Information Visualization Assignment 3

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1 Design Summary

This section contains information about the design summary for Assignment 3. In this section we will discuss the usage of the developed tool, how it is developed, features to receive credits for, and also some of the decisions made for visualization of the information.

1.1 Motivation & Expected Benefits

According to the development team, the tool can be put to use for the tourists visiting the city of Melbourne. The idea stemmed from the POI systems that were put up all over the city. Currently, the digital POI systems are not installed in every location in the city making it hard for tourists to know about events or places to visit in the city. Although a similar system is installed over the city, the information can be visualized graphically drawn maps only on designated poles.

1.2 User Interface & Back-end Functionalities

This tool can be used by anyone who resides or visits the city of Melbourne and can be accessed via Personal Computers, Laptops or in some cases mobile phones. Our system is efficient in a way that tourists would be able to access the website from any place in the city of Melbourne and look for events or places to visit based on his/her current location. This tool enables the user to select the distance they want to travel, the place or event they would like to visit, and view the information on the map. In addition, if tourists want to use public transport such as tram or train, they can view the information regarding the timetable of these categories. This tool enables users to view live information regarding a place such as `opening hours, phone number, website, etc`, and make decisions based on their preferences and convenience. A similar idea is implemented for public transportation such as `departure of tram or train from the stop, on what days does the tram or train run, etc`. This information as a whole would help tourists to find a suitable place to visit.

In this paragraph, the internal working of the tool is discussed in detail. This tool is developed using stack `Python, Flask, ReactJs`, and has been hosted on `Heroku web-server`. Datasets such as `POI, Cafe, Pubs, Bars, Restaurants, etc` were merged to form a single dataset for the categories `Bars, Restaurants, Museum, Hotel, etc`. However, due to

a memory issue encountered on `Heroku web-server` we had to create separate datasets for `train, tram, and timetable`. These datasets are hosted on the web-server as well. Flask is used as a container for all the micro web-service that is developed for the tool. Microservices are developed for `retrieving data from the back-end for selected radius and category, public transport timetable data, and some statistical information` from the back-end. The python code loads the datasets into the environment, then some pre-processing tasks such as `removing null values, duplicate data, converting data types, etc.` were performed for better processing of the data in the later stages. Once the data is ready, the microservice manager accepts the data calls and forwards them to the desired API code. The API code then returns a JSON file for the requested parameter.

Moving on to the front end, the website can be accessed by clicking here. `Mapbox` is integrated into the ReactJS application. The `Mapbox` component is enriched by using custom styles and layers. Few static layers have been uploaded to the `Mapbox` style to relieve some operations for loading the map. Two buttons and 2 dropdown boxes are styled on the map. These dropdown menus enable the user to select the radius and the categories, while the `Get Data` button fetches all the data from the backend and displays it on the map. Another button called `info` is used to show some basic statistics to the user with respect to the radius and categories selected. Currently the statistics might not be accurate as we have generated them randomly while pre-processing the data. On click to the icons on the map, various other APIs are invoked to show real time data to the user and guide them in making decisions. API such as `Google Places, Photos` are used for all the categories except trams and train. For these two categories, a custom API is written in the backend to fetch the timetable data for the concerned train or tram stop.

Figure 1 shows the graphical interpretation of the internal working of the tool.

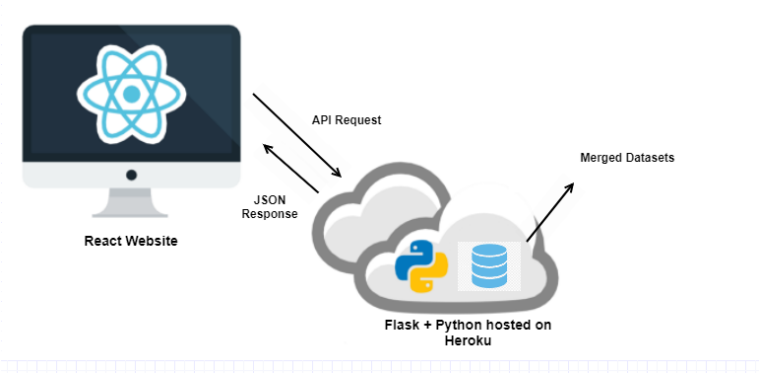


Figure 1: Integration of Frontend and backend

The map used in the tool has a basic cool color scheme and it is light on the eyes and layers and icons can be easily seen as they are of the dark scheme. Making it easy to spot. Few static layers are used as all the data cannot be retrieved from the back-end. And since the user group is the tourist the map gives an idea about how the place and surrounding areas feel and look.

2 Data & Human Centred Design

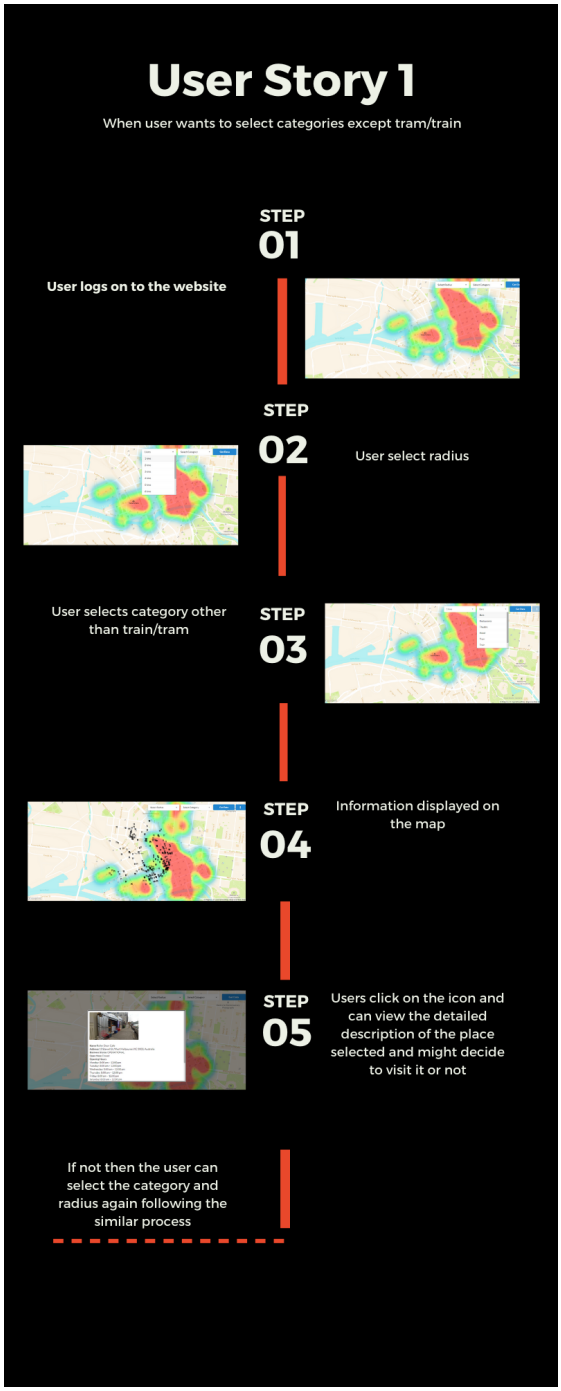
In this section we will discuss about some interesting patterns we found, use cases and rationale about this tool.

2.1 Rationale Behind Visualisation

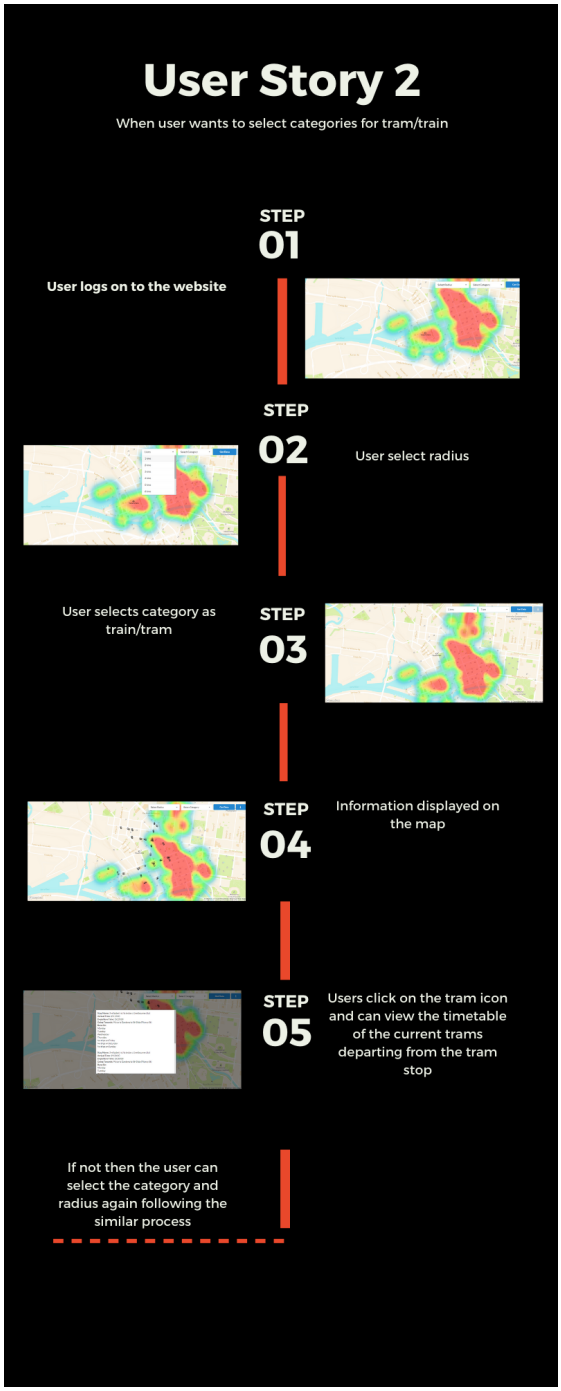
As we are using a lot of datasets, it would have been very difficult for the user to understand what was happening on the map layout. So to avoid this confusion, dividing the datasets into different categories helped to solve the issue of overcrowding the map with irrelevant data to the user and thus, making it possible to navigate the map more easily and effectively. Similarly, the implementation of a radius while selecting the categories, also removes irrelevant information for the user to avoid confusion. Removing the names of places to reduce cluttering and redundant information on the map improves the data-ink ratio as these information can be viewed by the user by clicking on the icons therefore, making the map look more aesthetically pleasing to the eye. Some static layers were added to the map to reduce the time complexity of communicating with the backend. A static layer added to the map is a density plot which displays the movement of the people. Including this layer in the map allows users to infer popular places that people visit to help them make decisions when visiting a place that falls within a given density.

2.2 User Stories

Story 2a talks about user selecting a category other than tram and train and how to navigate around the tool, while story 2b talks about how user can use the tool to access tram and train data.



(a) User story 1



(b) User story 2