs.gov.au/statistics/industry/tourism-and-transport/overseas-arrivals-and-departures-australia/latest-release.
3. *AU-NZ Travel Bubble*. (n.d.). CNBC. https://image.cnbcfm.com/api/v1/image/106903818-1624935703365-gettyimages-1313187078-dbg-jam-7.jpeg?v=1624935725&w=929&h=523&vtcrop=y
4. *AU-NZ National Flag*. (n.d.). Australian Immigration Network. https://www.australianmigrationnetwork.com.au/wp-content/uploads/2016/02/australia-newzealand-map-flag.png
5. *Australia Flight*. (n.d.). Travel Daily Media. https://www.traveldailymedia.com/assets/2021/09/australia.jpg

AUSTRALIA OVERSEAS TRAVELLER & INTERNATIONAL AVIATION

International Flights

Are the planes taking off and landing as usual?

Have you ever thought of where flights departed from Australia can take you to and how many are there?

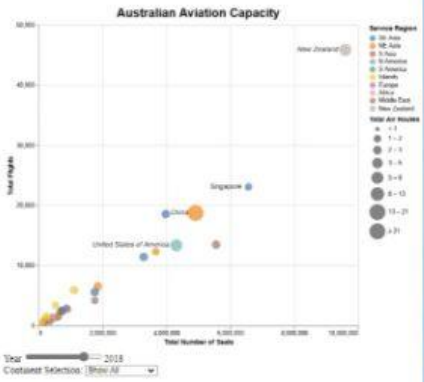
Australia has more than ***200,000*** flights operating per year before COVID.

Direct Flights from Australia can take you to ***47*** countries, ***105*** cities worldwide.

In 2018, there were ***234,955*** flights departed/arrived from/in Australia. Sydney processed ***81,619*** of them within that year.

Australia and New Zealand are like siblings across the Tasman Sea~

Before the pandemic, Australia and New Zealand boasted one of the most well-connected air routes in the Asia-Pacific region.



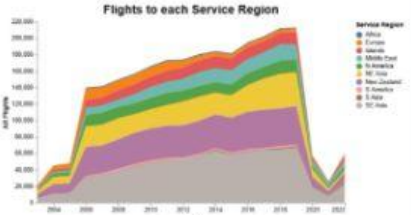
Aviation after Pandemic

Is Aviation recovering from the pandemic?

The Australian aviation sector has been gradually recovering from the COVID-19 pandemic, though it remains far from pre-pandemic levels.

In 2020, there was a **substantial decrease** in air travel, which worsened in 2021 due to ongoing travel restrictions and uncertainty. Most international flights from Australia still predominantly operate in the **Asia-Pacific region**, as well as to neighboring **New Zealand**, due to their relative proximity and the **Trans-Tasman travel bubble**.

However, the industry faces a challenging path ahead as international travel restrictions persist, hindering a full return to pre-pandemic levels.



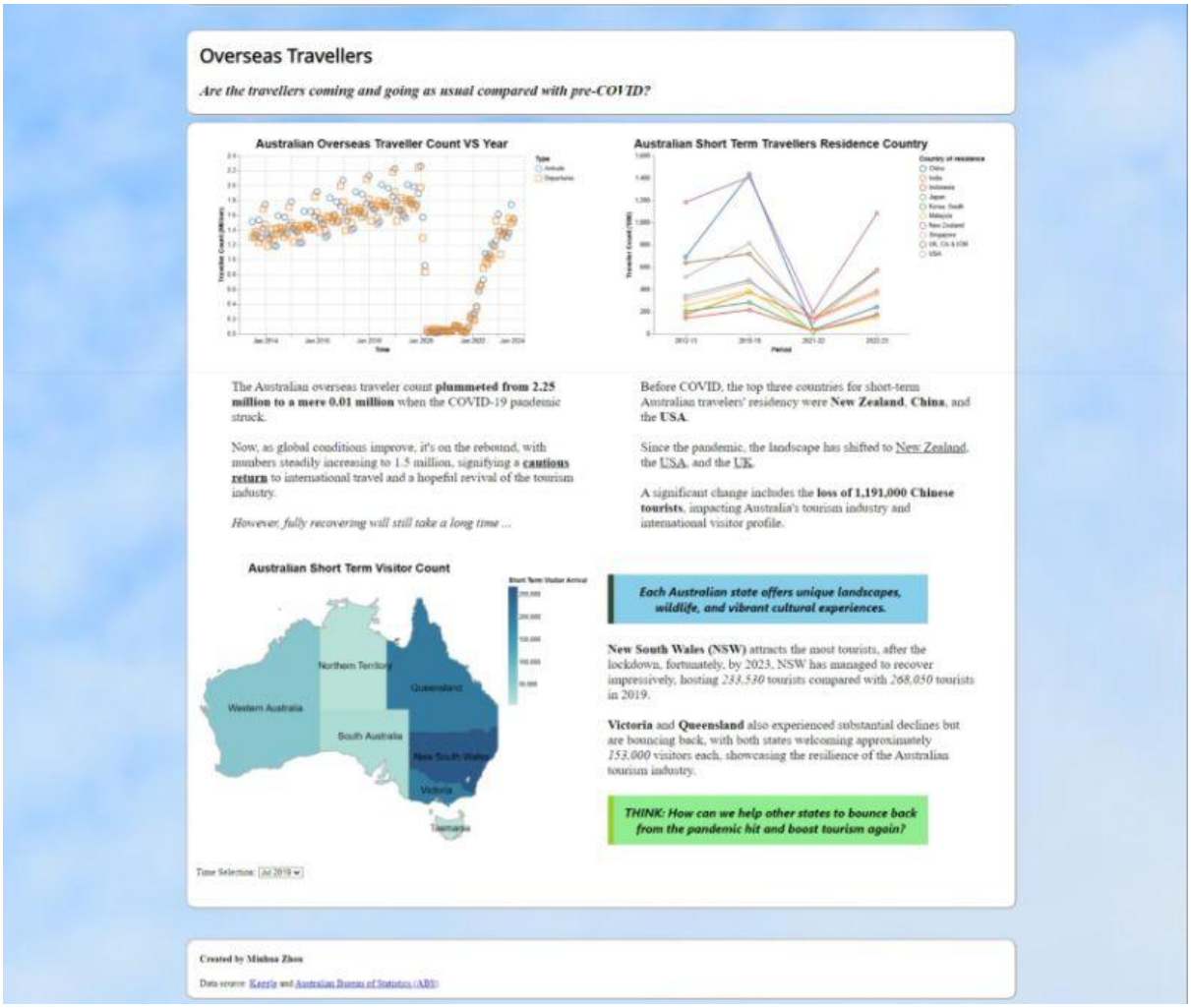
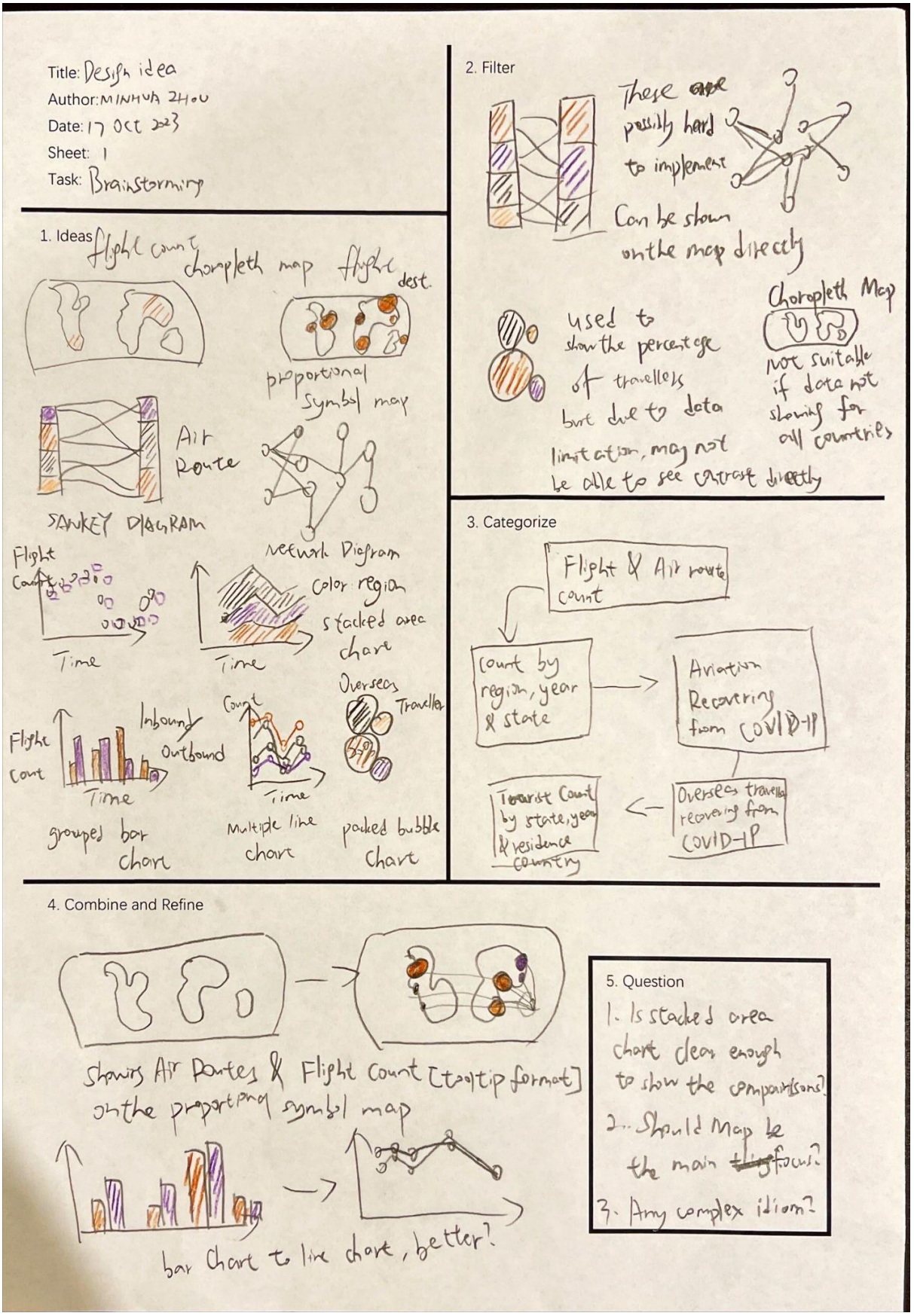


Figure 9. Overview of the visualization dashboard

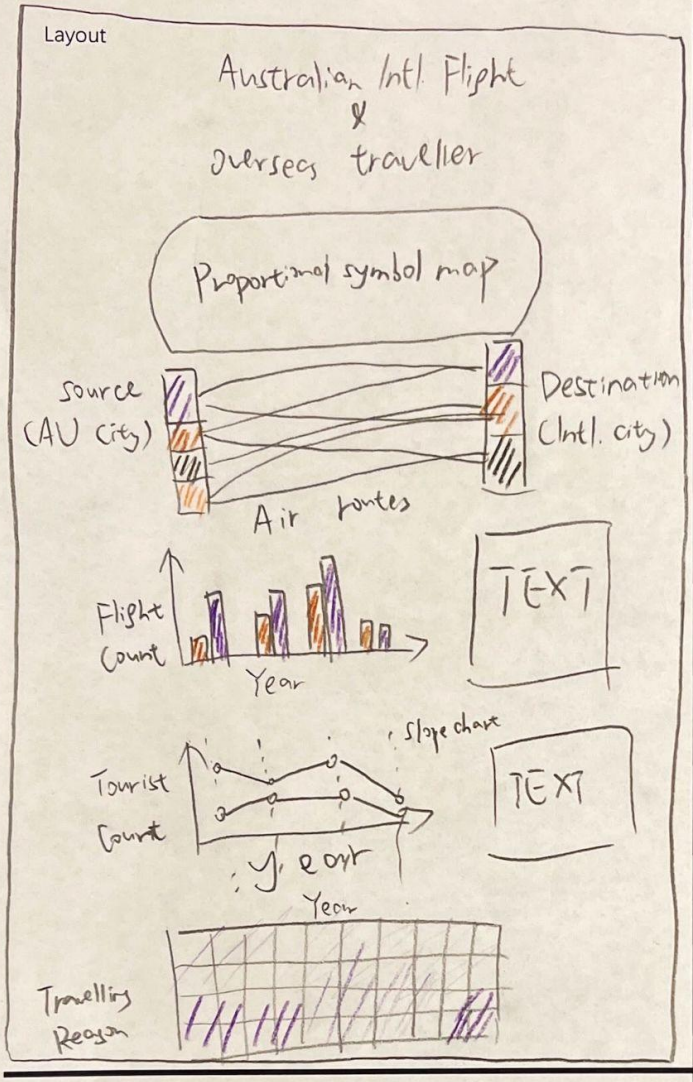
Appendices

A. See the next page for 5 design sheets.

Appendix A

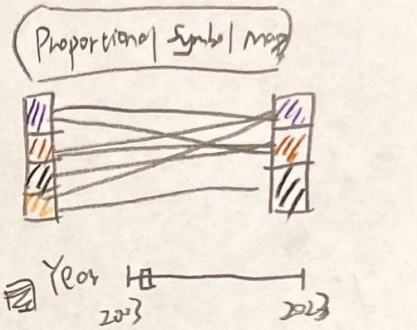

Title: Design idea
Author: MINHUA ZHOU
Date: 17 Oct 2023
Sheet: 1
Task: Brainstorming
1. Ideas
flight count
choropleth map
flight dest.
proportional symbol map
Air Route
SANKEY DIAGRAM
Network Diagram
Flight Count
Time
Color region
stacked area chart
Time
Overseas Traveller
Count
Flight Count
Inbound
Outbound
Time
Time
grouped bar chart
Multiple line chart
packed bubble chart
2. Filter
These are possibly hard to implement
Can be shown on the map directly
used to show the percentage of travellers but due to data limitation, may not be able to see contrast directly
Choropleth Map
not suitable if data not showing for all countries
3. Categorize
Flight & Air route count
count by region, year & state
Aviation Recovering from COVID-19
Tourist Count by state, year & residence country
Overseas traveller recovering from COVID-19
4. Combine and Refine
shows Air Routes & Flight Count [tooltip format] on the proportional symbol map
bar chart to line chart, better?
5. Question
1. Is stacked area chart clear enough to show the comparisons?
2. Should Map be the main ~~thing~~ focus?
3. Any complex idiom?

Layout



Title: First Draft
Author: MINHUA ZHAO
Date: 17 oct 2023
Sheet: 2
Task: Design idea combination

Operations

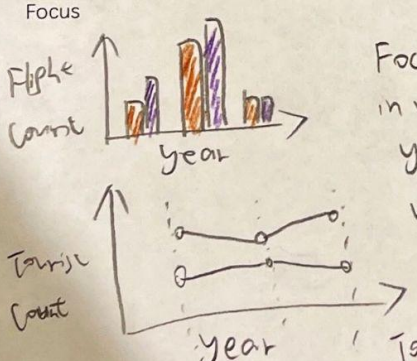


The slider is for Year selection

The charts should reflect the data based on selection

The steps for each slide should be 1.

Focus



Focus on changes in values over years (especially with the pandemic) period

Tooltip(s) should be added to show actual values and comparison (in percentage) with previous years

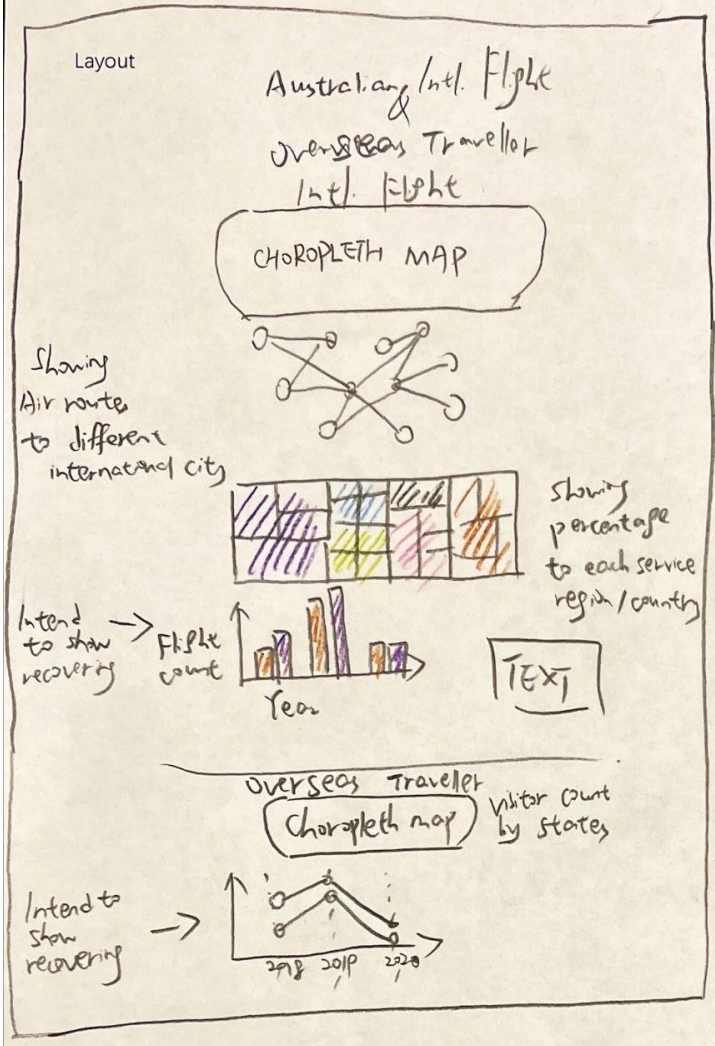
Discussion

Pros.
1. visual balance across different sections
2. sankey diagram used to show the flow

Cons
Sankey Diagram not useful to show specific air routes

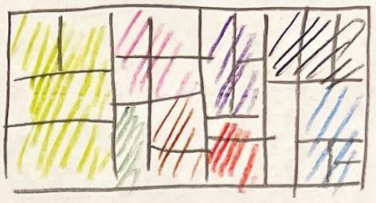
Question
Should map be the main focus?

Layout



Title: Second Draft
Author: WANHUA ZHOU
Date: 17 Oct 2023
Sheet: 3
Task: Desgh idea combination

Operations



Continent Selection [Asia ▽]

After selecting the continent from the drop-down menu, the heatmap should show the proportion of flight count to each country (change from color encoding for region to country). Smaller sections are cities.

Focus

Time series

Time series

Better storytelling. Sections are categorized based on the subtopic. Both recovering parts will have x-axis as Time/Year.

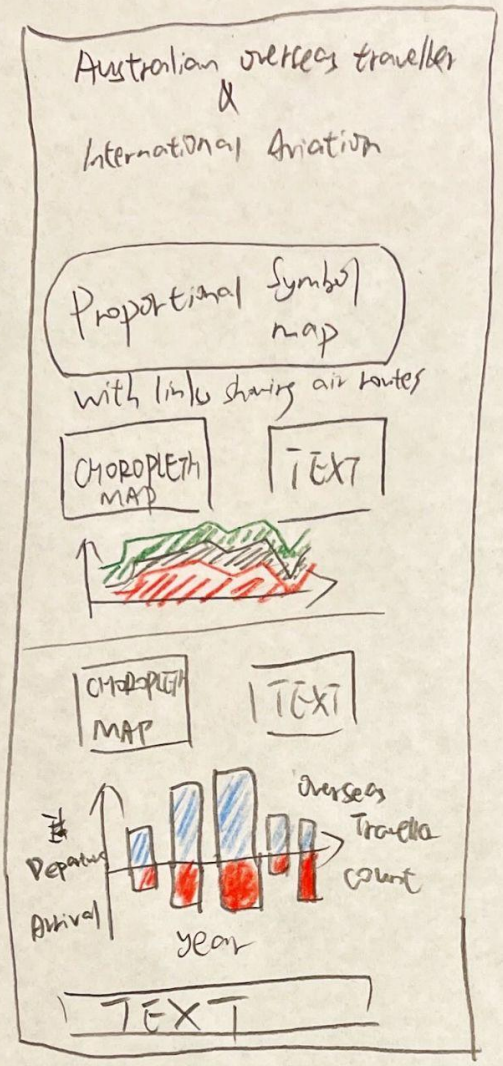
Discussion

Pros
1. Storytelling is more structured

Cons
1. The choropleth map for flight count will have huge blank areas due to missing data

Question
1. Change in heatmap may cause blindness?

Layout



Title: Third Draft
Author: Mingwei Zhou
Date: 17 Oct 2023
Sheet: 4
Task: Design idea combination

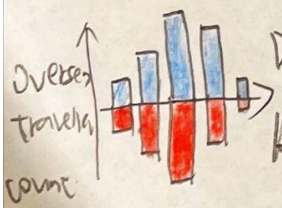
Operations

Tooltip

Whenhover over certain places on the chart, there should be a tooltip shown with information corresponding to the chart.

It should also contain comparison value if it's time series charts

Focus



Same color for all departures/arrivals

This butterfly chart demonstrates the comparison between different years of overseas traveller count

Discussion

Pros

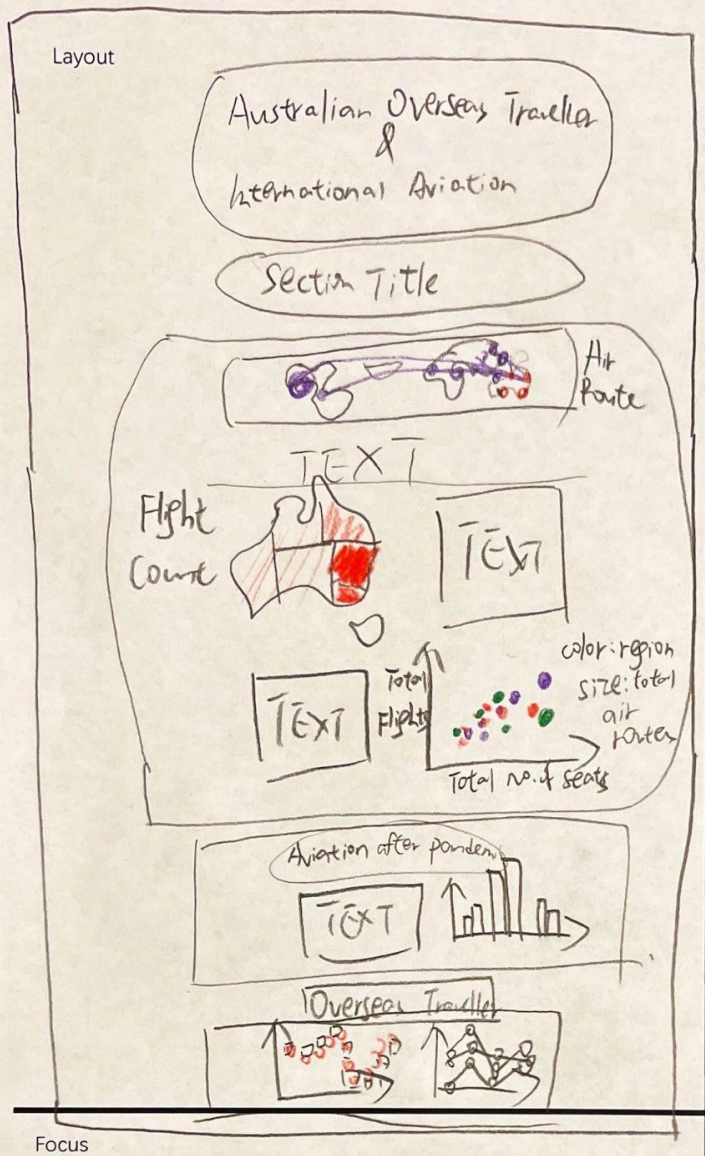
1. The proportional symbol map with links is effective in terms of storytelling.

Cons

1. The choropleth map, if places too close without connection, may confuse audience

Q: 1. Should comparison charts be ~~not~~ places type than ?

Layout



Title: Final
Author: MINHUA ZHOU
Date: 17 Oct 2023
Sheet: 5
Task: Design idea refinement

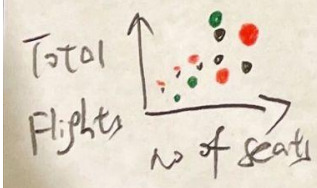
Operations

1. Year
The slider is used for year selection. The chart associated with such selection should reflect changes if the slider moves

2. Asia
The continent selection is done via this drop down menu

3. when hovering over the point or map. the tool tip should show

Focus



color: region
size: total air routes

The satter plot has 4 attributes encoded. It's intended to show ~~the~~ the trends of international flights.
New zealand should show on top right and allows the storytelling to tell the flight to NZ

Details

1. no special algorithm will be applied
2. Vega lite / Vega will be used for visualization manual modification for data cleaning
3. 1.5hr for each chart
3hrs for layout
4. no specific screen sheetsize full screen