Crime rates in NSW

Contents

Introduction

Crime Data of NSW from NSW Bureau of Crime Statistics and Research [1] was analysed for the project. The key findings from the analyses that need to be communicated through the narrative visualisation are:

- Crime rate has declined in NSW over the last 2 decades
- The Far West and North Western regions have higher crime rate than the other regions, while the South Eastern region has the lowest crime rate
    - In the recent years, the crime rate has decreased significantly in the North Western Region and increased in the Far West region. The crime rate has remained stable in the other regions
- The most common offences are assault, malicious damage to property, theft, and transport regulatory offences. The crime rates for assaults, thefts and property damage has decreased over the years; however, the crime rate for transport regulatory offences has increased significantly over the years

Implementation

The key implementation decisions in designing the narrative visualization are discussed below.

Platform

The platform chosen for the design was R Shiny. R Shiny was preferred over D3 because of familiarity with R over JavaScript, especially D3 library of JavaScript. The code in D3 also tends to be verbose compared to R Shiny. Given that we have 5 slides, the D3 code could be quite overwhelming and require much more time making it difficult to meet the stipulated deadline.

Libraries

For the regular plots, ggplot2 library was selected to implement the plots. This was an obvious choice given that the ggplot2 library is powerful and it allows usage of the grammar of graphics to create visualizations. For the interactive plots, the libraries considered were plotly, ShinyBS, and ggvis. The ggvis library was selected because it followed the grammar of graphics like the ggplot2 library. The default tooltips and plots were more visually aesthetic in ggvis library compared to the other libraries. For implementing the spatial maps, leaflet library was selected. Choosing the leaflet library was again obvious given that it is the leading library for creating interactive maps. The leaflet library has several options for interactivity, adding tiles, adding layers and better support compared to other libraries like tmap, plotly. The mapview library was chosen to implement the popup tables or popup graphs with the crime rates of the highlighted LGA. It has a concise code for adding popup tables and graphs, these popups can be added easily to leaflet maps using the popup argument for the leaflet functions. RColorBrewer library was selected for picking the colour palettes as it has good colour palettes for maps. The colour palettes are also categorised into sequential, diverging or qualitative. The information about the colour blindness of the colour palette is also provided.

Layout

The slide layout decided during the design process was similar to a side bar layout in R Shiny with the annotation in the side panel and the plot in the main panel. For navigating between the tabs, the navigation bar page (navbarPage) layout from R Shiny was selected. The navigation list panel layout was not suitable here as it has the navigation links on the left; this would not go well with the annotation in the side panel. So, the navigation bar page with the navigation links on the top was chosen for the design.

Interaction of the map

The choices for the interaction of the map were either a table or a graph (line chart) popping up on clicking anywhere on the map. The table or graph would show the details of the crime rate for the LGA. Both the interactions were implemented using appropriate functions from the mapview library. The leaflet map generally takes a few seconds to load. It was taking longer to load with the line charts option compared to the tables option. The table was also looking better on the map than the line chart. The line chart was also changing the pan and zoom level of the map. Hence, the interaction for the map was finalised to be a table with the details of the crime rate for the highlighted LGA.

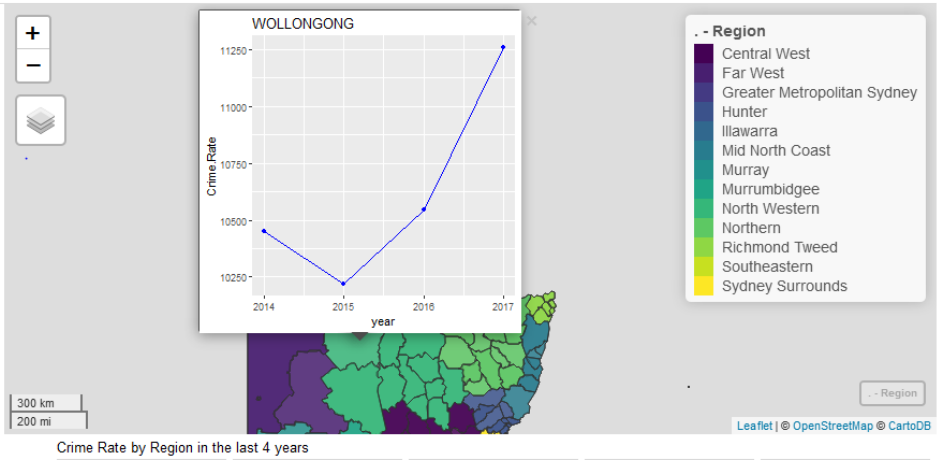


Fig 05: Interactive Map with line chart

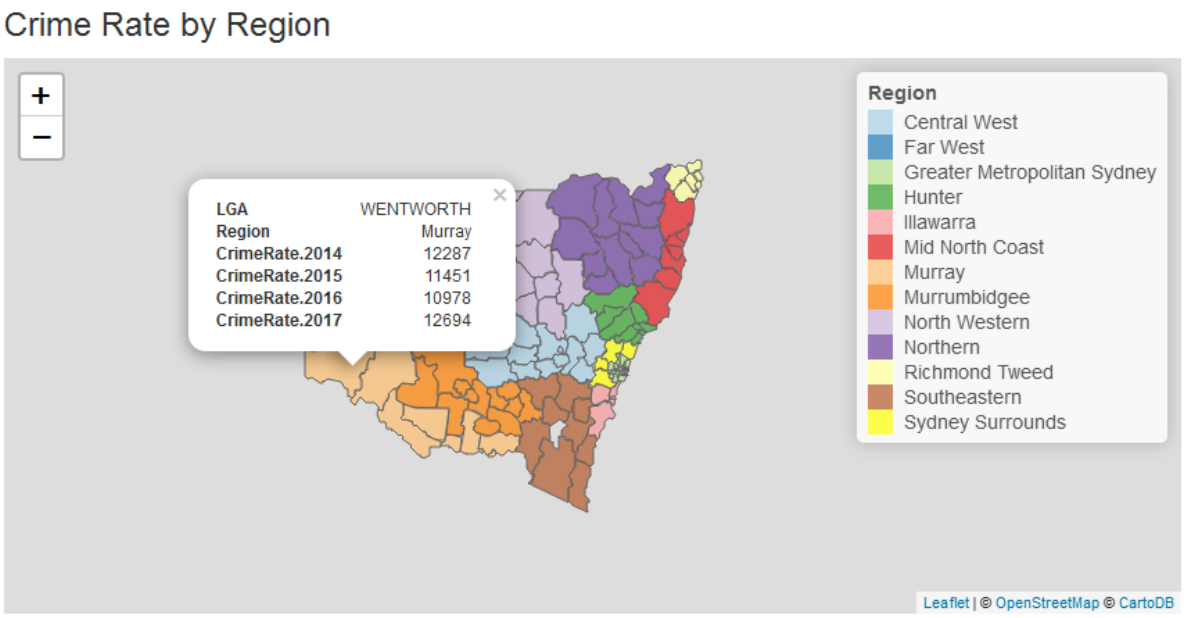


Fig 06: Interactive Map with Table

Colour Palette

The colour palette chosen for the spatial map to show the regions was the “Paired” colour palette from the RColorBrewer library. This palette was selected because it is a qualitative palette and is also colour blind friendly. The colour palette is seen in fig 06 above.

User Guide

The user guide to view and interact with the visualisation is as follows:

1. The R Shiny code uses functions from a few libraries. Please ensure that the following libraries are installed in your system:
    - ggplot2
    - shiny
    - ggvis
    - mapview
    - leaflet
    - rgdal
    - RColorBrewer
    - Scales
2. The R Shiny code assumes that the data files are in the same directory as the code. Please ensure that data files and the code are in the same directory in your system
3. Run the R Shiny App. Preferably run it in R Studio and view the visualization in the browser
4. When the app is run, you will land on the overview tab which is quite straightforward with no interactions

Fig 07: Overview tab in the final design

5. Click on the links in the navigation bar to navigate between the tabs. Go through the tabs from left to right: from the overview tab to the exploratory tab
6. On the crime rate in NSW tab, click on a point in the plot to see the number of offences and population for the selected year

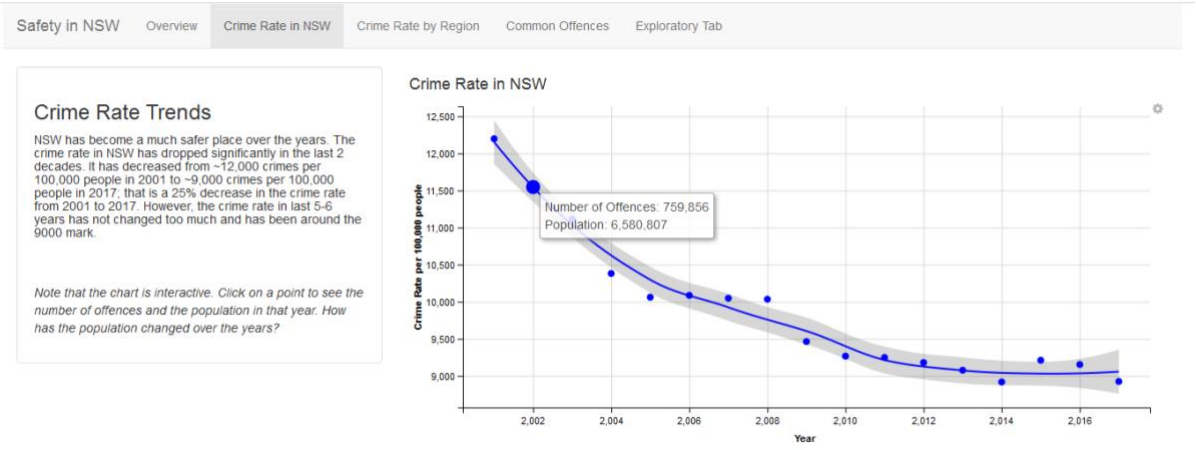
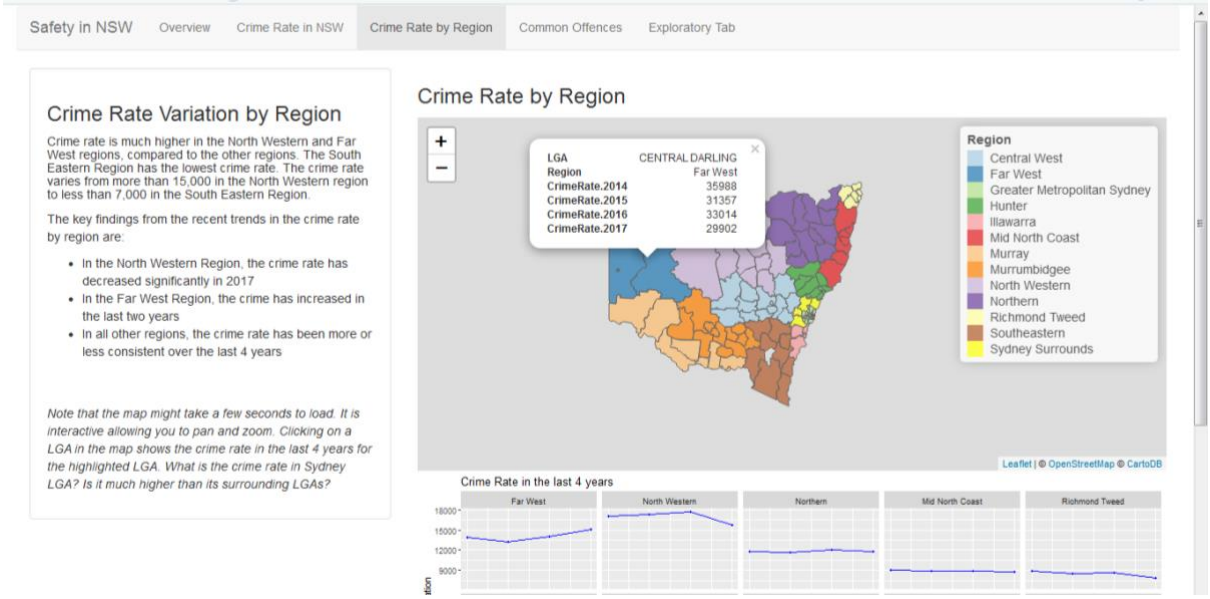


Fig 08: Crime Rate in NSW tab in the final design

7. When you click on the crime rate by region, the annotation will be seen immediately,



however, the leaflet map takes a few seconds to load as is the case with maps. Once the map loads, you can pan and zoom in the map. Click anywhere on the map within the boundaries of NSW to see the table with the details of the crime rate for the LGA of the point (refer to fig 09). You might have to scroll to see the complete facet plot for the crime rate by region in the last 4 years

Fig 09: Crime rate by Region tab in the final design

8. On the Common Offences tab, the line chart with the trends in the crime rate for common offences is interactive. Like the Crime Rate in NSW tab, click on a point to see the number of crimes for the selected offence type and population in that year

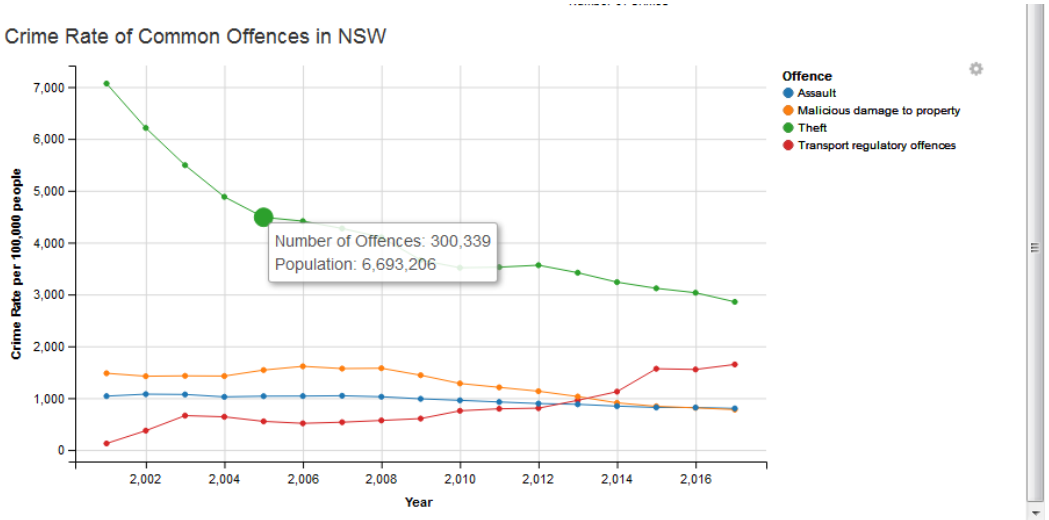


Fig 10: Interactive line chart in the Common Offences tab

9. The last tab is the exploratory tab, select the appropriate region and offence type in the dropdowns. “All Regions” and “All Offences” is selected by default. On changing the selection in the dropdown, the plot shows the line chart with the corresponding data (see fig 11 for reference)

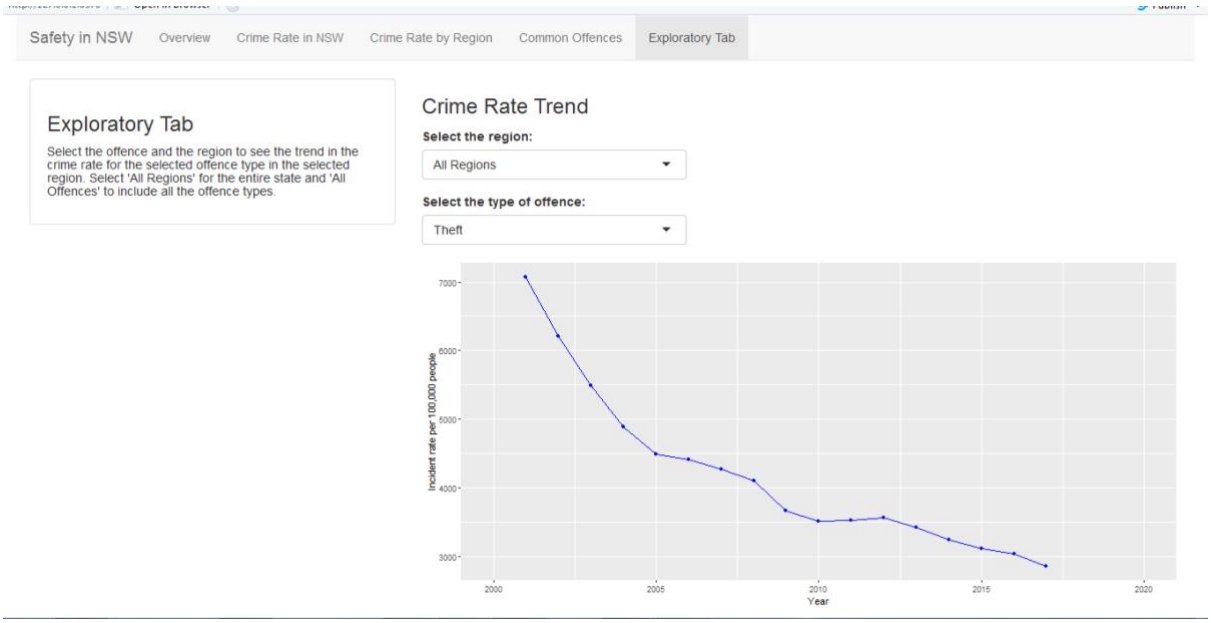


Fig 11: Exploratory Tab in the final design

References

[1] NSW Bureau of Crime Statistics and Research. *Recorded Crime by Offence: Monthly data on all criminal incidents recorded by police*; geographic breakdown by LGA. Retrieved from https://www.bocsar.nsw.gov.au/Pages/bocsar_datasets/Datasets-.aspx