Information Visualization (GEOM90007_2023_SM2)
Assignment 3: Report

Gruop: 37
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This Shiny app caters to both prospective tourists planning to visit Melbourne and those who are already exploring the city. Melbourne stands out as one of Australia's premier tourist destinations, celebrated for its multiculturalism, culinary delights, captivating attractions, and promising business prospects. Nevertheless, tourists often grapple with the challenge of selecting the suitable restaurants, attractions, bars, hotels, and shared office spaces, especially if it's their inaugural visit to Melbourne.

The primary objective of this application is to offer visitors an intuitive and interactive tool for a comprehensive Melbourne experience and enhanced trip planning. It allows visitors to effortlessly locate and access essential attractions and landmarks, providing detailed information such as names, operating hours, and addresses. Whether tourists are eager to explore gastronomic delights or unwind at bars during the evening, they can readily discover nearby restaurants and bars, complete with operating hours and exact locations to satisfy their culinary and social cravings. Moreover, travelers can promptly find nearby hotels, complete with vital location information, facilitating their choice of accommodation. For those needing temporary workspaces, the app offers a convenient search function for shared office spaces, simplifying the quest for nearby workplaces.

Additionally, the app features accident data analysis in Melbourne, presented in a pie chart format, allowing tourists to identify areas with fewer traffic congestion issues. Often, traffic jams result from accidents in specific road sections. Moreover, the app includes a population density analysis chart for the Melbourne area, providing visitors with an insightful overview of the city's busiest areas. This data can be invaluable when selecting a place to stay since areas with higher population densities are more prone to congestion.

Through these versatile features, this Shiny app is strategically designed to enhance the Melbourne experience for visitors, making it more enjoyable, convenient, and productive. Whether tourists intend to explore iconic attractions, savor delectable cuisines, or efficiently accomplish their work, this app equips them with crucial information about Melbourne, empowering them to maximize their time and resources.

What aspects of the design we want to get credit for

In developing the R language project for Melbourne commuters, we have carefully integrated principles from lectures on perception, perception and visual variables. Here's a comprehensive breakdown:

Clear interface layout: Visual hierarchy: Drawing on the principle of visual hierarchy, the highlighting of page names at the top establishes a clear knowledge hierarchy. This ensures that the user can discern the level of importance in the interface, which facilitates efficient navigation.

Interactive map Features: Human vision and color sensitivity: Our choice of dark green for tram routes is based on our understanding of human vision. Given that the human retina is made up of rods and cones, with cones sensitive to colors such as green, this choice ensures that tram routes are easily distinguishable.

Intuitive location ICONS: Semiotics and Symbolism: Our ICONS are based on Peirce's semiotic ternary model. For example, the light blue precise dot of a tourist attraction serves as an iconic representation, utilizing the pre-attention processing of the human visual system. Similarly, an orange

knife and fork icon in a restaurant, or a red glass in a bar, are symbolic representations in which the relationship between signifier and signified is defined according to culture and context.

Interactive side panels: Human information processing: The design of the foldable side panels is rooted in an understanding of how humans process information. By organizing information in layers and ensuring clear distinctions between different elements, we cater to the capacity limitations of the human visual system, ensuring efficient encoding and retrieval of information.

Adjustable background brightness:

Sensitivity: The background brightness slider is a recognition of the sensitivity of the human eye. By allowing adjustment from black to white, we cater to the different sensitivities of rods (responsible for low-light vision) and cones (responsible for daylight vision). This ensures optimal visual comfort in different ambient lighting conditions.

Real-time weather widget: Visual attention and pre-attention processing: The strategic positioning of the lower-right weather widget ensures that it effectively captures visual attention. This design choice takes advantage of the principle of pre-attention processing, ensuring that users can quickly gather important information without creating cognitive overload.

God's Eye Melbourne map: Visual acuity and navigation efficiency: The design of the mini map takes into account the role of the fovea in the human retina. By allowing users to drag and view different parts, we ensure that the interface is aligned with areas of the retina that provide the highest clarity. The quick back button further improves navigation efficiency.

Embedded Tableau view: Data graphs and visual variables: Pie charts and density charts are rooted in the principles of data graphs. By providing insights into traffic accidents and high-traffic areas, we ensure that complex data is communicated clearly, precisely and efficiently. Visual variables are chosen based on how effectively they convey a particular type of data.

In summary, our project is a synthesis of a deep understanding and application of human-centered design principles, visual hierarchies, and effective data visualization. Every design choice is backed by science to ensure the best user experience. We believe that these complex design aspects, combined with the basics in the lectures, make our project worth considering.

What you can find in "Tourist Melbourne" ?

"Tourist Melbourne" a travel guide for leisure travelers and digital nomads coming to Melbourne. It provides travelers with a comprehensive wealth of information to assist them in planning their trip more effectively in a number of ways.

Density Visualization: Visitors can discern Melbourne's bustling hubs through the congregation of varied icons on the map. This visualization aids them in acquiring a more profound comprehension of the city's layout, facilitating the discovery of optimal locations for recreation. For digital nomads or those visiting friends, "Tourist Melbourne" illuminates areas replete with bars, hotels, or eateries, enabling them to strategize their activities with greater convenience.

Diversity of Facilities: Icons coded in various hues on the map make the multifaceted amenities of the city immediately discernible. From bars and restaurants to iconic buildings and co-working spaces, everything is clearly delineated. It caters to the gamut of visitors' needs, from leisure and entertainment to remote working.

Integrated Search & Filtering Mechanism: The interface is replete with a series of buttons, each accompanied by its corresponding dropdown selectors. With a mere click, the map displays all facilities within the chosen category. And for those desiring details on a specific venue, the dropdown menu proffers a comprehensive list of choices. For tourists in Melbourne, this tool effortlessly directs them to popular sights, landmarks, or lodgings. For digital nomads, it aids in swiftly locating the ideal co-working spaces.

Detail Information: Upon selecting a marker on the map, the interface's right-hand panel unfurls detailed insights about the locale, such as operating hours. Such information can help travelers plan their trips smartly and avoid dealing with an out-of-business store. Moreover, when a marker is clicked, a pop-up reveals the location's address and a navigation button. This button links directly to Google Maps, so tourists can get detailed directions or street views, while digital nomads can explore the environs of workspaces.

Live Weather: The climate information in the lower right corner of the interface is an important reference for visitors to plan their day, especially when choosing clothing or deciding between indoor and outdoor activities.

"Tourist Melbourne" is not just a map, it's a comprehensive visiting guide, meticulously crafted for travelers. It adeptly assists both transient guests and protracted residents in seamlessly and efficiently immersing themselves in the Melbourne experience. From visiting cultural landmarks in the morning, to dining at a local restaurant at noon, to working for a few hours at a nearby co-working space, and ending a rich day with a sip at a vibrant wine bar by the hotel. Melbourne's kaleidoscopic life experiences are lucidly delineated within this interface. We aspire that every traveler who ventures to Melbourne embarks on a nice journey.

Patterns and Discovery

Bars and Pubs Data: Data about bars and pubs in Melbourne is read from the "bars-and-pubs-with-patron-capacity.csv" file. This dataset is subsequently filtered based on the availability of the business address, latitude, longitude, a specific census year range (2012 to 2023), and the presence of the word "bar" in the trading name.

Landmarks Data: Data about Melbourne's landmarks is read from the "melbourne_city_landmarks(new).csv" file. The presence of this dataset suggests that the application might be presenting prominent places in Melbourne, which is crucial for tourists.

Hotel, Dwelling, & Coworking Data: This suggests that the application provides insights into hotels, residential dwellings, and coworking spaces in Melbourne.

Weather Extractor: The application integrates live weather data from the OpenWeatherMap API. This feature can be invaluable for tourists as it provides real-time weather information for Melbourne, allowing them to plan their activities accordingly.

SHINY SERVER:

Icons: Various icons are defined for different types of locations: bars, dwellings, coworking spaces, landmarks, and hotels. This indicates that these places are visually represented on a map interface, making it easier for tourists to identify and navigate to them.

Melbourne Coordinates: These are used to center the map on Melbourne, ensuring that the focus remains on the city.

Analysis: For tourists visiting Melbourne, the Shiny application developed in this R script offers a treasure trove of valuable insights. Using the interface, tourists can easily locate bars and pubs that are operational, based on recent census data, thereby ensuring that they visit places that are currently active. Furthermore, with the integration of Melbourne's landmarks, visitors can effortlessly identify and navigate to the city's prominent attractions. This is further enhanced by the visualization of hotels, residential dwellings, and coworking spaces, catering to a range of tourists, from those on leisure trips to business travelers.

The addition of real-time weather data is a thoughtful touch. Tourists can check current weather conditions in Melbourne, allowing them to make informed decisions about their day's plans, be it a sunny day at the Royal Botanic Gardens or visiting indoor attractions during unexpected rain.

The tool's map interface, adorned with distinct icons for different places, ensures ease of use. Tourists can, at a glance, determine the kind of establishments or attractions around them, making their exploration of Melbourne more efficient and enjoyable.

The tools and libraries used in the R script, especially Shiny, Leaflet, and dplyr, play pivotal roles in shaping this experience. Shiny enables the creation of interactive web applications, allowing tourists to interact and get personalized insights. Leaflet brings in the capability to visualize spatial data, making the map interface intuitive. Lastly, dplyr assists in filtering and processing the data to ensure that only relevant and current information is presented to the user.

In conclusion, this Shiny application is a comprehensive guide for tourists in Melbourne, amalgamating essential information, from landmarks to accommodations, all augmented with real-time weather data. The tools and methods employed in the R script ensure that this data is presented in an engaging and user-friendly manner, making tourists' experience in Melbourne memorable.

Reference:

- Card, S. K., & Mackinlay, J. (1997, October). The structure of the information visualization design space. In Proceedings of VIZ'97: Visualization Conference, Information Visualization Symposium and Parallel Rendering Symposium (pp. 92-99). IEEE.
- Ware, C. (2019). Information visualization: perception for design. Morgan Kaufmann.

Group member contribution table:

Name	Contribution to project (max 50 words)	Percentage contribution
Hongyu Su	I am responsible for coding the restaurant and bar part of the map interface, and helping to develop the location information section and fix some bugs. In addition, I also made a tableau pie chart about Traffic accident areas.	25%
YiFei ZHANG	Responsible for real-time weather feature display, landmark feature display, information panel display for every location in code. Contribute to data pattern and discovery in documentation. Contribute to bug fixing.	25%
Fan Pu	Responsible for hotel, dwelling, coworking and tram route feature display of map interface, together with the design of pedestrian network density map in tableau. Fixed the bug of tableau title and content display.	25%
Ruotong Zhao	Designed and Constructed all pages' layouts, dynamic themes, basic map functionalities, interactive hover windows（movable and contractile）, dropdown selector filters, navigated to specific Google Maps via buttons, embedded Tableau in R Shiny, addressed bugs, and authored some parts of the user guide, video.	25%