Information Visualization
Group 4 Report
(GEOM90007_2024_SM2)

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Design summary
Background:
The target audience for this project is tourists visiting Melbourne, where tourism significantly contributes to the city's GDP, showing rapid growth and increasing revenue year by year. With more people choosing Melbourne as a travel destination, this interface is designed to meet the growing demand for comprehensive travel assistance. Addressing key aspects such as accommodation, dining, transportation, and weather, the interface provides an interactive, user-friendly experience to support visitors in planning and enjoying their trip to Melbourne.

Dashboard1:

Dashboard 1 provides visitors with a weather trend reference to help them with their travel planning by displaying last year's sunshine, temperature and rainfall data for Melbourne. The design includes calendar heat maps and month adjustment panels for a convenient interactive experience. The dashboard uses a calendar heat map to display daily solar radiation, maximum temperature and rainfall. Different shades of colors represent the intensity of weather conditions, allowing users to identify at a glance which days are suitable for travel, which is intuitive and easy to understand. The month adjustment slider on the right side allows the user to select a specific month and view the weather trends for different months at any time. The sliders dynamically update the chart data, providing users with the flexibility to view climate change throughout the year for each month of the year according to their individual needs.

Dashboard 2:

Dashboard 2 provides travelers with comprehensive travel assistance information through three modules: map navigation, itinerary details and expenditure analysis. In the map navigation module, users can filter different types of facilities (e.g., restaurants, parking lots, etc.) through a selection box, and the map will dynamically update its display according to the selection, helping users customize the map content for a personalized experience. The module also applies the DMS (degrees, minutes, and seconds) conversion and map jumping functions from extracurricular knowledge, which allows users to enter coordinates for precise positioning. dashboard mainly emphasizes the importance of interactive design in data visualization The itinerary details module provides daily itinerary suggestions. Users can select different dates to view the itinerary, quickly understand the characteristics of each attraction, and reasonably plan the travel route. The Expense Analysis module uses pie charts

to display the proportion of each type of expense, allowing users to clearly understand the budget allocation and manage travel expenses more scientifically.

Dashboard 3:

In that sense, it is clear that Dashboard 3 summarizes the food of Melbourne to the viewers from three important modules: restaurant guide, diversity of cuisine, and cuisine popularity. Under the Restaurant Guide module, one can filter restaurants based on price, rating, and type of cuisine. A list dynamically appears depending on the user's preferences. Lecture 7 indeed insists on this being a state-of-the-art design for modern visualization without any information redundancy and providing interactivity, which is easy to use. Cuisine diversity is visualized using a bubble chart in the module of Cuisine Diversity, while Cuisine Popularity used a bar chart to plot ratings and popularity for helping users to make their choices. By using the method of integrating R into Tableau taught by lab8, now clicking on any cell in the restaurant guide can jump to the location of the corresponding restaurant on the map, which provides tourists with real-time interaction and visualization of the exact location of the restaurant.

Dashboard 4:

This visualization establishes a clear visual hierarchy (From Lecutre 2) through the layout, color usage, and sizing. For instance, the bubble chart visually emphasizes regions with the highest ratings through bubble size and color intensity such as Melbourne (CBD), which stands out due to its larger bubble size, drawing the viewer's attention to this popular area. This visualization effectively uses a high data-ink ratio (From Lecutre 5) by minimizing unnecessary embellishments and focusing on data display. Textual elements are clean, only appearing when necessary, such as the tooltips in the bubble chart or tree map, which display detailed information only upon interaction. This visualization also implemented an interactive design (From Lecture 7) allowing users to explore the data deeply at their own pace. Filters allow users to customize their view by selecting specific regions, enhancing the relevance of the displayed data. By doing so, users can focus on areas of interest and intuitively explore more granular details.

Summary showcasing

Dashboard 1 mainly provides weather data references for 2023 for tourists who are planning to visit Melbourne. Tourists worried about the weather when traveling to Melbourne can adjust the calendar's filter bar to obtain Melbourne's daily sunshine, maximum temperature, and rainfall data in 2023 to determine the departure date. In addition, visitors worried about weather changes or planning for a long-term vacation can use the area map of Melbourne's monthly climate trends. After tourists select the month to visit Melbourne through the filter tool, they can learn about Melbourne's overall temperature fluctuations and rainfall changes in the past month and get a preliminary impression of Melbourne's climate.

The map tab of Dashboard 2 primarily provides basic geographical information related to facilities, transportation, and attractions for tourists already in Melbourne. Tourists will likely be attracted to the map that takes up the largest proportion of this interface at first glance, and then they will notice the filtering options on the left. We consciously design this visual hierarchy to facilitate users to query facilities quickly. Tourists who are unfamiliar with Melbourne and are searching for nearby toilets can select toilet type from the facility option, and the map will consequently display all toilet icons with their address in Melbourne. Clicking on the toilet icon will display detailed information such as accessibility for men, women, and people with disabilities. After that, they can enter their current location and destination into the starting and destination fields and click the "Get Directions" button to navigate to Google maps to obtain the best route, avoiding the requirement for additional applications. Similarly, tourists who are unfamiliar with the distribution of facilities in Melbourne can obtain the geographical information of the corresponding facility on the map by selecting the corresponding facility type, including toilets, restaurants, carparks, accommodations and so on. We combine and display data sets from different sources on this interface to improve the efficiency of obtaining useful information. Additionally, the icons of different facilities vary and contrast with the map. Tourists, even first using this interface, can therefore easily notice the icons and identify different facilities. To find the most suitable nearby parking space, tourists who drive can interact with the car park icon to learn its address, type, and number of parking spaces. It is worth mentioning that the most convenient public transport in Melbourne, tram and bus, are color-coded on the map, and tourists who want to know the distribution of tram or bus stations on different routes can simply click on the icons to view stop names and addresses, to plan their own travel route. Visitors who are unsure about where to visit can utilize the filter of the top 10 locations to get popular tourist

destinations in Melbourne as a reference. At the same time, this interactive map supports displaying multiple layers of facilities or transportation options and simultaneously displaying the top 10 locations, which is convenient for travel planning.

The trip details tab of Dashboard 2 provides seven itineraries for tourists who have yet to plan their trips or are interested in Melbourne. Each itinerary includes a theme as well as multiple corresponding attractions and brief descriptions. Tourists can click on the name of the attraction they are curious about and head directly to the official website of the corresponding attraction for further information and to make reservations. Apart from understanding the itinerary, tourists are supposed to prepare travel expenses. By selecting the expenditure tab of this page, tourists can observe a pie chart of the annual expenditure distribution of tourists in Melbourne. This pie chart clearly shows the proportion of tourists' expenditure in different areas, and tourists can drag the mouse to the pie chart to view the specific amounts of different types of expenditures so as to have a reference plan for their travel expenses.

Dashboard 3 provides information about the top 100 high-quality restaurants for tourists who want to dine in Melbourne. Visitors can use the Melbourne Cuisine Diversity Bubble map to understand the proportion of different cuisines among these top restaurants. Moreover, tourists can browse the Cuisine Popularity and Ratings bar chart to view the specific number of different ratings for different cuisines. The Melbourne Restaurant Guide table allows visitors to sort restaurants based on the name, type of food, rating score, or price range. The information about restaurants can also be shown with details such as their addresses and ranking, which is convenient for tourists to order restaurants in line with their preferences.

Dashboard 4 provides tourists who plan to stay in Melbourne with high-rated apartment data on Airbnb. Tourists can understand the distribution of apartments in different areas of Melbourne by observing the treemap of the number of Airbnb in the region. We take advantage of the higher data-ink ratio brought by the treemap structure. The treemap fully uses the limited space without additional text and coordinate axes and only displays the number of hotels in multiple areas through block color and size. Furthermore, tourists who want to find hotels with affordable prices nearby can use the filter function in this dashboard. We associate the filter with all the charts in this dashboard, and all charts will be updated simultaneously and in real-time based on the filter conditions to create a personalized experience for tourists.

Contribution

Name	Contribution to project	Percentage contribution
Hanyue Zhu	This contributor developed the R code and functional implementation for Dashboards 1, 2, and 3, enabling key features across weather, travel, and cuisine modules.	25%
Yang Chen	Developed design summaries for Dashboards 1, 2, and 3 by analyzing R code, detailing functionality and user experience.	25%
Tao Peng	Developed Dashboard 4 and completed its design summary. Completed the Dashboard 4 part in the Readme file.	25%
Yifei Jiang	Embed the Shiny app interactively in Tableau. Complete the Readme file. Complete the summary showcasing part of the report.	25%

Lecture Reference

[1] D. Shojaei, Lecture 2 - SENSING–PERCEPTION & STATICTICS, University of Melbourne, 2024.

[2] D. Shojaei, Lecture 5 - SPATIAL DATA PRINCIPLES, University of Melbourne, 2024.

[3] D. Shojaei, Lecture 7 - GEOVISUALISATION 1, University of Melbourne, 2024.

Code and Function References:

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