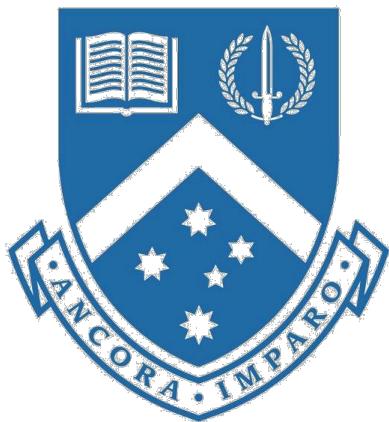


**SAROKRISHNA EKAMBARAKRISHNAN (30068029)**



**DATA VISUALISATION PROJECT**

**AUSTRALIA'S STANCE TOWARDS STRESS SUSTAINABILITY**

**FIT5147 DATA EXPLORATION AND VISUALISATION**

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## **1. INTRODUCTION**

A country's peace and position can be determined by few factors which helps in the prediction of its sustainability in this world. The ability to sustain a nation's serenity lies in the administration of the Government, people and external factors such as allies, contracts, ties and so on .The stressful countries are those that fail to provide its citizens with enough amenities and protection. The stress can come in different forms ranging from insufficient supplies to armed conflicts. When there exists peace in the country, there would be enhancement in all aspects of life. In this project, the capabilities of Australia in handling the Stress can be visualised by comparing with the rest of the world. As from the previous exploration project, it became relatively clear of Australia's stance towards Stress Sustainability but furthermore detailed analysis of its current position and how safe Australia has been for years are performed. Their sincere administration and control measures has helped to withstand the immense stress that any country can imagine in this era. Here, let us understand the Unemployment and crime Rate status of different countries by comparing with Australia, as it qualifies to be a less stressful country over the years. The propitious sign of an emerging economy strives to bring down the most stressful factors like unemployment and homicide level to its minimal and these are the two factors often substantiate and portrays the persona of a developed country. Through this project, Unemployment and Homicide datas of Australia and few other countries are used to show an overview of how the stressful the rest of the world by keeping Australia as an index or threshold.

## 2. DESIGN

---

### 2.1 SHEET 1:

#### IDEAS:

In this project, multiple datasets are required to demonstrate the proximity level of the countries with Australia. The main concentration were on two factors such as Unemployment and Crime Rate. The following are the ideas that were brainstormed to gain an overall perspective:

- An interactive Bar chart for different states of Australia.
- A chloropeth map of the world to demonstrate the countries that are in the same position as Australia.
- chloropeth map of Australia to analyse the unemployment or crime rate trend.
- The line graph to demonstrate the ration of youth to old unemployed.
- Stacked Bar graph to demonstrate the status of the crime levels in Australia
- Pie chart to show the different crimes in Australia
- Homicide rates of different countries can be analysed using line graph

#### FILTER:

The goal is to visually analyse Australia's position in terms of stress, the chloropeth Map are filtered as the Unemployment and Crime rate of Australia and the world are explored in the previous project and would not add more weightage to the main analysis of showing how close the country is to Australia. The stacked bar graph is filtered as it can be replaced with a better visualisation graph such as circle packing graph. Few other graphs are filtered based on the incompatibility of the type of dataset and visualisation graph.

#### CATEGORIZE:

The datasets come under continuous , categorical, numerical categories. The graphs that are best used to visualise for each of the categories were chosen.

#### COMBINE AND REFINER:

The stressfulness of a country can be determined by two main factors such as Unemployment Rate and Crime Rate. Both the streams will be combined to give a final overview of how Australia is evolved and its status in the current era.

---

### 2.2 SHEET 2:

The layout of the visualisation are neatly placed and categorised using R shiny Dashboard. In the Dashboard, there are three main tabs such as Motivation, Unemployment Analysis and Crime Rate Analysis, which has five more sub tabs such as Australia(2), Australia's proximity with other countries for Unemployment and Crime Rate Analysis(2) and Detailed Crime Analysis of Australia.

#### 2.2.1 Case 1:

In the initial design phase, for Unemployment Analysis, when Australia is clicked, the bar graph for all the states of Australia for each whole year was made. The monthly progress of the employment rate for each year would not convey any insights about the state's unemployment status or its approach to make it any better. Hence an interactive Bar graph for all the states of Australia for different years can be done.

### **2.2.2 Case 2:**

In the design phase, a line chart seemed sufficient to visualise the Australia's proximity with respect to Unemployment Rate for the rest of the world. The dataset used here can be made categorical to visualise better for the idea to show the countries that have close values of Australia's rate, more than Australia, worse than Australia and Less than Australia.

---

### **2.3 SHEET 3:**

This sheet explains the operations required to proceed with the visualisation tool for the end users such as migrants, statisticians, any one interested to know about Australia. All the tabs can be pressed to visualise the necessary analysis. There are drop down list for user to choose and interact with the graph.

### **2.3.1 Case 1:**

In the design phase, the use of clustering method on the crime data was designed. There are multiple benefits for Item Aggregation and clustering as it can be visualised better. A frequency graph was intended as each subdivisions of crimes can be visualised to understand the intensity of the volume of crimes in Australia but doing that would be able to highlight the overall aspect of showing how many divisions and the status of the crimes in Australia prevails. Hence **Aggregation/clustering** can be performed on the dataset to enhance the analysis. For this graph, user chooses the year and type of crimes and its crime analysis displays. A categorical dataset would help in this case.

### **2.3.2 Case 2:**

Here, the idea of showcasing the countries position with respect to Australia. In terms of safety, how is Australia better than half of the world. In the initial design phase, a network diagram was designed as each country's similar competition countries will be displayed. But as the implementation of a network diagram was challenging, a better approach stream graph was implemented, highlighting the countries with really high crime rate in relation with Australia through the years.

---

### **2.4 SHEET 4:**

The **Focus** in this visualisation tool would be on the Analytics that ought to be performed on few datasets to get an insightful visualisation. The Item Aggregation and clustering deserves a highlight as it provides a different inference about the dataset and for the end user to understand a different aspect of the main idea. For this project, clustering of the Crime datasets would provide an enhanced insight about the crimes in Australia and how it is distributed in Australia. Correlation can also be focussed by using a scatterplot to find the relations between items.

**Advantages :**

- The Advantages of using Item Aggregation/ Clustering as it's one of the vital building block for the more complex process of visualisation[2].
- It improves the scalability.

### **Disadvantages :**

- Sometimes neglecting of the necessary items from the dataset while clustering or aggregating might happen.

### **2.5 SHEET 5:**

The Final design includes all the visualisations required to make the end user understand my perception towards the main idea. The realisation designs includes the Bar graph, line graph, Frequency graph, Network diagram, Circlepacking.

#### **Algorithms:**

##### **1. BLS Unemployment Rate Algorithm:**

**The Bureau of Labour Statistics** uses an API to calculate the unemployment rate of a country. The datasets are obtained from the official Government websites.

While Wrangling, the missing values for the unemployment rate of a country can be predicted using BLS-API.

##### **2. Crime Score Calculation:**

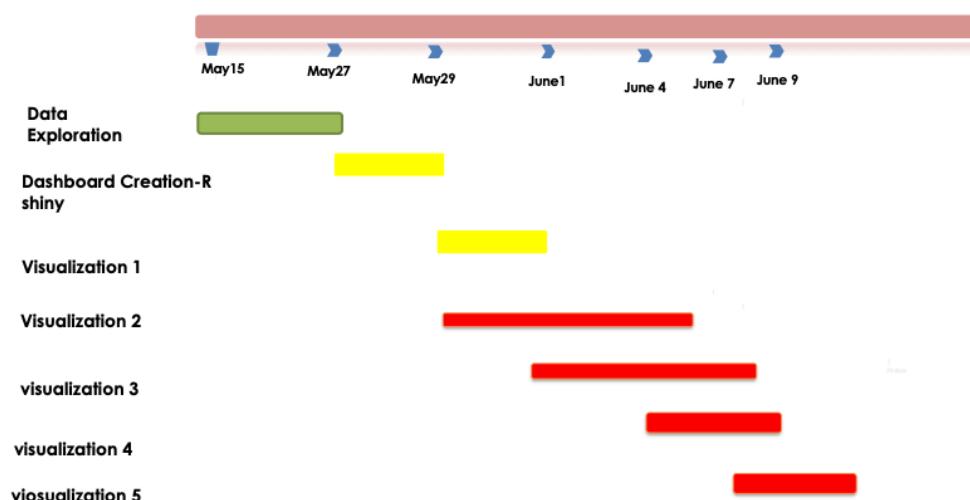
The crime score for each country can be calculated by using an algorithm to find crime score by RPUBS-RStudio where each crimes are assigned with weights.

**Requirements** to perform all of the above would be:

- R, R shiny

#### **Timeline Chart:**

**Timeline chart**



### **3. IMPLEMENTATION**

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#### **3.1 BAR GRAPH:**

An interactive Bar graph was implemented to show the current status of Australia with respect to unemployment rate only for three years because this graph would be of great help for any immediate migrants or for the people in that respective state to know about the position or rank. The Bar graph is set to descending order as the state with the worst unemployment rate would be the first graph. From this the best and worst state of unemployment rate can be understood.

The reason for choosing only three years (2014, 2018 and 2019.) also would demonstrate the efforts of the Government in bringing up a state's stature for the betterment of its people.

#### **Insights:**

The Rankings observed are:

(On a scale of 1-3 where 1 being worst),

In the year **2014**,

- 1- New South Wales:
- 2- Victoria
- 3-Queensland

In the year **2018**,

- 1-Victoria
- 2.New South Wales,
3. Queensland

In the Year **2019**,

- 1.New South Wales,
- 2.Queensland,
- 3.Victoria.

From the graph, many insights can be observed. Few of them are:

1. For any migrant, from the graph they can understand the opportunities that may prevail for them.
2. The Government's measures taken to better the rates as the Victoria's position was pushed to 3 in 2019 from 2018.

#### **Library used:**

Barplot

---

#### **3.2 TREEMAP:**

For hierarchical aggregated visualisations, **Zoomable Treemap** was implemented. The dataset was made categorical to build a hierarchy where the countries that have close values of Australia's rate, more than Australia, worse than Australia and Less than Australia. The threshold value was Australia's unemployment rate for each year. So a **Treemap** was used, here the categories can be visualised beautifully and very interactive to the point where the unemployment rate for each country under a category can be seen. To make it zoomable and for better visualisation, a **d3.js** library called **d3treeR** was used thus increasing the complexity of handling the visualisation with respect to data.

### **Insights:**

1. The size of each categories determines the number of countries belonging to the category where an overall idea can be gained of that year's stature.
2. Interesting facts can be observed such as In the year 2018, Nepal (a third world country ) was better than Australia(first world countries).
3. Australia's constant governance of maintaining its employment rate.

### **Library used:**

treemap  
d3treeR

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### **3.3 CIRCLE PACKING:**

**Circle packing** graph was used for visualisation as it interactively enhances the analysis. **Item Aggregation/clustering** are performed on the dataset to obtain the necessary categories. For this graph, user chooses the year and its crime analysis displays. In the first level, Clusters of cases such as Unsolved, No charges laid and Solved , followed by divisions such as A crime against people, B Property related offences and C Drug offences(only three categories are considered as it is sufficient to get an overall idea about safety In Australia and has the highest counts) and the final level would be the Subdivisions of crime such as B40 Theft, B50 Deception, etc..The dataset is categorical which is a bonus point to approach this method. The dataset ought to be converted to a node format to branch out as levels.

### **Insights:**

1. There are more Unsolved B property related offences every year such as theft, bribery, etc
2. Drug offences are minimal every year.

### **Library used:**

circlepackeR  
data.tree

---

### **3.4 SUNBURST:**

**Sunburst** graph is used to display the detailed information about the crimes in Australia. This is an extra implementation as it was not put in the design sheets. The overall perspective of crime divisions for each year can be visualised. The percentage of each crimes in each year can be viewed too. The values are summed up for each categories of crime for each year. The filtering of the data was done to achieve this. The dataset ought to be converted to tree format (json) to form parents and child nodes(key and value pairs).

### **Insights:**

- 1.The year 2016, most crimes happened especially there was a boom in Drug offences and there was an increase of immigrants in the same year [3] which might have some connection with the increase in crime rate.
2. There is always an increase in the B property crimes in Australia every year.
3. There exists wavering of A crime against person crimes every year in Australia.

**Library used:**  
sunburstR  
d3r

### 3.5 STREAMGRAPH:

Streamgraph was implemented instead of Network diagram as it was challenging to inculcate the d3 network library with R hence a streamgrph approach was done. This graph is a type of stack area chart which would serve the purpose of finding which countries has the worst crime rate in other terms unsafe and few countries that are similar to Australia(one of the safest country in the world[4]). For this visualisation, considering all the countries of the world would not be effective as there exists fluctuations to which country can be regarded as the most unsafe because of this confusing era and it was explored in the exploration project. Here the goal is to show the countries that have crime rates way more than Australia and few first world countries that have similar population and have almost same crime rates.

Insights:

1. Few competitive countries have a little better rate than Australia such as United Kingdom, Canada and so on .
2. Croatia has maintained its crime rate for all the years from 2009 to 2017.

**Library used:**  
streamgraph

## 4. USERGUIDE

The following are the details about each tabs and how to understand the visualisations for the end users:

**STRESS ANALYSIS**   ≡

### Australia's Stance Towards Stress Sustainability

A country's peace and position can be determined by few factors which helps in the prediction of its sustainability in this world. The stressful countries are those that fail to provide its citizens with enough amenities and protection. The stress can come in different forms ranging from insufficient supplies to armed conflicts. The severity of the stress upon people can be high even in advanced economies. Here, the stress level of few countries in comparison with Australia can be visualised. The propitious sign of an emerging economy strives to bring down the most stressful factors like unemployment and homicide level to its minimal. Due to the country's instability, the mental stress of its people elevates leading to unwanted armed and unarmed conflicts. Through this project, Unemployment and Homicide data of Australia and few other countries are explored as these are the two factors often substantiate and portrays the persona of a developed country.



#### Why Australia?

This confusing era makes us question our survival in any country. The impending threat in all countries poses a huge problem but the Australian government and the genuine spirit of the citizens keeps the wheel of peace rotating without any hiccups. The purview of the economic stature of Australia conveys a strong message worldwide that their perseverance and resilience helped to achieve their goal in reducing unemployment and a strong judiciary system to elevate their current position and impetus enough to be proud Australians and immigrants.

<b>Unemployment Analysis</b>  SubTab1-Australia The Bar graph to show the current status of all the states in Australia  SubTab2-Australia's proximity-countries The Treemap to show the countries that comes under the different hierarchies in relation with Australia's Rate	<b>Crime Analysis</b>  SubTab1-Australia The Sunburst graph to show the distribution percentage of crime divisions in Australia for each year  SubTab2-Detailed Australia The Circle Packing Graph to show the status, divisions and subdivisions of crime for each year of Australia  SubTab3-Australia's proximity-countries The StreamGraph to show different countries's crime Rate
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## 4.1 INTRODUCTION

The above is the **Motivation** page of the tool describing the reason behind the visualisation tool. The above **STRESS ANALYSIS** is the name of the dashboard and the sign next to it is to press to view the options.

### STRESS ANALYSIS

- Motivation
- About

- Unemployment Analysis
  - Australia
  - Australia's proximity-countries
- Crime Analysis
  - Australia
  - Australia-Detailed
  - Australia's proximity-countries

# Australia's Stance Towards Stress Sustainability

A country's peace and position can be determined by few factors which helps in its sustainability in this world. The stressful countries are those that fail to provide its amenities and protection. The stress can come in different forms ranging from internal and external armed conflicts. The severity of the stress upon people can be high even in advanced countries. The stress level of few countries in comparison with Australia can be visualised. The present emerging economy strives to bring down the most stressful factors like unemployment to its minimal. Due to the country's instability, the mental stress of its people elevates. The unwanted armed and unarmed conflicts. Through this project, Unemployment analysis of Australia and few other countries are explored as these are the two factors often seen in the persona of a developed country.



## Why Australia?

This confusing era makes us question our survival in any country. The impending challenges pose a huge problem but the Australian government and the genuine spirit of the nation are working hard to keep the wheel of peace rotating without any hiccups. The purview of the economic stature of the country is also improving day by day.

The dashboard options are displayed. We are currently on the Motivation page as it is highlighted. **Unemployment Analysis** Tab has two sub tabs :

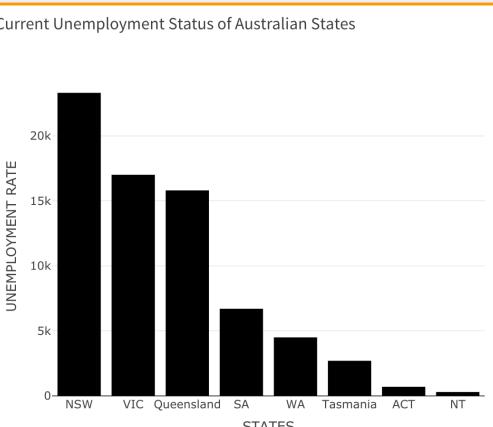
### 1.Australia:

### STRESS ANALYSIS

- Motivation
- About

- Unemployment Analysis
  - Australia
  - Australia's proximity-countries
- Crime Analysis
  - Australia
  - Australia-Detailed
  - Australia's proximity-countries

#### Current Unemployment Status of Australian States



STATE	UNEMPLOYMENT RATE
NSW	~22k
VIC	~17k
Queensland	~15.5k
SA	~8k
WA	~4.5k
Tasmania	~2.5k
ACT	~1k
NT	~0.5k

Control for Year

Year

2014

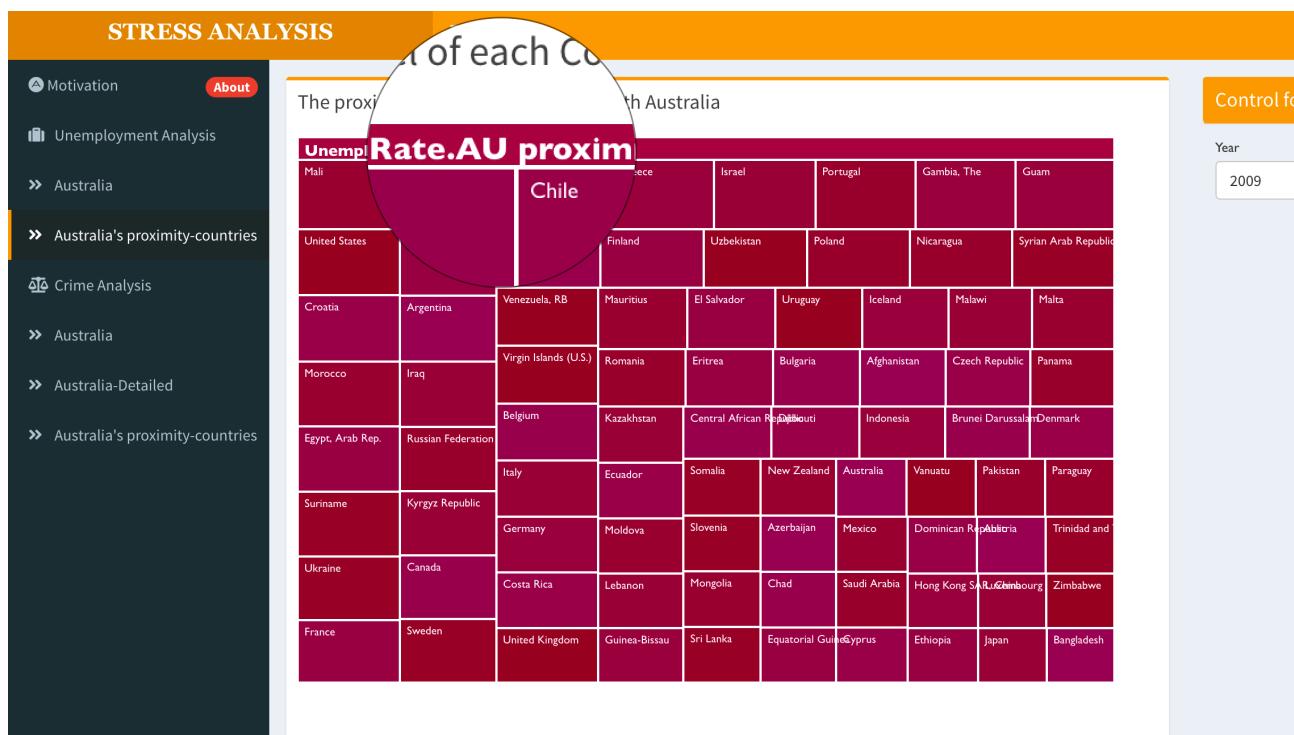
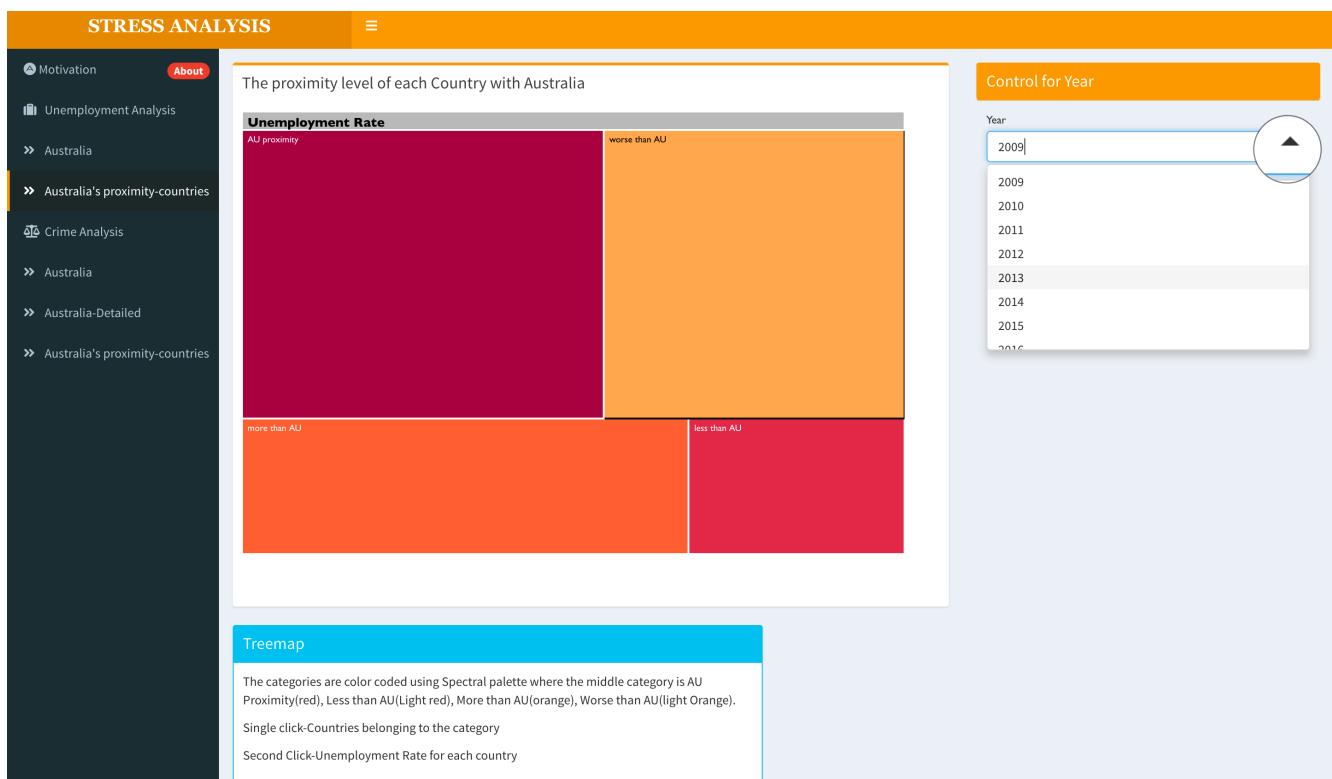
2018

2019

The current status of Australia with respect to unemployment rate only for three years. The Bar graph is set to descending order as the state with the worst unemployment rate would be the first graph. From this the best and worst state of unemployment rate can be understood.

The **Control of the Year** box is for the user to interact and visualise the graph change according to the input.

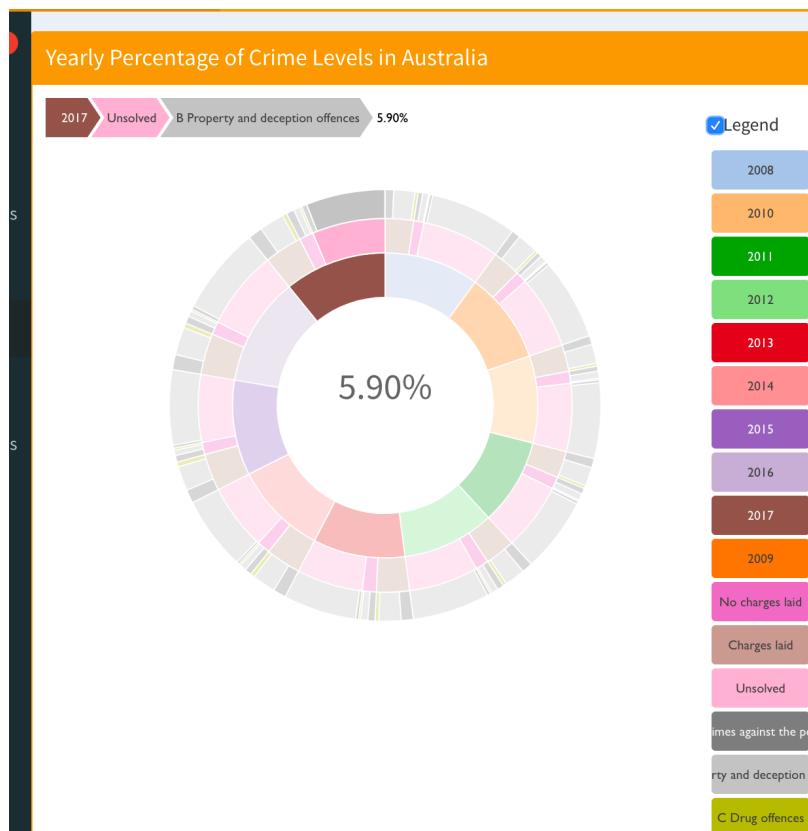
## 2. Australia's proximity-other country:



The levels of interaction can be done by clicking on the desired category, the above chosen was AU proximity displaying the counties with similar values.

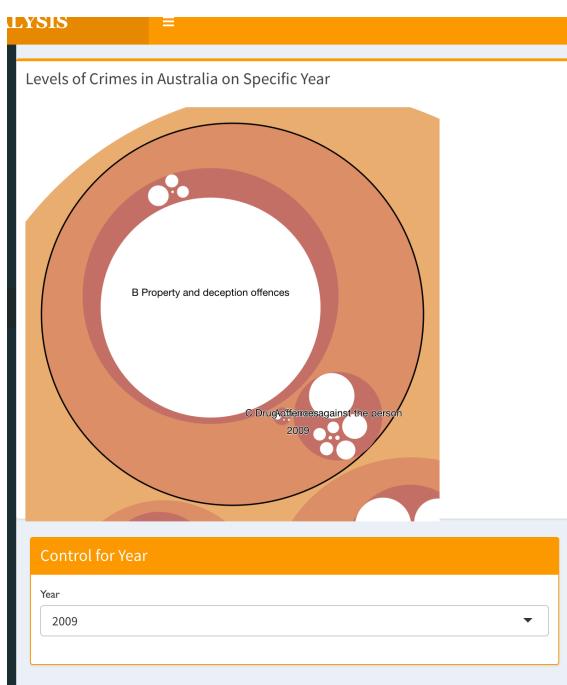
### Crime Analysis has three tabs:

#### 1. Australia



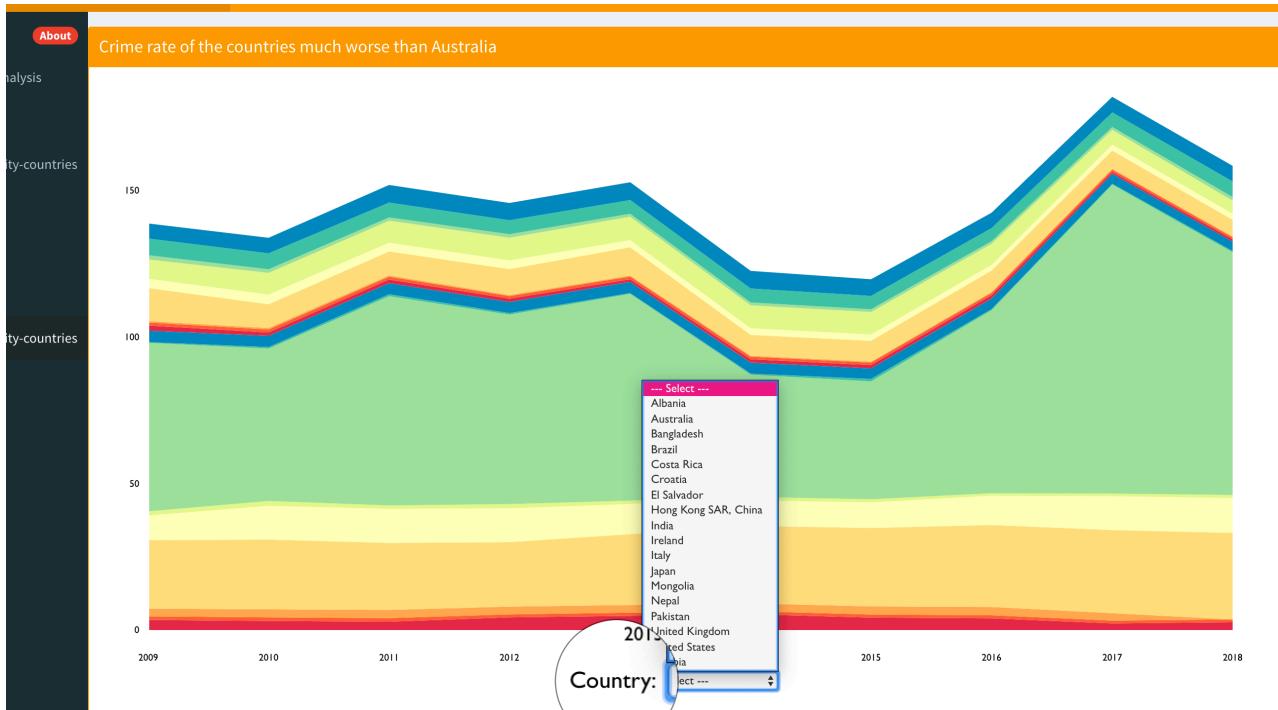
The user can hover the graph to see the percentage change in the middle.

#### 2. Australia-Detailed:



Each level of the crimes can be clicked and found out in the graph, the first level is for the states of the crimes, second level is for the crime division and third level is for the crime subdivision.

### 3. Australia's proximity-other country:



In The stream graph, the user can choose the country they want to visualise separately, it will be highlighted.

Info boxes are also provided to the graphs for the users to have a better understanding of what they are visualising.

## 5. CONCLUSION

The Data Visualisation project provided with many insights about how to handle and manipulate the data to make a beautiful visualisation for the end user to understand and develop different perspectives. The main goal behind choosing this topic “Australia’s Stance Towards Stress Sustainability” was to bring out creative and different insights of Australia’s capabilities towards Stress management. The initial step of understanding the prospects of the datasets and the extent of Australia’s measures to maintain its stature in the world was achieved in the Exploration project where multiple questions arose and several approaches were determined to answer them. Therefore led to the above mentioned Visualisations of the desired topic. While using different Analytics to furthermore analyse the data, it provided with the better overview fo how serious Australian Government acts towards the crimes and different measures to increase the employment opportunities for its people.

From the above visualisations, insights about Australia and the rest of the world in terms of Unemployment and Crime Rate was analysed and understood. The purview of the economic stature of Australia conveys a strong message worldwide that their perseverance and resilience

helped to achieve their goal in reducing unemployment and a strong judiciary system to elevate their current position and impetus enough to be proud Australians and immigrants. This success is shared by the corporation of the people. It's an arduous mission for Australia to maintain a sane frontier amongst the super powers. The other few factors such as Pollution, Family support, Living conditions to prove that Australia is one of the least stressed countries.

I would have analysed a little bit more of the economic stature of Australia to have an added point on how it excels in its governance and requires a little more pointers to improve its level.

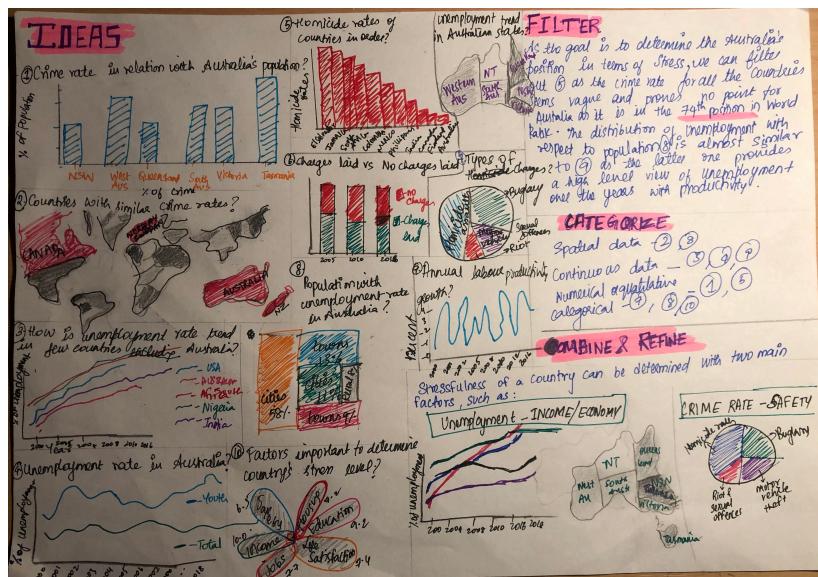
## 6. REFERENCES

1. .Atlas & Boots. (2019). *World's most stressed countries – ranked*. [online] Available at: <https://www.atlasandboots.com/most-stressed-countries/> [Accessed 28 Apr. 2019]
2. <https://engineering.purdue.edu/~elm/projects/hieragg/hieragg.pdf>
3. [https://en.wikipedia.org/wiki/Crime\\_in\\_Australia#2016-2017](https://en.wikipedia.org/wiki/Crime_in_Australia#2016-2017)
4. <https://www.businessinsider.com.au/safest-countries-in-the-world-for-women-2019-4>

## 7. APPENDIX

### FIVE-SHEET DESIGN:

1.



**LAYOUT**

**Case 1:**

**DASHBOARD - STRESSFUL SUSTAINABILITY**

**UNEMPLOYMENT**

- AUSTRALIA
- COUNTRIES (OTHER)

**CRIME RATE**

- AUSTRALIA
- COUNTRIES (OTHER)

**DATA EXPLORER**

**UNEMPLOYMENT RATE FOR VIC IN 2005**

Feb Mar Apr Nov Dec

UNEMPLOYMENT RATE THROUGH THE YEARS

Maps - with markers

NSW 2006 LM

**Case 2:**

**DASHBOARD - STRESSFUL SUSTAINABILITY**

**UNEMPLOYMENT**

- AUSTRALIA
- COUNTRIES (OTHER)

**CRIME RATE**

- AUSTRALIA
- COUNTRIES (OTHER)

**DATA EXPLORER**

**UNEMPLOYMENT RATE FOR CANADA & AUSTRALIA IN 2018**

mm - Canada  
aa - Australia

**Case 3:**

**DATA - UR**

Australia All countries

YEAR	Month	NSW	SOUTH AUSTRALIA	TASMANIA	VIC	WEST AUSTRALIA	QUEENSLAND
2004	Jan	2.8	2.5	1.8	2.6	2.5	2.7
2004	Feb	2.9	2.4	1.4	2.7	2.6	2.8
2005	Jan	.	.	.	.	.	.
2005	Feb	.	.	.	.	.	.

**OPERATIONS IN LAYOUT:**

**Case 1:**

**DASHBOARD - STRESS SUSTAINABILITY**

**UNEMPLOYMENT**

- AUSTRALIA
- COUNTRIES (OTHER)

**CRIME RATE**

- AUSTRALIA
- COUNTRIES (OTHER)

**DATA EXPLORER**

**PRESS**

**CHOOSE MAIN FACTOR**

**INVESTIGATION STATUS**

charges laid  
NO charges laid  
Unresolved

**offense division**

- A - against people
- B - property offense
- C - drug
- F - other

**ITEM AGGREGATION**

FOCUS/ZOOM

**GRAPH DISPLAYED**

**FREQUENCY GRAPH**

Frequency

Incidents recorded

**Case 2:**

**DASHBOARD - STRESS SUSTAINABILITY**

**UNEMPLOYMENT**

- AUSTRALIA
- COUNTRIES (OTHER)

**CRIME RATE**

- AUSTRALIA
- COUNTRIES (OTHER)

**DATA EXPLORER**

**CHOOSE ONE FROM LIST**

**Country**

- Albania
- Angola
- Arab World
- Australia
- Zimbabwe

**TIME**

UR: 8.4  
CR: 3.3

UR: 8.6  
CR: 3.2

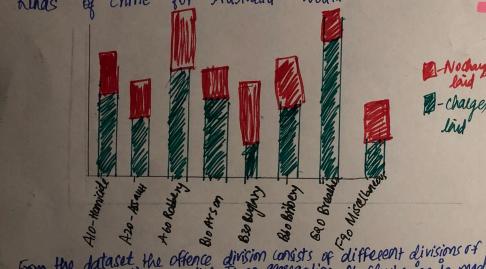
UR: 7.9  
CR: 6.7

2018 - COUNTRIES WITH SIMILAR UNEMPLOYMENT & CRIME RATE VS AUSTRALIA

## ANALYTICS - Focus

### ITEM AGGREGATION, CLUSTERING AND SMOOTHING

For CrimeRate of a country, there are multiple attributes involved. The distribution of different kinds of crime for Australia would be:



From the dataset, the offence division consists of different divisions of offences for each year. Here, Item aggregation or clustering is made use so that all the subdivisions fall (20, 40, 60, ... belonging to A-against people division so they are aggregated and formed as one).



Title: Focus with Analytics  
Author: 30068029  
Sheet: 4  
Task: 4

### ADVANTAGES:

- ① Inclusion of Item Aggregation gives a better overview of how serious Australian government acts towards the crimes.
- ② As few crimes don't hold heavy weightage in terms of are not offenable crimes, they cannot determine the safety of a country.
- ③ Correlation between unemployment rate with population can determine the economic status + how is the country's stance for Employment. (Scatterplot can be used).

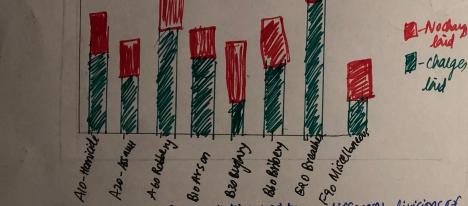
### DISADVANTAGES:

- ① Using Item aggregation might lead to omit few attributes, there might be few crime divisions requiring more attention as it is a high Punishable crime.

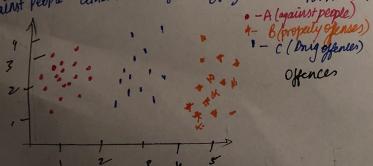
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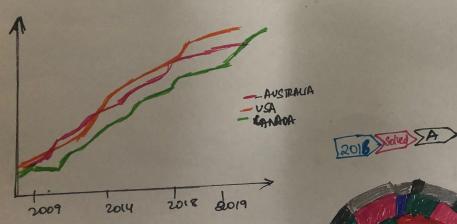
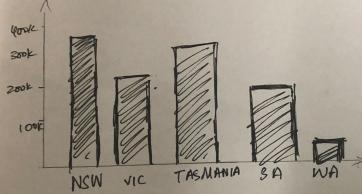
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### DISADVANTAGES:

- ① Using Item aggregation might lead to omit few attributes, there might be few crime divisions requiring more attention as it is a high Punishable crime.

## FINAL DESIGN



= DASHES

