

Data Visualisation Project

Digital Nomad Destination Visualisation



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1. Introduction

A destination for living as a digital nomad is one of the most important life factors. There are multiple features that comprise a personal living environment, and the criteria of these factors vary from person to person. This thought stemmed from various living experiences in many countries, which led to the selection of digital nomad destinations as the topic for the Data Exploration Project (DEP).

The DEP allowed the extraction of meaningful insights into digital nomad destinations by analysing data that represents those life conditions, such as internet speed, cost of living, temperature, etc. As highlighted by Munzner (2015), the primary purpose of visualisation is to provide insight, especially to non-expert audiences who may not be able to interpret raw data directly. Therefore, a subsequent data visualisation project was required to communicate these insights effectively to the intended audience.

In the Data Visualisation Project (DVP), an interactive narrative application was developed to deliver these insights on global digital nomad destinations. This project specifically targets early-stage digital nomads who have just begun a digital nomad life and are seeking their first destination, but have more challenges than experienced digital nomads. The application provides interactive operations that help users to explore, filter, and compare their potential destinations based on their personal preferences and criteria.

2. Design Process

The Five Design-Sheet (FdS) methodology (Roberts et al., 2017) is used for the design process. The Five Design-Sheet methodology is an interactive design framework to help users systematically develop, compare, and realise alternative solutions for visualisation and interface challenges. The design process based on the FdS methodology, including brainstorming, applying critical comparison, and transparent realisation, can be expected to create a design satisfying the project objective.

Initially, the design process was grounded in a clear understanding of the target audience and the nature of the data. In this project, the target audience consists of early-stage digital nomads who may have limited experience with data-driven decision-making and are likely to prefer intuitive, visually engaging tools over complex analytics. This required the design to highlight clarity, accessibility, and interactivity.

Additionally, the data analysis insights in the DEP cover multidimensional features like internet speed, cost of living, climate variables, and short-term accommodation ratings across a wide range of countries. These numerous, continuous, and categorical variables presented

a challenge: how to integrate, compare, and communicate diverse information in a way that supports users' practical decision making.

Thus, the FdS methodology was selected to guide a user-centred, data-driven design process that considers the unique needs of the primary audience and the complex characteristics of the data. Each stage (sheet) of the process was constructed by these initial considerations.

Sheet 1: Brainstorm

Sheet 1 contains brainstorming of 18 visualisation ideas, with a strong focus on the needs of early-stage digital nomads as the target audience. This stage considers why early-stage digital nomads want to use this application, what data should be shown and how to successfully deliver the insights to the users. Visualisation ideas ranged from bubble plots and grouped bar chart to choropleth and radar charts, and also included visual variables such as colour saturation.

There were three filtering steps performed to get the initial designs for Sheets 2,3, and 4. First, duplicated ideas were eliminated, considering the data variable types, since the design should effectively provide the visual insights of all variables. The data used in this project consists of categorical variables (Living Condition Cluster and Living Cost Cluster), numerical variables (Living Condition Index, Living Cost Index, Average Hotel Rates, Internet Speed, Average Surface Temperature, Average Precipitation), and spatial data (geometry data of each country). Second, ideas were categorised based on the three types of story: Summary of Total Countries, Grouped-Level (Cluster) Comparison, and Individual Country Exploration. Lastly, make three initial designs by combining and refining visual ideas. These three designs are evaluated with reflection questions:

- How can the visualisation help users compare multiple features across countries?,
- What type of user interactions could be more useful or engaging?
- What kinds of information are essential to highlight in narrative visualisation, and how might different visual styles support that?

Sheet 2: Exploring Regional Living Conditions via Choropleth and Cluster Comparison

Sheet 2 design is a combination of a choropleth map and a grouped bar chart. This design aims to help early-stage nomads explore and compare regions and clusters based on the living condition index (LCI_Cond) in regions, using an interactive map and grouped bar chart. In detail, the grouped bar chart is helpful to show each cluster's composition of three features: Living Condition Index, Internet Speed, and Hotel Rates.

The layout consists of a choropleth map on the left, occupying 65% of the width and a grouped bar chart on the right, with 35% width. The design intentionally arranges the choropleth map

(left side) and instructions for map usage for the destination overview on the top left, considering the viewing path. This layout is expected to provide users with an overview of the region and country-level living conditions in the choropleth map first, then delve into a detailed comparison of living condition clusters and their features within the selected region in the grouped bar chart. The main title is on the top middle, and the subtitle for the grouped bar chart is located above the chart, applying weight to bold with visual hierarchy by adjusting the font size.

The choropleth map expresses the Living Condition Index (LCI_Cond) score using colour saturation, which shows the degree of LCI_Cond score and countries without data plans using white as a represented colour. The map also offers the spatial data of each country. The y-axis range of the grouped bar chart is located between 0 and 1 because LCI_Cond, Internet Speed, and Hotel Rating are normalised to visualise in the grouped bar chart for comparison.

Operation #	Function of Operation	Applied Visualisation Area
Operation 1	Tooltip with hover function on the map	Choropleth Map
Operation 2	Region Selection	Choropleth Map
Operation 3	Feature Selection on the bar	Grouped Bar Chart

Table 1: List of Operations in Sheet 2 Design

Table 1 shows that there are three operations used in this design. Operation 1 offers detailed information on each country on the map, including country name, Living Condition Index score, and Cluster type. It allows users to get the specific data while they are exploring destinations. Operation 2 asks users to click a region on the map where users want to extract and get the detailed clusters comparison in the grouped bar chart on the right side. Operation 3 allows users to click a bar to investigate the actual value of each feature in each cluster. If users click a bar, the selected bar will be highlighted by decreasing the opacity of other bars, and the exact value number will appear on top of the bar.

This design empowers users to intuitively explore regional patterns and compare living condition clusters using a clear map-and-chart layout, supported by interactive operations. However, the difference between country-level values on the map and cluster averages in the grouped bar chart may cause confusion. Additionally, as more clusters exist depending on the region, the grouped bar chart can become crowded, and important details may be missed unless users interact directly with the visualisation.

Sheet 3: Feature-Based Country Ranking within Clusters with Cluster Comparison

This design lets users explore details of digital nomad clusters that are sorted by Living Condition Index (LCI_Cond) score and compare top-performing countries located in the selected cluster by a selected feature, using an interactive heatmap and a lollipop chart.

The main title is arranged on the top-centre of the design. This design layout two visualisations on top-left (Heatmap) and bottom-right (Lollipop chart), which naturally guides the users' attention from the cluster overview in the heatmap to a detailed country comparison, considering living environment features in the lollipop chart. To maintain the balance of the entire layout, both the heatmap and the chart have descriptions following their position. Additionally, the feature filter for the lollipop chart is placed above the chart, and an input filter to select a specific number for Top N is assigned on the left. This layout expects users to apply the feature filter first, then input the number that users want to see on the chart.

Operation #	Function of Operation	Applied Visualisation Area
Operation 1	Cluster selection on Heatmap	Heatmap
Operation 2	Feature Selection Filter	Lollipop Chart
Operation 3	Top N Filter Input	Lollipop Chart
Operation 4	Country Selection on Bar	Lollipop Chart

Table 2: List of Operations in Sheet 3 Design

Table 2 mentions that this design plans four operations. Operation 1 allows users can click a cluster name on the row of the heatmap. The highlighting function that drops down the opacity of the unselected clusters' heatmap area helps users to focus on the selected area. At the same time, this operation affects the lollipop chart below as a cluster filter. Operation 2 gives the dropdown menu to choose Living Cost Index (LCI_Cost), Internet Speed, or Hotel Rating. The x-axis of the chart and the symbol of the lollipop will be updated depending on the selected living feature. A user can input N to see the top-N countries by the selected feature within the chosen cluster using Operation 3. Operation 4 gives a descriptive summary of the selected country. A user can select a country in the chart by clicking the country represented bar. This interaction will show the insight of the selected country in the left area of the chart.

This design emphasises detailed feature-based country comparison within clusters using interaction operations. However, the placement of the descriptive summary in the chart presents a potential usability issue. Specifically, after a user clicks a country bar in the right-side chart, they must shift their attention leftward to read the textual summary. This reversal of the natural left-to-right viewing path may disrupt cognitive flow and cause mild disorientation.

Sheet 4: Comparing Country Profiles Across Multiple Features

This design supports an in-depth comparative analysis of digital nomad destinations using three coordinated visual components: a bubble plot, radar chart, and interactive data table. The bubble plot visualises the relationship between the Living Cost Index (LCI_Cost) and user-

selected features such as Internet Speed or Hotel Rate, facilitating high-level country comparisons. Users can further explore detailed country profiles on a radar chart, providing insights across five normalised key metrics (LCI_Cost, Internet Speed, Hotel Rate, Temperature, and Precipitation). Colour synchronisation between selected bubbles and radar chart profiles reinforces visual coherence and aids user interpretation.

An interactive data table complements the visual exploration by presenting numeric details for up to three candidate destinations simultaneously. Alongside this table, a descriptive summary box provides analytical interpretations of the selected countries, contextualising numeric data clearly.

The main title is positioned centrally at the top, clearly identifying the purpose of the visualisation. The layout follows a logical viewing path, aligning the bubble plot (left) and radar chart (right) to naturally guide users through an author-driven narrative flow, consistent with the martini glass flow structure from broad country comparisons to detailed individual profiles. Below, the interactive data table occupies 60% of the horizontal space on the left, emphasising numeric clarity. In comparison, the description summary occupies the remaining 40% on the right, facilitating intuitive understanding by providing interpretative context after numeric exploration.

Operation #	Function of Operation	Applied Visualisation Area
Operation 1	Feature Selection via Dropdown	Bubble Plot
Operation 2	Country Selection via Bubble Interaction	Bubble Polo & Radar Chart
Operation 3	Feature Filtering in the Interactive Table	Interactive Table

Table 3: List of Operations in Sheet 4 Design

According to Table 3, this design contains three operations. Operation 1 provides users to select primary living conditions (e.g. Internet Speed, Hotel Rate) from a dropdown menu. This operation clearly illustrates the relationship between the Living Cost Index (LCI_Cost) and the selected feature, enabling visual comparison across countries. When user clicks on a bubble representing a country, Operation 2 updates the radar chart automatically to show the detailed profile with normalised values of five key metrics (LCI_Cost, Internet Speed, Hotel Rate, Temperature, and Precipitation). Operation 3 consists of checkboxes above the table, and it aids users in selecting features to display on the table. The default set-up displays all five features in the table.

This design applies step-by-step user exploration, balancing visual overview (bubble plot and radar chart) with precise numeric details (interactive table). Despite potential complexity, careful visual hierarchy and clear interactive elements (click, hover, dynamic updating) guide users intuitively through the comparative analysis. Potential implementation challenges

include feature inconsistency between radar and table views, depending on user selections and shifting table widths based on checkbox filters.

Sheet 5: Realisation

This design enables complete comparison of digital nomad destinations by integrating four interactive visualisation components: a choropleth map, bubble plot, radar chart, and interactive comparison table. It follows a hybrid narrative genre that combines reader-driven interaction with author-driven framing. While users maintain control through region filters, feature selection, and country comparison inputs, the layout and progression are intentionally structured, supporting a martini-glass flow from global overview to targeted decision-making. This dual approach balances open-ended exploration with visual guidance, enabling users to interpret living condition data, evaluate differences across key features, and make informed, personalised decisions efficiently.

The overall layout follows a left-to-right and top-to-bottom viewing path. The interface begins with region filters and feature selection controls placed along the top row. The main visual analysis section is composed of three parts:

- **Global Overview of Digital Nomad Conditions**

The choropleth map (top-left) shows country-level LCI_Cond values and supports region-based filtering. It gives an overview of worldwide living conditions to users.

- **Cost vs Selected Feature per Region and Feature Profile of Selected Country**

The bubble plot (centre-left) visualises the relationship between LCI_Cost and a selected feature. The radar chart (centre-right) presents detailed feature profiles of a selected country.

- **Final Candidate Comparison**

The interactive table (bottom-left) and a summary box (bottom-right) allow users to compare up to three countries in terms of actual feature values, with descriptive insights.

Operation #	Function of Operation	Applied Visualisation Area
Operation 1	Region Selection & Tooltip	Choropleth Map & Description 1
Operation 2	Feature Selection (Dropdown)	Bubble Plot
Operation 3	Country Selection (Bubble Click)	Bubble Plot & Radar Chart
Operation 4	Feature Filtering (Checkboxes)	Interactive Table & Description 3
Operation 5	Country Comparison Input	

Table 4: List of Operations in Sheet 5 Design

The five key operations in the final design (summarised in Table 4) reflect an intentional alignment with visual hierarchy, interaction design, and layout theory. Operation 1 applies choropleth filtering with tooltips to support regional scanning, establishing a broad overview

aligned with the martini-glass narrative structure. Operation 2 improves visual flexibility through feature selection, implementing X-axis reconfiguration in the bubble plot. Operation 3 bridges exploratory and explanatory layers by updating the radar chart via bubble click, reinforcing perceptual coupling. Operation 4 helps users manage information overload by letting them choose which feature columns to display in the table. This makes it easier to focus only on the information they care about. Operation 5 was inspired by the “Top N selection” originally proposed in Sheet 3. However, given the data’s scale (92 countries), the design evolved to accommodate search-based filtering, improving efficiency and precision. This change demonstrates constant refinement as encouraged by the FdS methodology, adjusting interaction mechanisms to data characteristics and user decision behaviour.

3. Implementation

Based on the design process guided by the FdS methodology, the final implementation focused on delivering a clear and interactive user experience using R Shiny. JavaScript was also integrated to support custom behaviours such as smooth scrolling and dynamic navigation. The following section outlines the technical and interface components of the application.

3.1 Technical Implementation

This visualisation is constructed by R Shiny, which supports reactive server-client communication, ideal for interactive dashboards. The UI is built using Shiny’s fluidPage layout, and all sections follow a grid-based layout, with custom CSS for consistent styling and JavaScript for advanced navigation controls. Server logic is fully reactive, enabling real-time updates across all components.

Key tools and libraries include:

- **shiny, dplyr, readr, sf** for data management and spatial features
- **leaflet** for interactive choropleth mapping
- **plotly** for an animated, scalable bubble plot
- **fmsb** for radar chart visualisation
- **DT** for interactive, filterable data table
- **stringr, RcolorBrewer, shinyjs** for utility and style support

To ensure visual and design consistency, the application applies structured HTML and custom CSS for interface styling, drawing design patterns (Datawrapper Academy, 2023). This approach helps maintain a consistent visual consistency across key UI components such as buttons, navigation elements, and informational blocks. The typography and layout choices

follow the principles that were learned in FIT5147 (Jenny, 2024), including the use of hierarchical heading styles (h2, h3, h4) and proper font sizing to guide user attention and improve readability. These design elements improve the dashboard's professional appearance and user experience.

All primary datasets are preprocessed in R, ensuring clean, normalised, and joined data structures before app deployment. This includes:

- Spatial data wrangling for world country geometries
- Normalisation and calculation of composite indices (e.g., Living Condition Index, Hotel Rate, Internet Speed)
- Integration of metadata (region, cluster) for multi-level filtering and comparison

Interactive data objects are stored within the app session to support high performance even as users change filters and selections.

Interactive Features:

- **Choropleth Map:** Implemented using *leaflet*, visualises the Living Condition Index (LCI_Cond) for each country with colour palettes and interactive tooltips.
- **Bubble Plot & Radar Chart:** *plotly* and *fmsb* were used to display relationships between features and detailed country profiles. These are linked, so a click on the bubble updates the radar chart accordingly.
- **Data Table & Summary Box:** Built with *DT* for feature filtering, searching, and highlighting. Narrative summary logic uses templating functions, updating text as user selections (countries) change.
- **Navigation & Smooth Scrolling:** The sidebar toggle and smooth scrolling features were implemented by integrating a custom JavaScript file (*scroll.js*) into Shiny's *www*/ directory. The scroll behaviour was achieved using *Shiny.addCustomMessageHandler* (Sontrop & Schuijtvlot, 2017). The logic for sidebar animation and scrolling actions is adapted from practical examples on StackOverflow (2023) and a JavaScript tutorial video that demonstrated similar dynamic navigation patterns (Codú Community, 2022).

The main challenge was implementing dynamic reactive functions, specifically synchronising region filter operations (*select_all_region*, *clear_all_region*, *reset_region*) shared between the choropleth map and bubble plot. Managing this shared state required careful Shiny reactive design to make sure that all visualisations update consistently. In the bubble plot, *subplot()* and *plotly* were used to show two legends on the right and bottom with the interactive bubble plot (Sievert, 2020).

3.2 Interactive Narrative Visualisation Implementation

The implementation of the interactive narrative visualisation is grounded in user-centred design and visualisation principles, focused on helping early-stage digital nomads explore and compare short-term living conditions across countries. This section details how the application's layout, interactively, and narrative structure are planned to guide users from initial exploration to confident, data-driven decisions.

Overall Structure and Layout

The application is composed of three major visualisation sections:

- 1) Global Living Conditions Overview with Choropleth Map and Region Narrative
- 2) Cost vs Living Feature and Country Profile Comparison with Bubble Plot and Radar Chart
- 3) The Interactive Comparison Table and Narrative Summary depend on the country selection

The Navigation is supported throughout by the side navigator, assisting non-linear exploration. While the default structure of the dashboard encourages a top-down, author-driven progression from global overview to detailed comparison, the navigator allows users to jump directly between any of the main sections (e.g., from Part 2 back to Part 1, or from Part 1 straight to Part 3). This supports a reader-driven approach, enabling users to explore the content in any order that best fits their individual questions of workflow.

Global Living Conditions Overview (Choropleth Map & Narrative Panel)

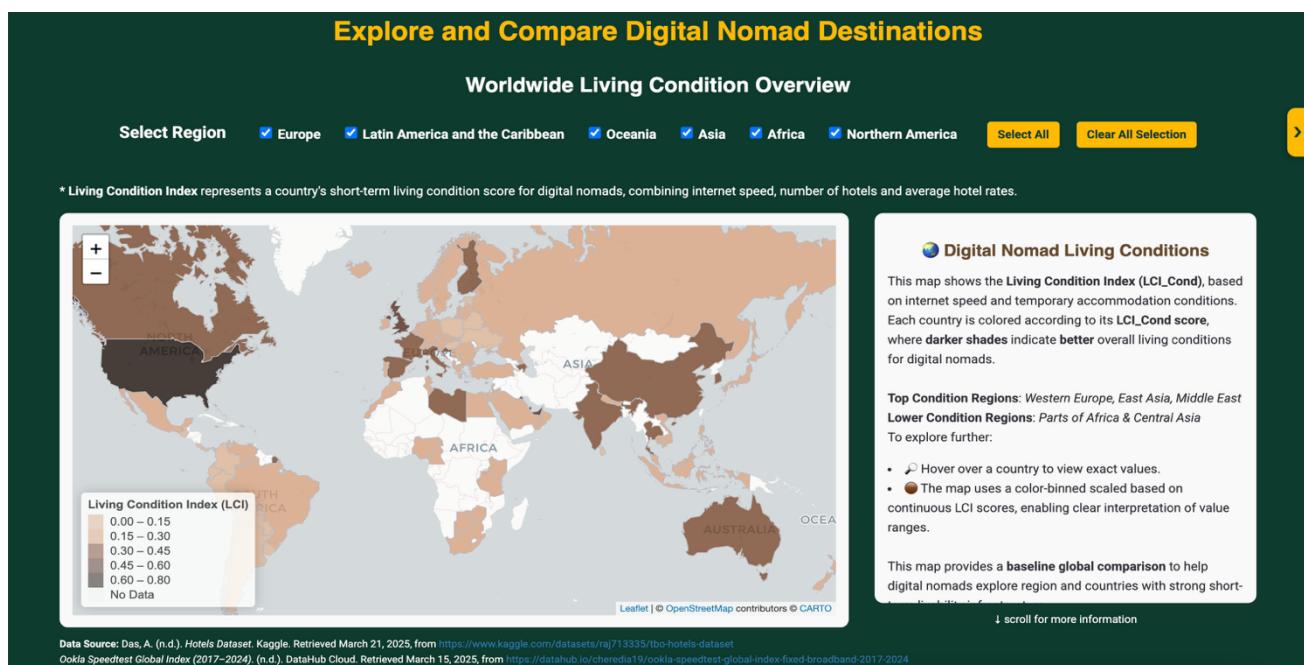


Figure 1: Global Living Conditions Overview (Choropleth Map & Region Narrative)

The application opens with a worldwide perspective, inviting users to explore digital nomad destinations using the choropleth map and contextual narrative panel. Figure 1 shows the initial landing screen with all regions selected, the Living Condition Index mapped to a colour scale, and an info-block at the right summarising global patterns.

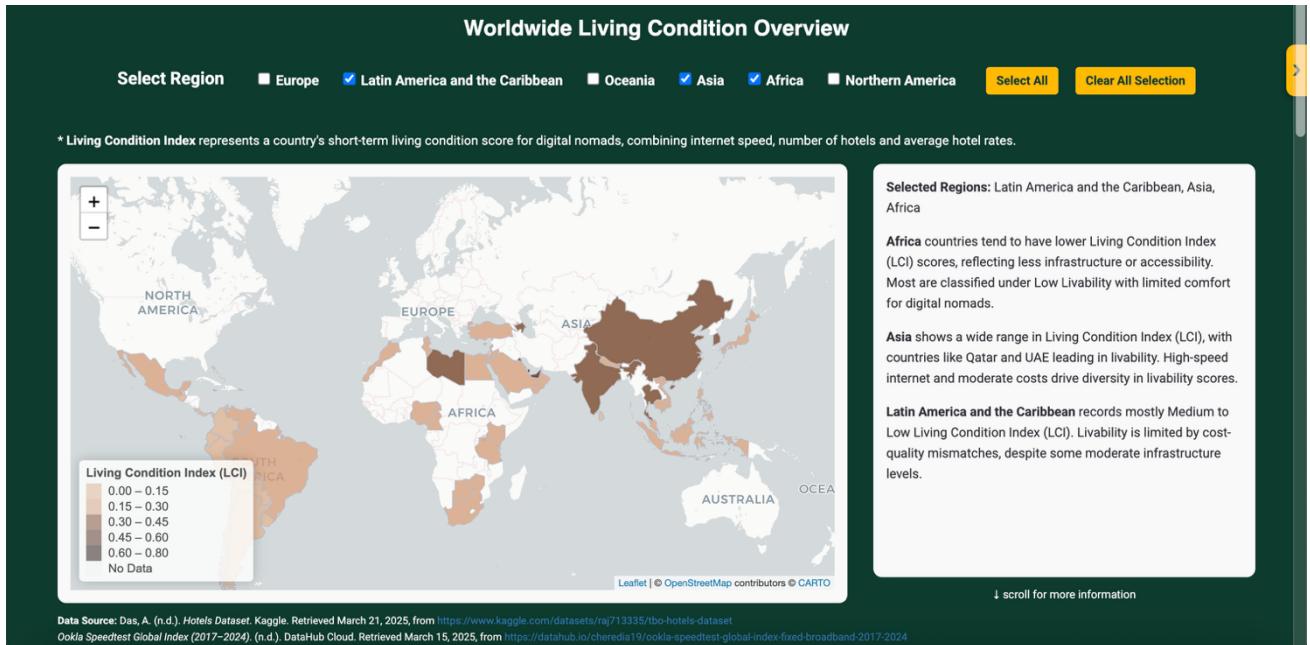


Figure 2: Region Filtering and Contextual Narrative

In this section, users can select or deselect regions via checkboxes above the map. As illustrated in Figure 2, the map provides an immediate visual overview of which countries score high or low in terms of digital nomad livability. The info-block updates key regional trends and explorations. Additionally, this filter is applied in the bubble plot (Figure 3) as well, expressing countries within selected regions.

Interactive elements such as the “Select All” and “Clear All Selection” buttons give users full control over their exploration path. Hovering over a country displays a tooltip with its exact LCI_Cond value (Figure 1). The texts above the map and in the default status of the info-box offer the explanation regarding LCI_Cond with a weighted font style. These interactions decrease the barrier for non-experts to interpret the visualisation.

Cost vs Living Feature and Country Profile Comparison (Bubble Plot & Radar Chart)

Moving from a global overview to a detailed feature-based comparison, the application presents a two-part interactive visual: a bubble plot for comparing countries by cost and a user-selected feature, and a radar chart for profiling a selected country. Figure 3 displays this interface, with the bubble plot on the left and the radar chart on the right.

Users can change X-axis of the bubble plot using the dropdown at the top (e.g., to Temperature, Hotel Rate or Precipitation). Each bubble represents a country, with its size indicating the LCI_Cond. To prevent the confusion, there are two legends: Country (right), represented with colour hue, and the

Living Condition Index (Bottom), expressed with bubble size. This plot offers a tooltip function for each bubble when users hover over it.

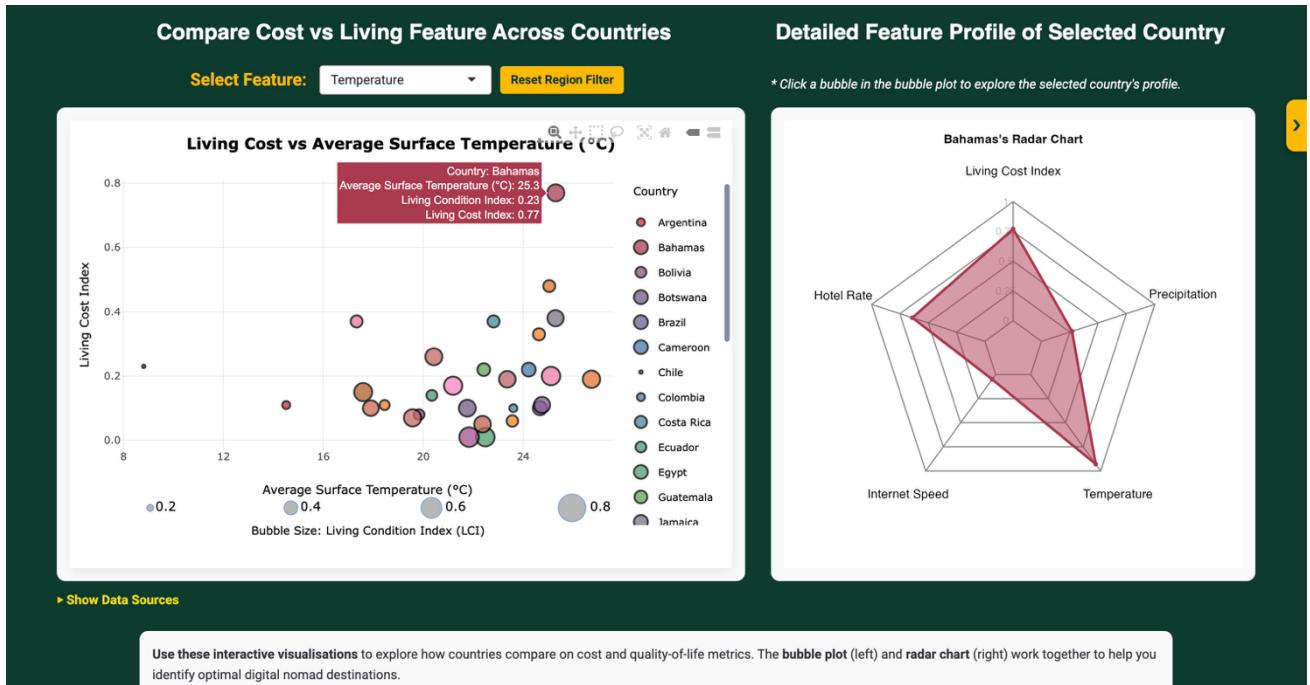


Figure 3: Cost vs Living Feature and Country Profile Comparison (Bubble Plot & Radar Chart)

Figure 3 explains another interaction where users can see the profile on the radar chart when they click a bubble. The title of the radar chart also shifts with the selected country name.

Interactive Comparison Table and Narrative Summary

The figure displays an interactive comparison table and a narrative summary section. The table is titled 'Compare and Decide: Digital Nomad Country Insights' and allows users to 'Select Features to Display' via checkboxes: Living Condition Cluster, Living Cost Cluster, Hotel Rate (1-5 star), Internet Speed (Mbps), Average Temperature (°C), and Average Precipitation (mm). It also includes buttons for 'Select All' and 'Clear All'. The table itself has columns for Country, Region, Living Condition Cluster, Living Cost Cluster, Hotel Rate (1-5 Star), Internet Speed (Mbps), Average Temperature (°C), and Average Precipitation (mm). It shows data for three countries: Albania, Argentina, and Australia. The narrative summary section is titled 'Comparison Summary' and provides instructions: 'Use this section to directly compare selected countries and make your final decision.' It includes a bulleted list: 'Select features using the checkboxes above.', 'Choose up to 3 countries to compare.', 'A comparison table and summary will appear.', and 'You can also search for a country using the search bar.'

Compare and Decide: Digital Nomad Country Insights							
Select Features to Display:							
<input checked="" type="checkbox"/> Living Condition Cluster	<input checked="" type="checkbox"/> Living Cost Cluster	<input checked="" type="checkbox"/> Hotel Rate (1-5 star)	<input checked="" type="checkbox"/> Internet Speed (Mbps)	<input checked="" type="checkbox"/> Average Temperature (°C)	<input checked="" type="checkbox"/> Average Precipitation (mm)	<input type="button" value="Select All"/>	<input type="button" value="Clear All"/>
Compare up to 3 Countries:							
Show 3 entries	Search:						
Country	Region	Living Condition Cluster	Living Cost Cluster	Hotel Rate (1-5 Star)	Internet Speed (Mbps)	Average Temperature (°C)	Average Precipitation (mm)
Albania	Europe	Low Livability	Moderate	1.94	50.57	12.39	128.7
Argentina	Latin America and the Caribbean	Low Livability	Affordable	1.17	25.36	14.51	80.1
Australia	Oceania	High Livability	Expensive	2.67	92	21.99	42.4
Showing 1 to 3 of 92 entries							
Previous 1 2 3 4 5 ... 31 Next							
Comparison Summary							
Use this section to directly compare selected countries and make your final decision.							
<ul style="list-style-type: none"> Select features using the checkboxes above. Choose up to 3 countries to compare. A comparison table and summary will appear. You can also search for a country using the search bar. 							

Figure 4: Interactive Comparison Table & Narrative Summary

For users ready to make a final decision, the third section provides a detailed comparison table and an automatically generated narrative summary. Figure 4 shows the interface, where users can select which features to display and search for up to three countries to compare.

Country	Region	Living Condition Cluster	Hotel Rate (1-5 Star)	Internet Speed (Mbps)	Average Temperature (°C)
Austria	Europe	Medium Livability	1.75	79.96	6.22
Belgium	Europe	Medium Livability	2.08	76.52	9.78
South Korea	Asia	High Livability	2.32	173.95	12.01

Showing 1 to 3 of 3 entries

1 Next

Comparison Summary

Use this section to directly compare selected countries and make your final decision.

- Select features using the checkboxes above.
- Choose up to 3 countries to compare.
- A comparison table and summary will appear.
- You can also search for a country using the search bar.

First, **South Korea** offers the fastest internet at **173.95** Mbps, while **Belgium** has only **76.52** Mbps. In comparison, **South Korea** is the warmest average temperature with **12.01°C**, while **Austria** is the coldest at **6.22°C**. Additionally, Hotel quality is highest in **South Korea** at average **2.32** stars and lowest **Austria** with average **1.75** stars.

Figure 5: Comparison Operation of Table & Narrative Insight

As described in Figure 5, users filter features with checkboxes, search and select countries, and view a table of exact values. The right side summary block then interprets these candidates, explaining key findings. This summary follows the logic that contains all cases of conditions, including the number of countries and feature selections. This approach reduces cognitive overload and bridges the gap between raw numbers and actionable recommendations, as the narrative changes automatically based on the user's current selection.

By integrating dynamic narrative generation with interactive tabular comparison, the application supports even complex decisions that are made by both data and interpretation, improving user confidence and insight.

The visual and technical design of the narrative data visualisation achieves clarity and engagement by integrating strong visual hierarchy, colour coding (colour saturation and colour hue), and accessible navigation. Custom CSS and JavaScript secure a consistent layout and soft transitions between sections. Key implementation challenges included maintaining real-time synchronisation of overall visualisations, creating accurate narrative summaries, and preserving a well-aligned visual experience, each addressed through thoughtful, user-centred design, as demonstrated via figures.

3.3 Using the Implementation

The method of using this implementation consists of describing how to launch, navigate, and interact with the interactive narrative visualisation application, delivering the practical user experience and features that support decision-making for digital nomads. Step-by-step guidance helps both technical and non-technical users can easily access all functions of the dashboard.

1. Launching the Application

The application is developed using R Shiny and can be run locally or deployed on a Shiny server.

To run the application locally:

- Ensure that R (ver. 4.2) and RStudio are installed on your system.
- Install all required packages as listed in the code: *shiny, dplyr, leaflet, plotly, DT, fmsb etc.*
- Open the main application file (app.R) in RStudio.
- Click the “Run App” button or execute shiny::runApp() in the console.
- Recommended to open in a web browser.

2. User Navigation and Interaction

When the application opens, users are presented with the Global Living Condition Overview (see Figure 1), where they can begin exploring digital nomad destinations.

a. Step 1: Global Exploration

i. Region Selection

Use the “Select Region” checkboxes at the top of the screen to include or exclude continents from the map. “Select All” and “Clear All Selection” buttons are available for convenience.

ii. Map Interaction

Hover over any country on the map to view its Living Condition Index in a tooltip.

Under the default mode and non-region selection (“Clear All Selection”) shows the default instruction information of this visualisation.

b. Step 2: Feature-based Comparison

i. Section Navigation

Use the persistent side navigator (yellow tab) to jump to the “Compare Cost vs Feature Across Countries” section or scroll down the page.

ii. Feature Selection

Choose the feature to compare on the X-axis using the dropdown above the bubble plot.

“Reset Region Filter” returns all countries in the bubble plot and the map above.

iii. Bubble Plot Interaction

Each bubble represents a country; the size and colour encode key metrics.

iv. Radar Chart Update

The radar chart updates to display a detailed feature profile for the selected country.

v. **Data Source Reference**

Click “Show Data Sources” for detailed citation of all datasets used.

c. **Step 3: Detailed Comparison and Decision-Making**

i. **Table Navigation**

Use the navigator or scroll to access the “Compare and Decide” section.

ii. **Feature Filtering**

Select which features to display in the table using the checkboxes.

iii. **Country Selection**

Search or select up to three countries to compare and get the insights.

4. Conclusion

This project explored how an interactive narrative visualisation could support early-stage digital nomads in making informed, data-driven choices about where to live and work. Through the structured application of the Five Design-Sheet (FdS) methodology, the dashboard took shape via iterative sketching, critical comparison, and practical realisation, always with a focus on the audience’s needs and technical comfort level.

A key component of the final application lies in an integrated set of interactive visualisations: a choropleth map, bubble plot, radar chart, and interactive table. In combination, these elements offer users the ability to move fluidly from global patterns to in-depth, country-level comparisons. Narrative blocks, a responsive layout, and intuitive interactions help guide users while encouraging exploration on their own terms. The additional operation of side navigation enhances this experience, allowing for user-driven browsing. Moreover, dynamic text summaries and linked visuals help users interpret data visualisation more easily.

Developing these features was not without challenges. Aligning filters across multiple visual elements and generating flexible, readable narrative templates proved complex. Performance considerations also arose when working with reactive components and larger datasets. These limitations point to potential areas for further improvement, including optimising the narrative logic and incorporating user feedback in future iterations.

Despite these challenges, the project successfully turns complex data into an engaging, user-friendly exploration tool. It shows how well-designed interactivity, grounded in user-centred thinking, can transform raw information into actionable insights. While designed for digital nomads, this approach also holds promise for broader applications in data storytelling and decision support.

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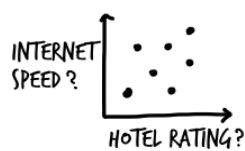
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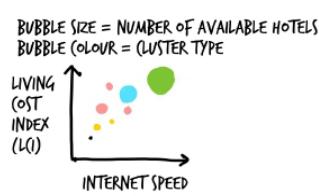
6. Appendix

Ideas

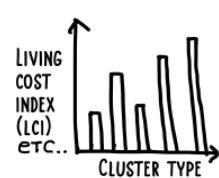
① SCATTER PLOT



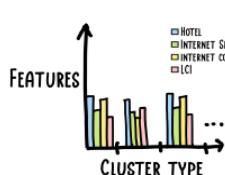
② BUBBLE PLOT



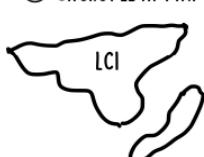
③ BAR CHART



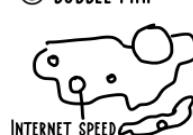
④ GROUPED BAR CHART



⑤ CHOROPLETH MAP



⑥ BUBBLE MAP



Sheet 1

Name GAYOUNG DAN Date

TOPIC STORY

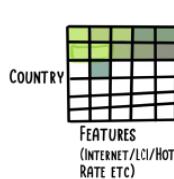
WHAT KINDS OF DIGITAL NOMAD DESTINATIONS EXIST BASED ON SHORT-TERM LIVING CONDITIONS?

AUDIENCE

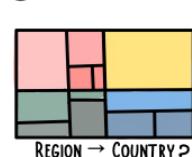
DIGITAL NOMAD

- FIRST - TIME/EARLY STAGE
- WANT TO EXPLORE WHAT TYPE OF COUNTRIES AVAILABLE

⑨ HEATMAP



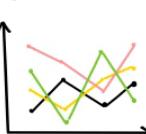
⑩ TREEMAP



⑪ LINE GRAPH



⑫ PARALLEL PLOT



⑬ RADAR CHART



⑭ TABLE

⑮ LOLLIPOP PLOT

⑯ MULTIPLE MAPS

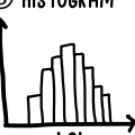
PER REGION

⑰ COLOUR PER

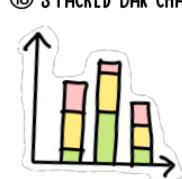
FEATURE / CLUSTER /

LOCATION

⑧ HISTOGRAM



⑯ STACKED BAR CHART



Filter

DUPLICATED IDEAS

- SCATTER PLOT → IS INCLUDED / POSSIBLE TO BE COVERED BY BUBBLE PLOT
- BAR CHART → GROUPED BAR CAN COVER MORE INFO
- BUBBLE MAP → SIMILAR TO CHOROPLETH MAP AND LIMITATION FOR VISUALIZING MANY COUNTRIES (CAN BE TOO DISTRACTIVE)
- LINE GRAPH → WEAKLY RELATED TO THE TOPIC (DOESN'T TARGET TO SHOW TIME TREND)
- MULTIPLE MAPS → DUPLICATED TO MAPS & LOW EFFECTIVE IN VISUALIZING THE TOPIC
- FILTERED IDEAS:** 2, 4, 5, 7, 8, 9, 10, 12, 13, 14, 15, 17, 18

Categorise

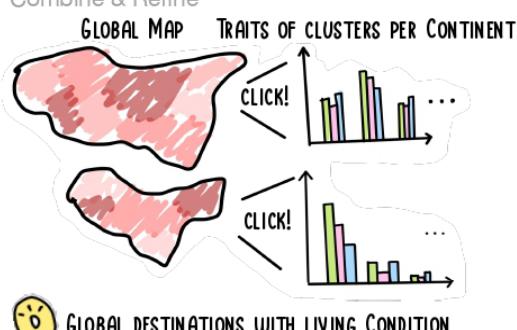
COMMON APPLICABLE IDEA
17 COLOUR PER FEATURE CLUSTER LOCATION

OVERVIEW / SUMMARY OF TOTAL COUNTRIES
5 CHOROPLETH MAP, 8 HISTOGRAM, 10 TREEMAP

GROUPED-LEVEL (CLUSTERS) COMPARISON
4 GROUPED BAR, 7 VIOLIN PLOT, 9 HEATMAP, 17 LOLLIPOP PLOT,
18 STACKED BAR

INDIVIDUAL COUNTRY EXPLORATION (DETAILS)
2 BUBBLE PLOT, 12 PARALLEL PLOT, 13 RADAR CHART, 14 TABLE

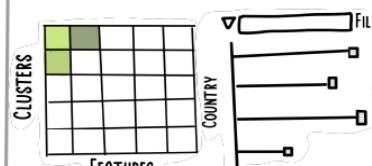
Combine & Refine



GLOBAL DESTINATIONS WITH LIVING CONDITION DETAILS IN CONTINENT-LEVEL WITH CLUSTERS INFO.

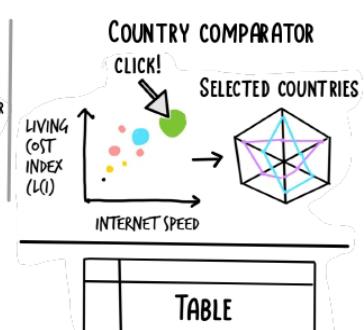
1

CLUSTER PROFILER: EXPLORE CLUSTER & COUNTRIES PER CLUSTER



2

COUNTRY COMPARATOR



3

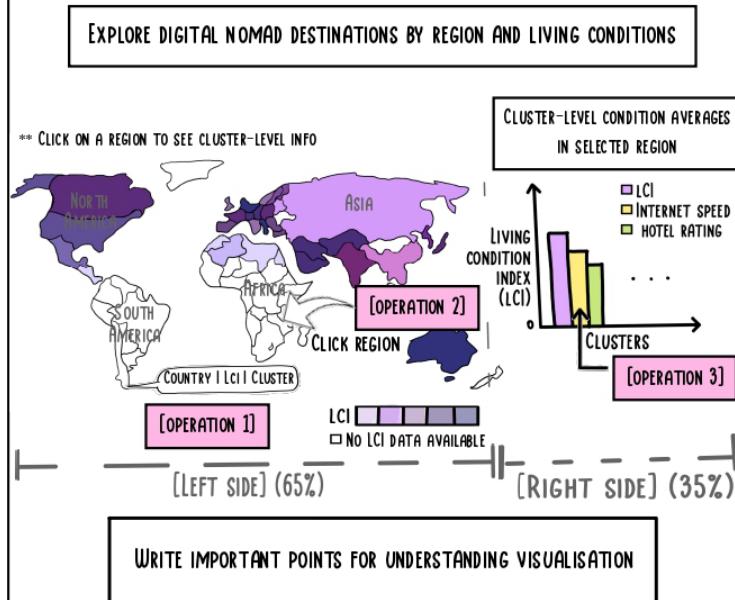
Summarise and question

HOW CAN MY VISUALISATION HELP USERS COMPARE MULTIPLE FEATURES ACROSS COUNTRIES?

WHAT TYPE OF USER INTERACTIONS COULD MAKE MY VISUALISATION MORE USEFUL OR ENGAGING?

WHAT KINDS OF INFORMATION ARE ESSENTIAL TO HIGHLIGHT IN MY NARRATIVE VISUALISATION, AND HOW MIGHT DIFFERENT VISUAL STYLES SUPPORT THAT?

Big Picture / Layout



Sheet 2,3,4

Name Gayoung Dan

Date

Title Exploring Digital Nomad Destinations Based on Short-Term Living Conditions

Description

The overall task is to design an interactive narrative visualisation that helps first-time or early-stage digital nomads explore and compare short-term living conditions across different countries.

Components / Operations

< Operation 1 > : Hover function on map

Hover function allows to view:

- Country name
- Living Cost Index (LCI)
- cluster type

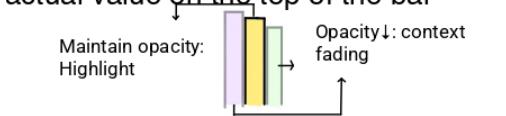
It gives info of each country

< Operation 2 > : Region Selection

When user clicks a region on the map, grouped bar chart Data will be changed based on the selected region

< Operation 3 > : Feature Selection on bar chart

When user clicks a bar, each bar shows actual value on the top of the bar



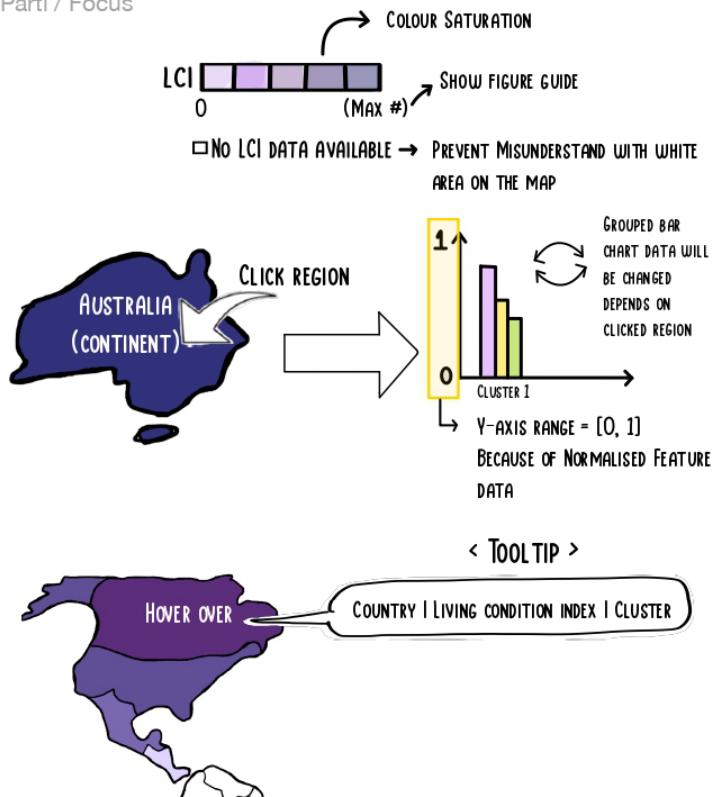
Pro & Cons

- Pros**
- The map (exploration) & the bar chart (comparison) are divided horizontally, clearly separating their functional role
 - visual clarity: The normalised y-axis, consistent color legend, reveal value labels with clicking
 - user focus: The click-based opacity emphasis helps direct user interaction to get the information

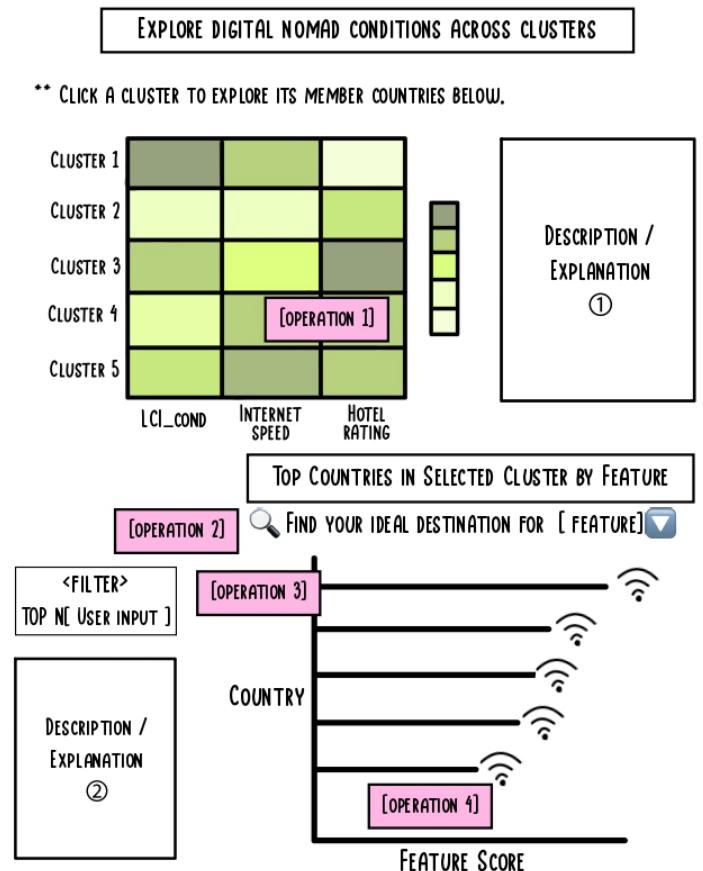
Cons

- Potential confusion to users: The map shows country-level values as well / while chart aggregates region-level cluster averages
- bar space constraint: if there are many clusters or attributes, The grouped bar chart may face spaces issue.
- interpretation burden: differences in value scale between the map and chart may confuse users without clear annotations
- user must click the bar or hover function to view the Country information in map and actual features value in bar chart

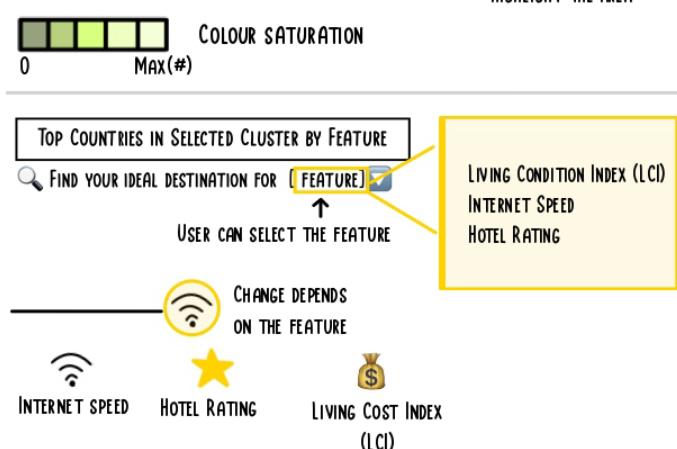
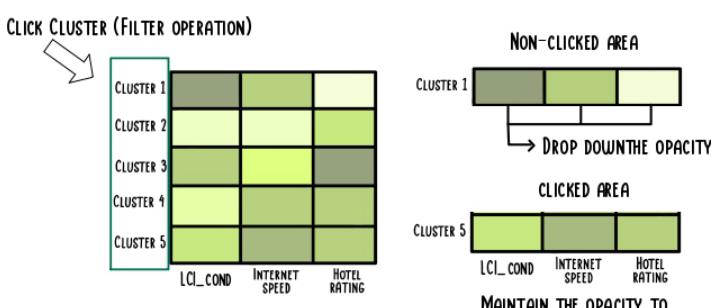
Parti / Focus



Big Picture / Layout



Part / Focus



Sheet 2, 3, 4

Name Gayoung Dan
Date

Title Exploring Digital Nomad Destinations Based on Short-Term Living Conditions

Description

The overall task is to design an interactive narrative visualisation that helps first-time or early-stage digital nomads explore and compare short-term living conditions across different countries.

Components / Operations

< Operation 1 > : Cluster Selection

When user click the cluster (on y axis of heatmap), the lollipop chart below will show the countries within selected cluster

- The heatmap also will be changed, except the row of the selected cluster, other rows will be fade out, decreasing the opacity.

< Operation 2 > : Feature Selection on Bar Chart

User can select the feature they want to explore by using the filter. When user click the button, user can see the option of features: LCI, Internet Speed, Hotel Rating.

< Operation 3 > : Filter out Top N countries

When user input the number on this Top N filter, User can see the top N countries in selected countries by feature on the right chart.

< Operation 4 > : Country Selection on Bar Chart

When user click the bar of countries in the chart, description ② will show the following information:

- HI, I'm [Country Name]!
- I belong to Cluster #.
- My [feature] is [data + units].

Pro & Cons

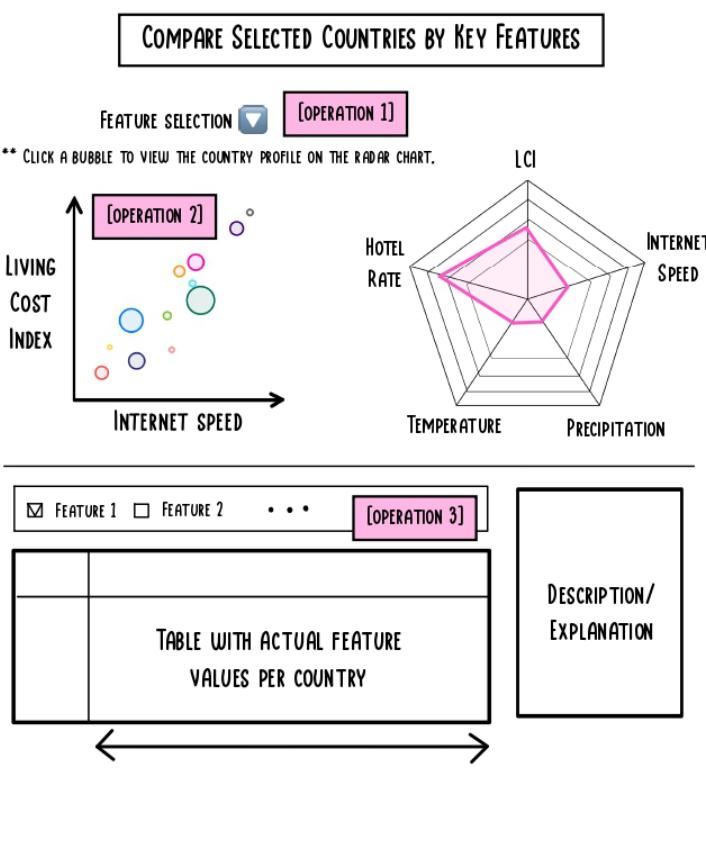
Pros

- Strong feature-cluster-country linking using interaction operations.
- Colour consistency between heatmap & bar chart

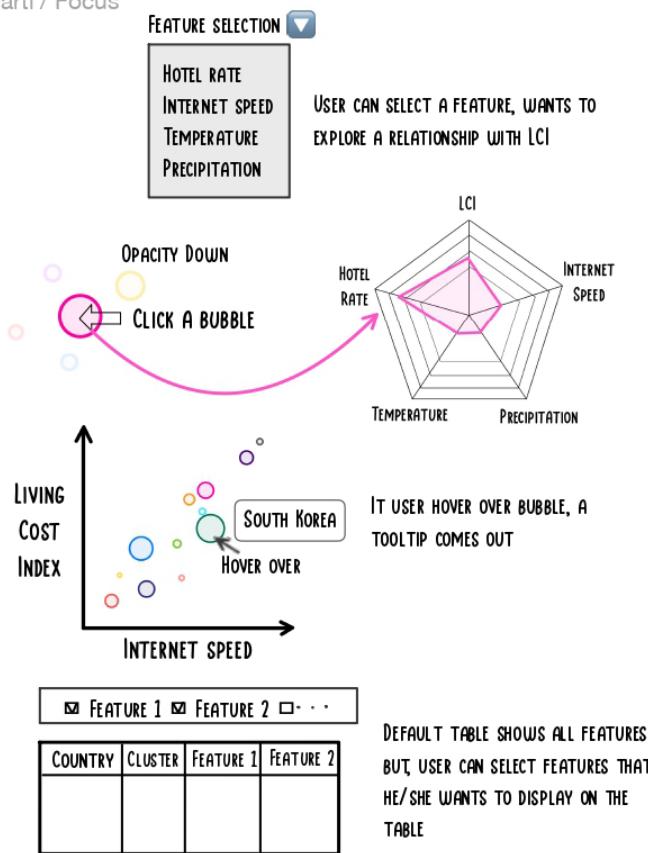
Cons

- Pictograms in bar chart may not be clearly interpreted by all users
- Potential usability issue on the chart description(right -> left)

Big Picture / Layout



Part / Focus



Sheet 2,3,4

Name Gayoung Dan

Date

Title Exploring Digital Nomad Destinations Based on Short-Term Living Conditions

Description

The overall task is to design an interactive narrative visualisation that helps first-time or early-stage digital nomads explore and compare short-term living conditions across different countries.

Components / Operations

< Operation 1 > : Feature Selection

The user can select a feature to be plotted on the X-axis of the bubble plot (e.g., Internet speed, Hotel Rating, etc).

This dynamically updates the chart to show the relationship between living cost index (LCI) and the selected feature across all countries.

< Operation 2 > : Country selection via bubble click

When the user clicks on a country in the bubble plot, its individual profile is displayed on the radar chart.

The radar chart visualizes the country's performance across multiple features, including LCI, internet speed, hotel rate, temperature, and precipitation.

< Operation 3 > : Feature Selection via Checkboxes

Users can select which features to display in the table using checkboxes positioned above it.

- **Default:** All Five features are selected
- Unchecking a box -> Hide the corresponding column from the table

Pro & Cons

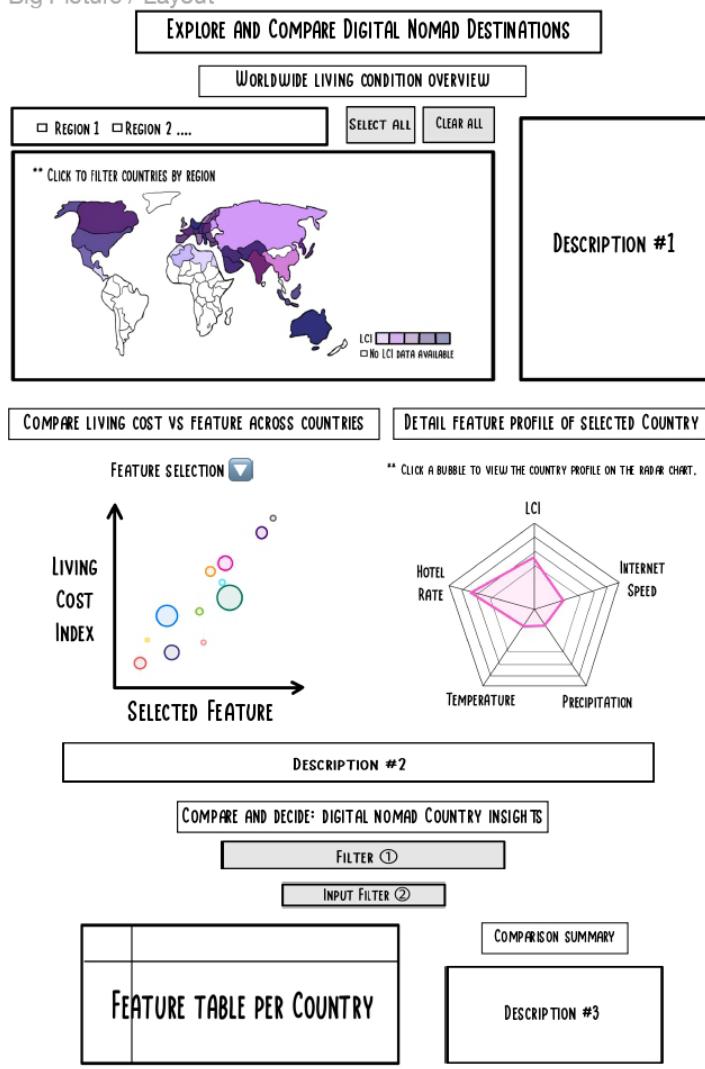
Pros

- Supports multi-step exploration from overview to detail: Bubble -> Radar -> Table
- Combines visual patterns with exact numeric comparison: Radar (Overall picture) -> Table (Actual Detail)
- Offers user-driven interaction and flexibility

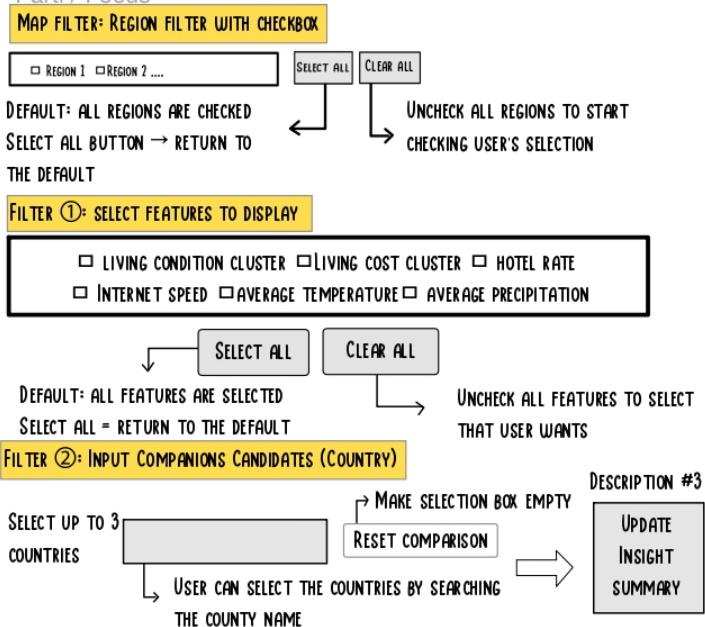
Cons

- Visual load may increase with multiple components
- Feature inconsistency between radar and table (if user unselect feature) may confuse users
- Table layout may shift based on checkbox filters

Big Picture / Layout



Parti / Focus



Sheet 5

Name Gayoung Dan

Date Exploring Digital Nomad Destinations Based on Short-Term Living Conditions

Description

The overall task is to design an interactive narrative visualisation that helps first-time or early-stage digital nomads explore and compare short-term living conditions across different countries.

Components / Operations

< Operation 1 > : Region Selection & Tooltip on Map

- User can click on a region in the checkbox to filter the countries displayed in the map and the bubble plot.
- Hovering over a country shows its name and LCI_Cond
- Depends on the selection, it updates description 1
- Default:** When no region is selected, all countries are displayed in both the map and bubble plot.

< Operation 2 > : Feature Selection for X-axis (Bubble Plot)

- A dropdown above the bubble plot allows user to select the X-axis feature (e.g., internet speed, hotel rating etc.)
- The chart dynamically updates to show the relationship between LCI and the selected feature.
- Default:** Internet Speed is selected as the initial feature

< Operation 3 > : Country Selection via Bubble Click

- Clicking a bubble (country) highlights it and updates the radar chart with that country's information.
- The radar chart visualises normalised scores across five key features.
- Default:** The radar chart remains empty until a country is selected.

< Operation 4 > : Feature Column Selection for Table

- Users can show or hide table columns by checking/unchecking feature options displayed above the table.
- The Input filter allows users input up to 3 countries that they want to compare as a final comparison.
- Default:** All six features (LCI_Cond Cluster, LCI_Cost Cluster, Internet Speed, Hotel Rating, Temperature, Precipitation) are selected.

< Operation 5 > : Input Filter + Interactive Summary

- User can input countries (up to 3) for final comparison.
- Description #3 shows insight summary between selected countries and features.

Details

- Framework:** R Shiny
- Key Packages: ggplot2, plotly, leaflet, fmsb, DT, dplyr
- Methods:**
 - region click -> country filter (map -> bubble/table)
 - bubble click -> radar update
 - checkbox filter for table column filter
- Data:** Metadata of each features and normalised data
- Time Estimate:** ~7 days incl. linking + testing (working hour 8h per day)