

Group Project Report (GEOM90007)

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I. INTRODUCTION

The Student Living Portal is a data interface for our client The University of Melbourne. The portal is designed for domestic and international students who are moving to Melbourne. It is catered for a range of student values and living preferences. It assumes no knowledge of Melbourne and is suitable for students whose English language skills may not be strong. Students already living in Melbourne may also find the portal beneficial to better understand the city.

Our content and design decisions were instructed by market research we conducted among Postgraduate students who had recently moved to Melbourne. From our research we found there were 4 primary criteria that students considered when looking for a place to live: Accommodation type, Places of Interest, Environment and Transport.

II. DESIGN SUMMARY

A. Use of interface

Home Page:

You land on the Home page where you can read about the data interface functionality.

Apartment Hunting:

The 'Apartment Hunting' tab provides a live connection to domain.com via an Open API to show the latest accommodation offerings around the City of Melbourne. There are a series of filters so a student can find the right accommodation to meet their budget and living preferences. If a student is interested in a property they can expand the accommodation listing and even apply for the accommodation immediately. Each listing also provides the feature of saving the house for future references and visualizing the location of the saved accommodations on other tabs for a better understanding of the area.

Environment

The 'Environment' tab contains key information for students on the physical environment and climate of the area. The *Urban Forest* layer contains information on the tree coverage around Melbourne so students can better understand the greenery of their surrounding environment. Students wishing to understand the climate of their area can explore the *Sensor readings* overlay.

Transport

The 'Transport' tab provides students with a host of information for getting around Melbourne. We have included Melbourne's major public transport options including: Bus, Train and Tram. Students can make use of the transport stops and route options to better plan their journeys and stay connected. Those students who have access to a car may find the *Street Parking* overlay helpful.

Place of Interests

Places of Interest provides markers of establishments and points of interest around Melbourne. These are categorised into a few relevant layers to explore such as cafes, restaurants, health, coworking spaces etc. The tooltips include an image of the place (pulled from Google Places Photos API), the name, address, rating, price level, keywords that encapsulate the services that the place offers.

B. Choice of data

Accommodation

- Domain Group - Developer Portal API

- Accommodation is a basic amenity which every student searches before pursuing overseas studies. Thus, providing latest accurate data is of the utmost need.
- We also selected this API since it is provided to developers free of cost and gives accurate images, locations and different aspects of each house listed on the website.

Environment

- Trees, with species and dimensions (Urban Forest)
 - The student demographic values greenery for its positive impact on mental health. We found this dataset contained all the trees in City of Melbourne as well as tree specific information.
 - We found other much larger datasets with shapefiles slowed down the performance of the data interface. We decided this additional information wasn't necessary and performance decrease would not be palatable for time-poor students.
- Microclimate Sensor Readings
 - We selected this dataset as it contained key information on temperature, humidity and wind-speed data. Students looking to maximise their comfort in Melbourne may find this information useful.

Transport

- Metro Tram Stops (AURIN), Metro Bus Stops (AURIN), Metro Train Stops (AURIN), Tram Routes (DATA VIC), Bus Routes (DATA VIC)
 - Understanding public transport options in the area is important for students to travel to and from uni on a budget.
- On-street Parking Bays
 - For students with access to a car this dataset provides useful information on street parking options.

Places of Interest

- Points of Interest - Google Places API
 - When selecting an area to reside in or explore, a student will want to consider nearby points of interest and establishments. Information on addresses, type of establishment, rating, price level and photos are all important.
 - Google Places API was best suited to this, as it provided not only detailed latitude-longitude information, but is also the best source for extensive and up-to-date information of establishments in a radius, while being free-to-use within certain limits. We pulled data within fixed radii in the Melbourne LGA, processed and categorised them and stored them in simple JSON format to add as layers.
- Coworking spaces
 - Students value working around others and the sharing of ideas. Coworking spaces are a good option for young professionals seeking to network with peers and gain exposure to the working environment.

C. Features

Technical Feature	Justification
Shiny Dashboard Plus	Shiny dashboard provides features that make it easy to access web application framework and create interactive platforms using R. It is open-source and easy to integrate any customization like using custom HTML, CSS files. There is flexibility for custom functions, packages and modules.
New Box Elements	Different new boxes were used for displaying the apartment listing on the apartment hunting tab. Such as social box to display the agency on top and image carousel for displaying list of images in a carousel format. This helped make the user interface clean and clear for user to understand and interact with the dashboard.
Linking tabs	We added linking between tabs using the update tab section which helps make the dashboard more connected.
Leaflet & Leaflet proxy	We used leaflets for all our maps to increase interactivity between the user and the displayed data. We used leaflet proxy to decrease the load on the server to load the whole map again and used leaflet proxy to add a group or layer.
Overlay Groups in maps	Instead of displaying different features on different maps we chose to use overlay groups in leaflet maps which allows us to display different features together with a layer control widget to turn on/off relevant layers.
HTTR and JSON-Lite for APIs	We use different Open APIs to populate the dashboard with data. To make use of APIs we use the httr package and then to convert the response into a valid dataframe we use JSONLite which makes the work easier.
Notification	Warning notifications are added in the tabs when a user tries to project saved houses on maps without actually selecting any houses to inform the user about the issue so that they may not think that it is a bug in the dashboard.

D. Design Choices

Visualisation Element	Design Choice	Justification
Dashboard Theme	Light colours, symbols for each tab, minimal text	Lighter colours were selected after reviewing other popular mapping applications to provide a cleaner look and encourage greater preattentive processing of different hues in our visualisations. Maps were increased in size to cover all available space.
Home Page	Vibrant relevant images with a guide to sections	Clean design guided by selected stock images alongside each description for fast visual associations to each tab
Apartment Hunting	Images allowed to take up the maximum space of each listing, minimal text, double columns	Images drawn from the domain.com listings and chosen as the largest element of each listing for immediate bottom-up processing as compared to listing details in text form. Double columns maximised the use of space. The layout was chosen keeping data-ink ratios in mind
Apartment listing information	Use of symbols for bed/bath/parking	“2 bedroom 2 bathroom 1 parking slot” visually condensed through a symbol set (Mackinlay’s criteria of expressiveness and effectiveness)
Apartment listing redirection	Selecting an apartment links it across all map tabs	Intuitive linking between the maps for the user’s attention to be clearly centred at the chosen apartment, while allowing them to explore multiple map views and layers linked to the same area
Environment: tree map layer	Tree map cover represented by green markers without use of clustering	Use of position/pattern as a visual variable to draw attention to areas of more clustering, this was done in accordance with Gestalt’s principle of proximity in mind. Interaction through tooltips provides additional information of every tree. Keeping the user viewpoint in mind, we allowed for the map to be panned using the cursor or arrow keys.
Environment: sensor layer	Markers used to represent the points at which sensor data was collected	Tooltips used to depict information collected from each sensor at the given map positions.
Transport: Bus Routes	Three map layers with fixed layer displaying ColorFactor coded bus routes grouped by bus number	Bus routes have been colour coded based on the official PTF colour scheme. Although the bus routes extended out of the Melbourne LGA, it gives the user a visually clear idea of the connectivity of their selected area to areas in and around Melbourne.
Transport: PTV transport stops	Icons displaying close by train, tram, bus stops with information	Colours and symbols used as visual variables and selected according to PTV Visual Identity Toolkit for fastest visual preprocessing through association with Maps applications and signs around Victoria. These positional visual markers aid the user in quickly identifying nearest means of public transport, with tooltips and labels for additional information. We implemented adaptive zoom and clustering as a geo-visualisation method of exploration to reduce the cognitive load from screen cluttering. This has the added benefit of faster load-times.
Transport: Parking	Fixed blue circles with high opacity and small size	Clear, small circle markers help the user visually gauge general parking availability. Users can zoom into an area to locate specific parking spots. Blue selected due to parking-related semiology usually being blue.
Points of Interest	Clear map with layers for Cafe, Food & Drink, etc.	Layers chosen for the viewer to quickly visualise the type of establishment they want to see. Colour chosen as a visual variable to show the rating of the establishment (< 2 = red, < 4 = yellow, 4 – 5 = green). Symbols for each category chosen and manually customised based on their type.
Points of Interest: tooltips	Image with heading title, star symbol rating, dollar symbol price range, address and relevant keywords.	Image loaded from Google Places API added for fast and interesting visual processing of the establishment. Star symbols and dollar signs used with these fields instead of plain text to mimic standard ratings on websites like Google. Place ‘Types’ from Google Places added with a search symbol for easier visual distinction, irrelevant keywords like “point of interest, establishment” removed to give the user a brief, clear idea of the particular point of interest.

III. SUMMARY (TWO PAGES)

A. User Story #1

Scenario:

Anita is an international student traveling to Australia and the City of Melbourne for the first time. She is PHD students studying chemical engineering and is seeking for a place of living around university as she has to go to the university every day for doing research in laboratories. Another challenge for Anita is finding the best transportation option to university.

Our data interface:

Our interface is addressing Anita concerns. Anita can search, compare and find the type of accommodation which suits her conditions on "Apartment Hunting" tab. She has the option for checking each accommodation facilities, location, images, and the Geographical location on the map. In addition, in "Transport" tab, Anita can find information about tram, bus, and train stations, the vehicles' number, the routes using stops, and the zone number to choose the best route. Also, if Anita is intended to use a car, the street parking locations is available in "Transport" tab.

B. User Story #2

Scenario:

Allan is domestic student moving to Melbourne to undertake their Masters Degree in Computer Science at the University of Melbourne. He has already found his accommodation in the city but wishes to understand the neighbourhood better. Allan finds his study workload immense and spending time in nature helps him alleviate his stress levels. He also enjoys an active nightlife and hanging out with friends in cool bars.

Our data interface:

Our data interface is ideal for someone like Allan. Allan will find on the "Places of Interest" tab he can filter the overlays to select *Food & Drink*. Here he can find all the relevant bars and nightlife options near his area. Since Allan is on a budget he can identify more parsimonious options using the "\$" indicator on the venue pop-up. He is also able to view a picture of the establishment on the pop-up to get a better feel if the bar is cool enough for him. The reviews, which are colour coordinated draw his attention and allow him to find cheap drinks. The *Shops and Supermarkets* overlay may also help Allan identify his local supermarket so he can arrange for meals at home.

Since Allan is environmentally conscious he may want to peruse the Environment tab. On the *Urban Forest* overlay Allan can discover the greenery around his area. Since Allan is still new to the city he can click the 'current location' icon in the tool menu on the top-left. Allan will now be able to see all the trees in his location and plan his next nature walk. If Allan is inclined to learn more about the neighbouring tree's he can click each tree and find out additional details.

Lastly, to fit Allan's tight budget he can use the Transport Tab to identify his transport options for his next big night out!

As a result of our Student Living Portal Allan is better placed to enjoy his time in Melbourne.

IV. DESIGN SUMMARY

Our Student living portal will aid University of Melbourne students moving to Melbourne or wishing to explore the City of Melbourne. Students can find a place to live and better understand their area. We identified key student areas of interest and included these in our data interface. Students using this dashboard will have an enhanced experience living in Melbourne and enjoy their studies more!

V. STUDENT CONTRIBUTION

Name	Contribution	% Contribution
Declan Baird-Watson	Developer for the Environment and Transport tabs of the data interface. Set-up group communication channels. Drafted and proof read report. Contributed to client presentation.	25%
Madhavi Mohoni	Designed and implemented Places of Interest Tab. As chief designer I provided feedback on key design elements. I edited the client presentation and wrote the Design Choices table	25%
Mehrnoosh Salimian Rizi	Developer of homepage and write different sections of draft report. Provided feedback on Data interface design. I drafted the report and provided proof reading for all the report sections. Also, I contributed to client final presentation.	25%
Abhijeet	I was chief developer for the data interface. I was responsible for implementing key features including API connectivity. I also made a number of technical decisions for instance the decision to use Shiny Dashboard Plus. I mentored team members on using Shiny and Leaflet. I helped write the final project report.	25%