CS732: Data Visualisation Assignment 1 Report

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I. Introduction

This report examines the Higher Education Attrition Rate (Dropout Rate) dataset from 2005 to 2013 to explore trends in student retention across various demographics, regions, and socio-economic backgrounds at public universities in Australia.

II. Dataset

The dataset comprises several files detailing attrition rates across various demographics and geographical areas. Key variables include:

1) Reference year: Year of the attrition rate.
2) attrition rate: Overall attrition rate.
3) nesbattrition: Attrition rate for non-English speaking background students.
4) disattrition: Attrition rate for students with disabilities (hearing, learning, mobility, vision, medical, etc.).
5) seslow2006attrition: Attrition rate for students from low socio-economic backgrounds (2006 SEIFA index).
6) seslow2011attrition: Attrition rate for students from low socio-economic backgrounds (2011 SEIFA index).
7) indigenousattrition: Attrition rate for Aboriginal and Torres Strait Islander students.
8) modeinternalatt: Attrition rate for internal (classroom) study.
9) modeexternalatt: Attrition rate for external (online) study.
10) modemultiatt: Attrition rate for mixed internal and external study.
11) typeftatt: Attrition rate for students studying full-time.
12) typeptatt: Attrition rate for students studying part-time.
13) genderfemaleatt: Attrition rate for female students.
14) gendermaleatt: Attrition rate for male students.
15) ageunder25att: Attrition rate for students aged under 25.
16) age25to39att: Attrition rate for students aged 25 to 39.
17) agegt39att: Attrition rate for students aged greater than 39.
18) boahigheredatt: Attrition rate for students admitted based on prior higher education.
19) boasecondaryatt: Attrition rate for students admitted based on secondary education.
20) boavetatt: Attrition rate for students admitted based on prior VET education.
21) boamatureatt: Attrition rate for students admitted based on mature age entry.
22) boaproffatt: Attrition rate for students admitted based on professional qualifications.
23) boaotheratt: Attrition rate for students admitted based on other provisions (e.g., interviews, tests).
24) atarunder70att: Attrition rate for students with ATAR under 70.
25) atar70to89att: Attrition rate for students with ATAR between 70 and 89.
26) atargt89: Attrition rate for students with ATAR of 90 or above.
27) bfoescienceatt: Attrition rate for Natural and Physical Sciences students.
28) bfoeITatt: Attrition rate for Information Technology students.
29) bfoeengineeratt: Attrition rate for Engineering students.
30) bfoearchatt: Attrition rate for Architecture and Building students.
31) bfoeagricatt: Attrition rate for Agriculture and Environmental Studies students.
32) bfoehealthatt: Attrition rate for Health students.
33) bfoeeducatt: Attrition rate for Education students.
34) bfoemanageatt: Attrition rate for Management and Commerce students.
35) bfoesocietyatt: Attrition rate for Society and Culture students.
36) bfoeartsatt: Attrition rate for Creative Arts students.
37) SA3code: Unique Statistical Area Level 3 (SA3) code from the Australian Bureau of Statistics' ASGS 2011.
38) SA3name: Name corresponding to the SA3 code.
39) 2005 to 2013: Annual attrition rates for each year from 2005 to 2013.
40) LGAcode: Local Government Area (LGA) code using 2015 boundaries from the Australian Bureau of Statistics.
41) LGAname: Name corresponding to the LGA code, based on 2015 boundaries.

Apart from this, we have made columns of our own based on the available data. These columns are:

1) avg[...]: Averages of different datasets from 2005 to 2013.
2) AvgRate: Average rate of attrition percentage change per year for SA3 and LGA states ,for 2005-2013.

III. Tasks

Through visual exploratory analysis, we aim to gain the following insights and expect one to reproduce the following tasks:

1) T1: Trend Analysis Over Time and Demographics
2) T2: Field of Study Analysis
3) T3: Geographical Analysis

IV. Assumption / Data Filtration

Given the small size of the dataset, we have opted not to apply any assumptions or filtration to the data.

V. Data Stories

A. T1: Trend Analysis Over Time and Demographics

What are the overall trends in attrition rates across the years 2005-2013?

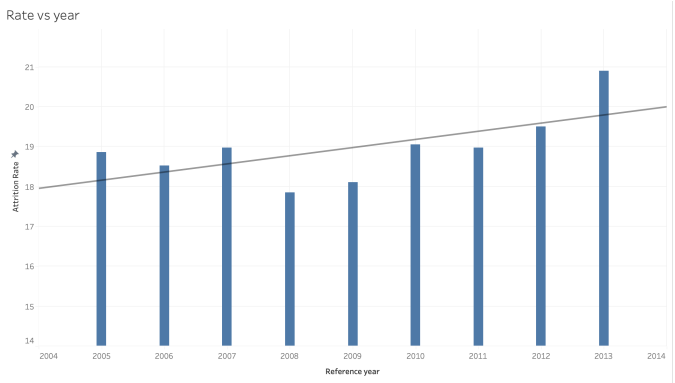


Fig. 1: Bar plot between Attrition Rate(%) and Year

1) Overall attrtion rate across years: One can observe from Figure 1, a general increase in attrition rates each year, with an exception in 2008.

Several factors contributed to this anomaly, including the Global Financial Crisis, which led more students to stay in education due to a challenging job market. Additionally, government reforms increased funding and support for higher education, enhanced student support services improved retention. A focus on education quality also helped engage students and reduce dropouts.

2) Age Group Analysis: An area graph showing attrition rate versus year for different age groups is plotted in Figure 2. This graph reveals that the trends for individual age groups align closely with the overall attrition rate.

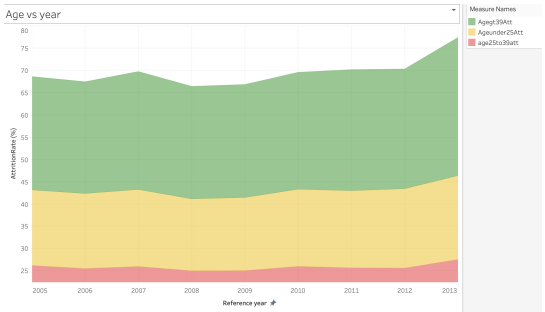


Fig. 2: Area plot showing attrition rate (%) by year for different age groups

Key observations from this plot include:

- The 25 to 39 years age group has the lowest attrition rate, likely due to greater stability in personal and professional lives.
- The age group above 39 years consistently shows the highest attrition rate, possibly due to increased job responsibilities, financial pressures, and personal commitments.
- The age group below 25 years shows moderate attrition rates, younger students might be more prone to dropping out due to the challenges of adjusting to higher education, exploring career paths, or switching courses.

3) Gender-Based Analysis: Figures 3 and 4 present the gender-based analysis. Figure 3 displays a bar graph for males and a line graph for females, while Figure 4 shows a pie chart of the average attrition rate by gender.

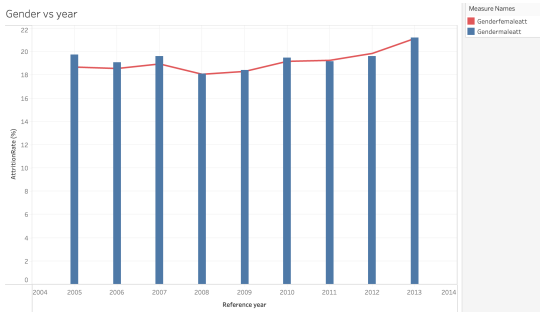


Fig. 3: Bar and line plot of attrition rate by gender (male: bar, female: line) over time

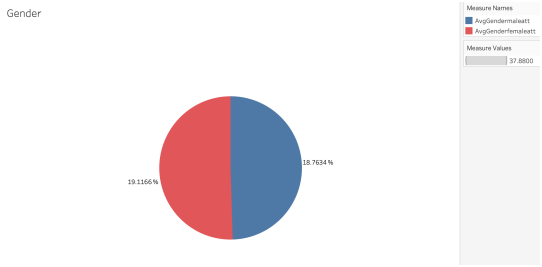


Fig. 4: Pie chart of average attrition rate by gender

From these plots, the following key observations are made:

- The combination of the line and bar plot in Figure 3 is used to compare attrition rates between genders.
- The pie chart in Figure 4 illustrates the overall attrition rate for males and females.
- The colors in Figures 3 and 4 are consistent, dark pink is used for female to highlight femininity and contrast with blue, while blue represents male for its common association with masculinity and clear differentiation..
- Figure 4 indicates that females have a higher overall attrition rate compared to males.
- Figure 3 shows that between 2005 and 2007, males had a higher attrition rate than females. However, from 2008 to 2013, the attrition rates for both genders were similar.

Summary: The analysis shows that females have a higher overall attrition rate compared to males, as seen in Figure 4. From 2005 to 2007, female attrition was lower than male, but by 2008-2013, the rates were similar, suggesting that institutional changes may have addressed earlier challenges. The

visualizations effectively highlight these trends and gender differences.

4) Mode of Study Analysis: A line graph depicting the average attrition rate across years for different modes of study is shown in Figure 5. Additionally, Figure 6 presents a horizontal bar graph of average attrition rates from 2005-2013 for these modes.

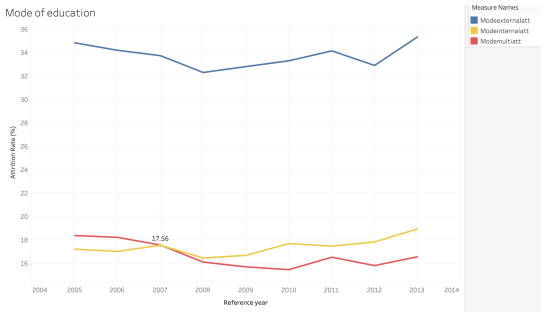


Fig. 5: Line graph of average attrition rate across years for different modes of study

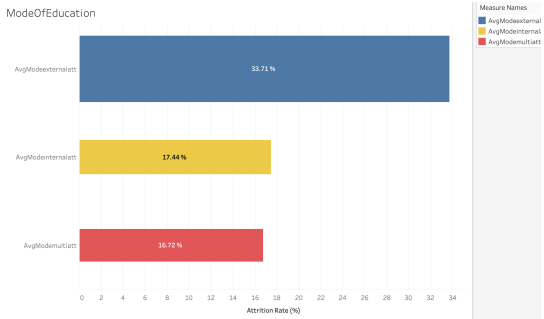


Fig. 6: Horizontal bar graph of average attrition rate (2005-2013) for different modes of study

From these plots, the following key observations are made:

- Figure 6 shows that external mode(blue) has the highest average attrition rate, followed by internal(yellow) and multi-mode(red) studies.
- The external mode's higher attrition rate is due to reduced support, interaction, and difficulties managing distractions and technology issues.
- Figure 5 shows that before 2007, multi-mode study had higher attrition compared to internal mode, likely due to the complexities of hybrid formats and technology-related challenges.
- After 2007, Figure 5 indicates that internal mode had higher attrition, possibly due to increased pressures or changes in delivery and support systems.

Summary: External modes lead to higher attrition rates due to distractions and technology issues. In contrast, multi-mode studies show lower attrition rates due to better engagement with technology and resources.

5) Studying Full-Time and Part-Time Analysis: Figures 7 and 8 illustrate the attrition rates for full-time and part-time students. Figure 7 presents a line graph showing attrition trends over the years, while Figure 8 provides a pie chart of average attrition rates from 2005-2013.

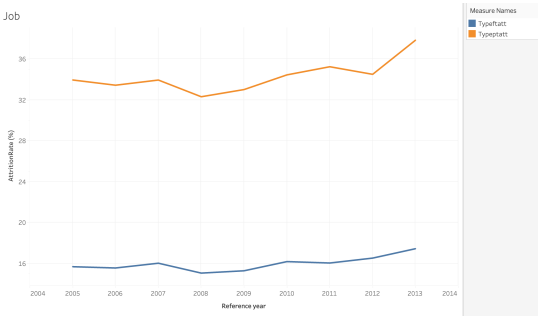


Fig. 7: Line graph of attrition rate across years for full-time and part-time students

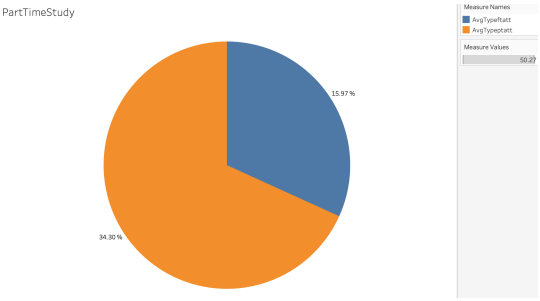


Fig. 8: Pie chart of average attrition rate (2005-2013) for full-time and part-time students

From these plots, the following key observations are made:

- Figures 7 and 8 show that part-time students have a higher attrition rate compared to full-time students.
- Figure 8 highlights the proportion of attrition rates attributed to part-time versus full-time study.
- The higher attrition for part-time students may result from balancing work and study, reduced access to resources, and less academic engagement.

Summary: Part-time students have higher attrition rates compared to full-time students due to challenges in managing studies with other commitments. The visualizations effectively highlight these differences and the impact of study mode on attrition.

6) Socio-Economic Status Analysis: Figures 9 and 10 depict attrition rates for students from low socio-economic backgrounds across 2005-2013. The data is based on the 2006 and 2011 Australian Bureau of Statistics' Socio-Economic Indexes for Areas (SEIFA).

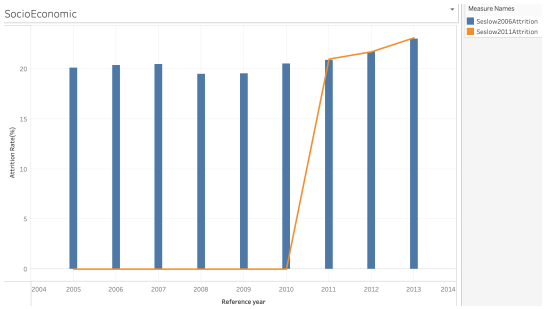


Fig. 9: Attrition rate across years for low socio-economic background (2006 and 2011)

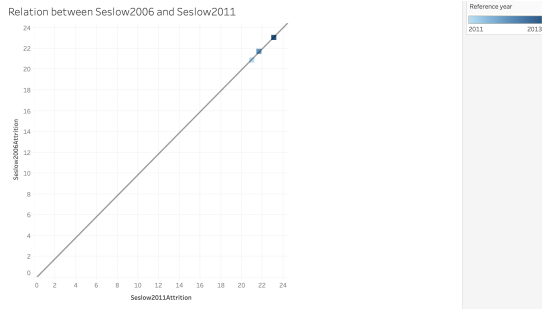


Fig. 10: Comparison of low socio-economic background (2006 vs. 2011)

Note: Low socio-economic status is based on students' postcode of permanent home residence mapped against the 2006 / 2011 Australian Bureau of Statistics' Socio-Economic Indexes for Areas (SEIFA) Index of Education and Occupation by postal area, with the postal areas containing the bottom 25% of the population aged 15-64 on the SEIFA file being classified as low socio-economic

From these plots, the following key observations are made:

- Figure 9 shows similar attrition trends for low socio-economic backgrounds in 2006 and 2011, consistent with Figure 10.
- Figure 9 reveals zero attrition for SESlow2011 between 2005-2010, since it's from 2011, while Figure 10 excludes these early data points in its analysis.
- The consistency between SESlow2006 and SESlow2011 suggests stable attrition patterns over the years for low socio-economic backgrounds.
- For the line chart representing 2011, orange is chosen to provide a vibrant and clear contrast to the blue, making it easy to distinguish between the two years

Summary: Attrition rates for students from low socio-economic backgrounds remain consistent between 2006 and 2011. The data indicates a stable relationship between these socio-economic indices over time.

7) Non-English Speaking Students Analysis: Figure 11 presents the attrition rates for non-English speaking students between 2005-2013.

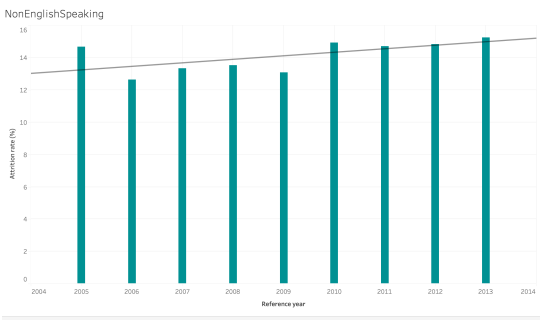


Fig. 11: Bar plot for attrition rate across years for non-English speaking students

From the plot, the following key observations are made:

- Figure 11 shows a slight but consistent increase in attrition rates for non-English speaking students over the years.
- The trend line in Figure 11 confirms this gradual rise.
- Teal is selected as the color for this Figure 11 because it is often associated with inclusivity and communication, aligning with the theme of addressing challenges faced by non-English speaking students. This choice ensures the data is clearly conveyed and thoughtfully represented..

Summary: Attrition rates for non-English speaking students have steadily increased over time, possibly due to language barriers, cultural adjustments, or difficulties accessing support services in a primarily English-speaking environment.

8) Disability of Students Analysis: Figure 12 presents attrition rates for students with disabilities from 2005-2013.

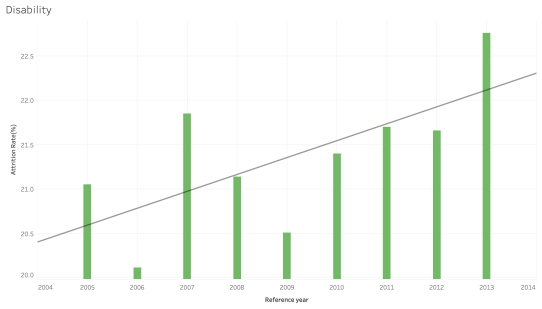


Fig. 12: Bar plot for attrition rate across years for students with disabilities

From the plot, the following key observations are made:

- Attrition rates for students with disabilities gradually increased over the years, as shown in Figure 12.
- 2006 shows the lowest attrition rate, likely due to the 2005 Disability Standards for Education, which improved support and accessibility.
- Green color is used in Figure 12 to represent the data for students with disabilities, symbolizing support and well-being.

Summary: Despite early improvements, attrition rates for students with disabilities have risen, possibly due to evolving challenges or insufficient ongoing support.

9) Indigenous Students Analysis: Figure 13 shows attrition rates for Indigenous students (Aboriginal and Torres Strait Islander) from 2005-2013.

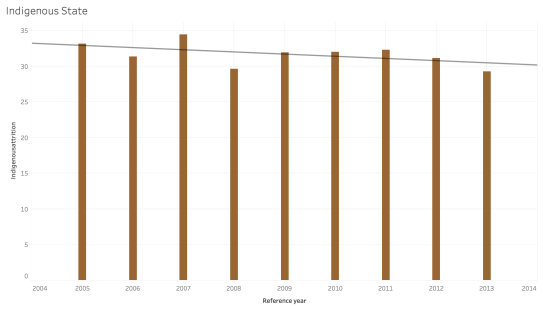


Fig. 13: Bar plot for attrition rate across years for Indigenous students

From the plot, the following key observations are made:

- Attrition rates for Indigenous students steadily decreased over the years, as seen in Figure 13.
- The most significant drop occurred between 2009 and 2013.
- 2013 recorded the lowest attrition rate, suggesting improvements in retention.
- Increased access to scholarships, community support programs, and cultural inclusion initiatives likely contributed to this decline.
- Earthly brown color ,used in Figure 13, chosen for representing attrition rates for Indigenous students due to its symbolic connection to land and cultural heritage. This color reflects respect for the traditional and cultural significance of Indigenous communities.

Summary: The gradual decrease in attrition rates for Indigenous students is likely due to enhanced educational support, government policies, and community-driven programs aimed at reducing barriers for Indigenous students.

10) ATAR Score Analysis: Figure 14 shows attrition rates from 2005-2013 based on different ATAR scores, and Figure 15 shows the average attrition rate across these years for each ATAR range.

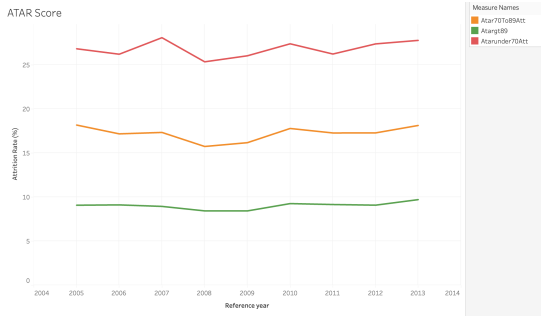


Fig. 14: Line chart for attrition rate across years based on different ATAR scores

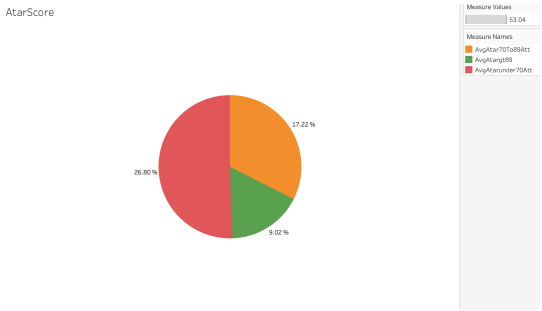


Fig. 15: Pie chart for average attrition rate across years based on different ATAR scores

From the plot, the following key observations are made:

- Figures 14 and 15 show that students with ATAR scores of 90+ consistently have the lowest attrition rates, remaining constant over time.
- Students with ATAR scores below 70 exhibit the highest attrition rates, indicating academic challenges, as seen in the red section of Figure 15.
- The pie chart in Figure 15, effectively visualizes the distribution of average attrition rates across different ATAR ranges using color differentiation.
- The line chart in Figure 14, highlights the trend of attrition rates for various ATAR scores over the years.
- Colors are consistent across both charts: red for high attrition (urgent concern), orange for moderate attrition (caution), and green for low attrition (stability) rates.

Summary: Higher ATAR scores correlate with lower attrition rates, likely reflecting stronger academic preparedness, while students with lower ATAR scores struggle more, leading to higher dropout rates.

11) Other Correlation Between Attributes: Square graphs were plotted to analyze the relationship between gender and mode of study (Figure 16) and studying time and mode of study (Figure 17), because they effectively represent relationships between multiple categorical variables, allowing us to observe trends in attrition rates over time.

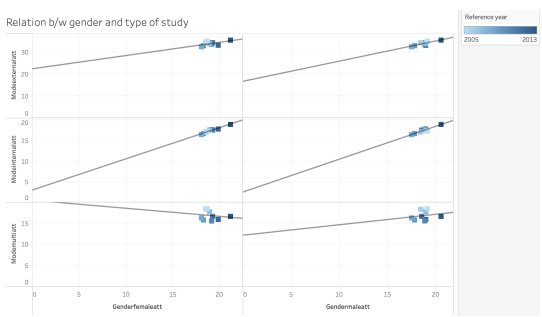


Fig. 16: Square graph showing correlation between gender and mode of study for attrition rates.

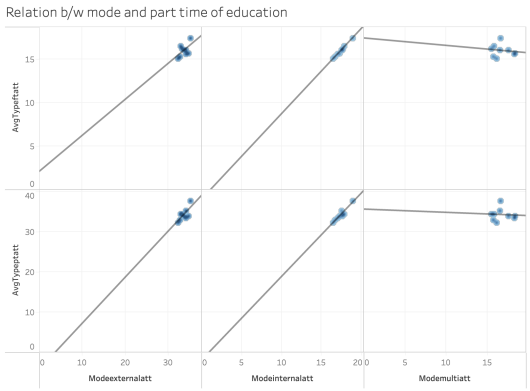


Fig. 17: Square graph showing correlation between studying time and mode of study for attrition rates.

From the plot, the following key observations are made:

- Figure 16 shows fewer female students in multi-mode programs are dropping out, likely due to improvements in blended learning, flexible schedules, and better resource access.
- The same figure reveals higher dropout rates for male and female students in internal and external programs, with males in multi-mode programs also showing higher attrition.
- Figure 17 indicates lower dropout rates for both full-time and part-time students in multi-mode programs, suggesting greater flexibility and integration.
- However, full-time and part-time students in internal and external programs display higher dropout rates, evidenced by the upward trend in the figure.
- The square graph effectively visualizes these trends by clearly showing the relationship between the variables.

Summary: Attrition rates for female students, as well as full-time and part-time students in multi-mode programs, show a declining trend. This is likely due to enhanced learning support systems, increased flexibility, and better resource access. The correlation suggests that multi-mode programs are becoming more inclusive and supportive, especially for diverse student groups.

B. T2: Field of Study Analysis

How do attrition rates vary across different fields of study?

1) Student Admission Criteria Analysis: Figures 18 and 19 present the student admission criteria analysis. Figure 18 displays a stacked bar graph for attrition rates for different student admission criteria across several years, while Figure 19 shows a horizontal bar chart of the average attrition rate for each criterion over the same period.

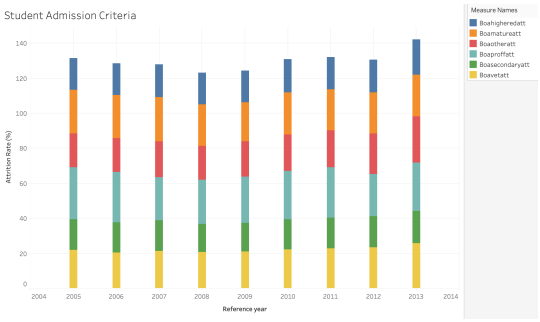


Fig. 18: Stacked bar graph for attrition rates for different student admission criteria across different years

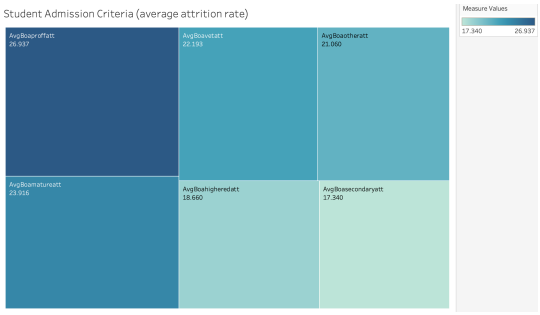


Fig. 19: Tree Map showing the average attrition rate for different student admission criteria over the years.

From these plots, the following key observations are made:

- Figure 18 shows similar overall attrition trends across different years, with the lowest rate in 2008.
- Figure 18 illustrates how each student admission pathway contributes to the overall attrition, using distinct colors for clarity.
- Figure 19 confirms that Boaproffatt has the highest average attrition rate, while Boasecondaryatt (admission via secondary education) contributes the least.
- The stacked bar chart in Figure 18 demonstrates the impact of each student admission criteria on attrition rate across years, using distinct colors.
- The tree map in Figure 19 ranks average attrition rates for student admission criteria from highest to lowest.
- Colors are consistent across both charts, ensuring clarity and ease of comparison.

The color scheme used across both figures is designed to provide clear and consistent information. In Figure 18, Boaproffatt is shown in light blue to highlight its consistently high attrition rate, indicating significant challenges for students with professional qualifications. Boamatureatt is represented in orange, reflecting its moderately high attrition rate, which may be due to the difficulties mature students face in balancing work and study. Boavetatt is depicted in yellow, showing a stable but noticeable attrition rate, suggesting that students from vocational backgrounds might need extra support. Boaotheratt is shown in red to emphasize its variable attrition rates, which could be due to the unpredictability of non-standard admission pathways. In Figure 19, these

color choices are maintained to allow easy comparison and interpretation of the average attrition rates.

Summary: The analysis of attrition rates based on student admission criteria reveals that students admitted via professional qualifications (Boaproffatt) consistently exhibit the highest attrition rates, suggesting a need for tailored support. In contrast, those admitted through secondary education (Boasecondaryatt) have the lowest rates, indicating stronger academic preparation. Mature age (Boamatureatt) and VET course entrants (Boavetatt) also show moderate attrition, reflecting potential challenges specific to these groups. Boaotheratt's variable rates across years emphasize the need for personalized academic support. These insights highlight the importance of targeted interventions to reduce attrition across diverse admission pathways.

2) Background Education of Student Analysis: Figures 20 and 21 present the background education of student analysis. Figure 20 displays a stacked bar graph for attrition rate for different education backgrounds across several years, while Figure 21 shows a tree map of the average attrition rate for different education backgrounds over the same period.

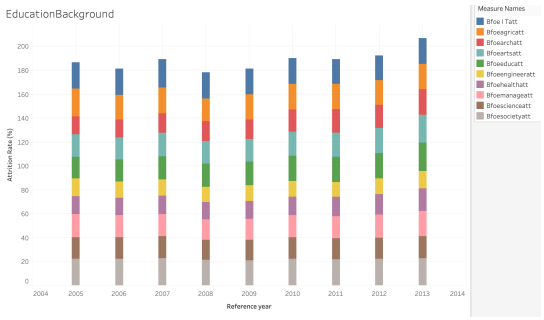


Fig. 20: Stacked bar graph for attrition rate for different education backgrounds across different years

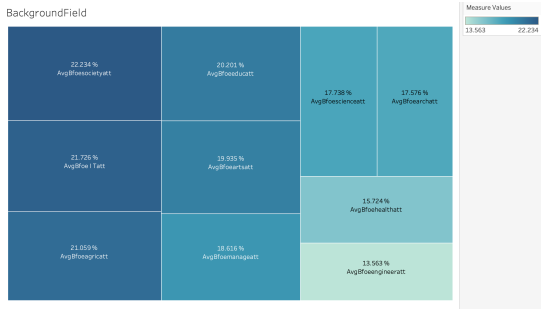


Fig. 21: Tree Map showing the average attrition rate for different education backgrounds over the years.

From these plots, the following key observations are made:

- Figure 20 shows similar overall attrition trends across different years, with the lowest rate in 2008.
- Figure 20 highlights higher attrition rates for Bfoesocietyatt (grey), Bfoe — Tatt (dark blue), and Bfoeagriatt (orange).
- Figure 21 confirms these findings, showing consistent color for higher attrition rates at left side, while Bfoeengineeringatt (yellow) has the lowest rate(at bottom right in Figure 21).
- The stacked bar chart in Figure 20 demonstrates the impact of each field of education on overall attrition, using distinct colors.
- The tree map in Figure 21 ranks average attrition rates from highest to lowest.
- Colors are consistent across both charts, ensuring clarity and ease of comparison.

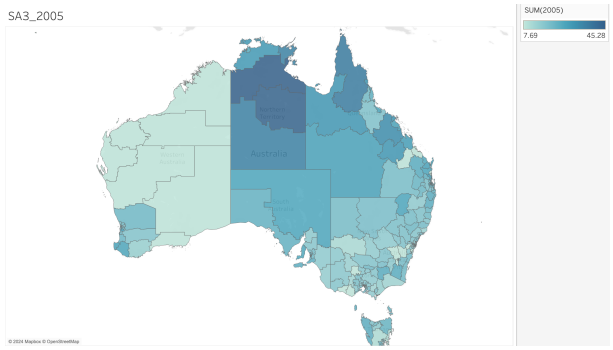
Agriculture and Creative Arts show the highest attrition rates due to limited career opportunities and financial instability. Conversely, Engineering and Health have the lowest attrition rates, reflecting strong job prospects. Natural and Physical Sciences, Information Technology, and Education exhibit moderate attrition rates influenced by steady demand and varying job market conditions. Management and Commerce also show moderate rates due to a dynamic job market. Society and Culture, and Architecture have higher attrition rates due to less direct career pathways and industry competitiveness.

Summary: The analysis indicates that fields with high attrition rates, such as Agriculture and Creative Arts, are often linked to limited career opportunities and financial instability. Conversely, fields like Engineering and Health, with low attrition rates, benefit from strong job prospects and high demand. Other fields exhibit moderate attrition rates, reflecting a balance between market demand and career stability.

C. T3: Geographical Analysis

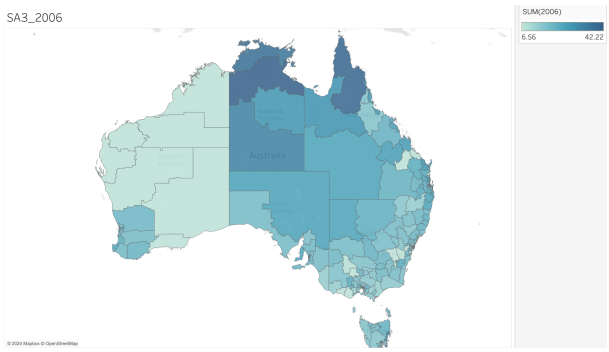
Are there any regional differences in attrition rates across Australia? **Note:** Some SA3 / LGA regions were missing in the dataset. To avoid null values, we assigned the minimum attrition rate observed across all years. As a result, the left part of the map consistently shows a lighter shade of teal blue, indicating the missing SA3 / LGA regions.

1) Based on SA3 area analysis:: Figure 22 and 23 shows different heat map for attrition rate across different years from 2005-2013 according to SA3 regions of Australia.

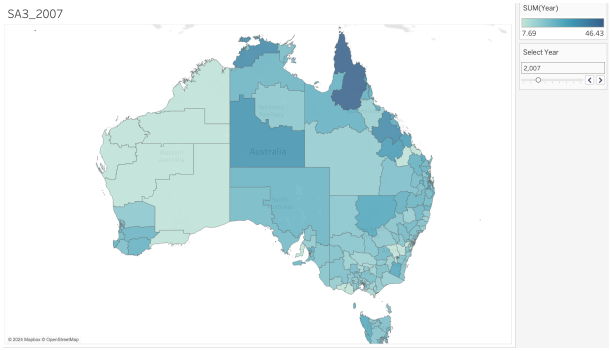


(a) Heat map for 2005

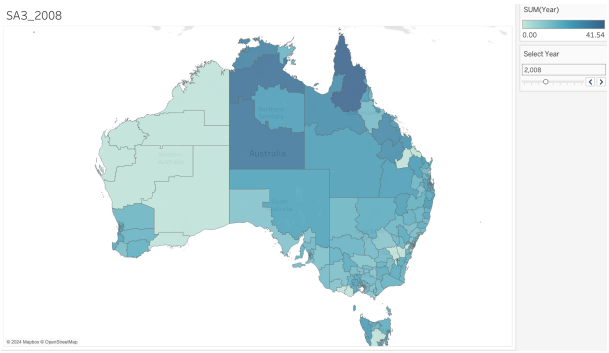
Fig. 22: Heat maps for SA3 areas 2005 to 2013 (Part 1).



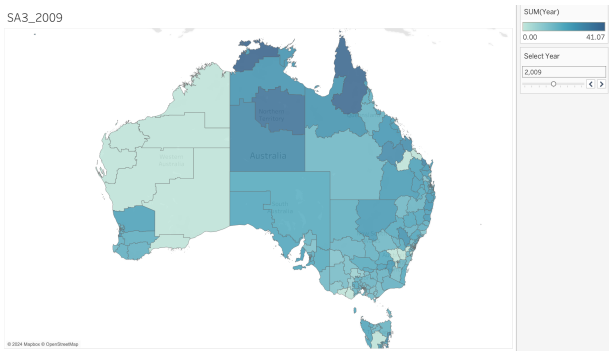
(a) Heat map for 2006



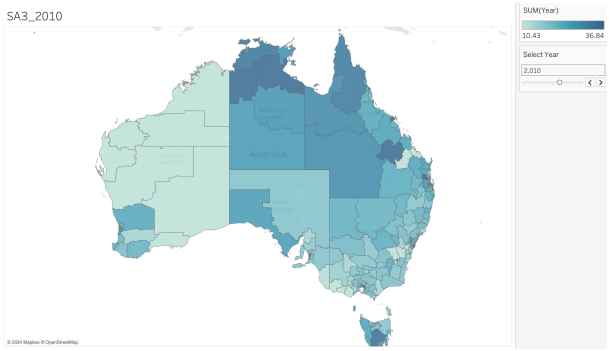
(b) Heat map for 2007



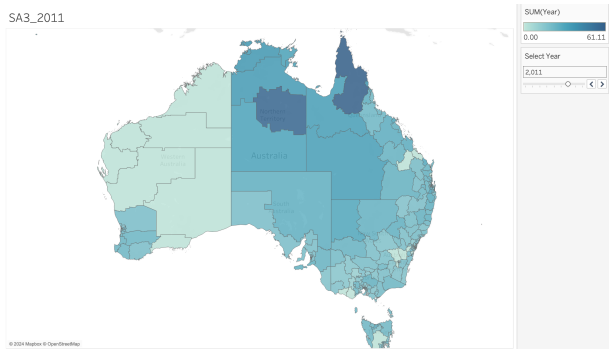
(c) Heat map for 2008



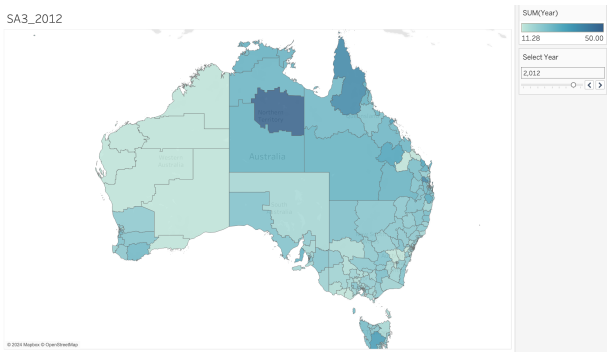
(d) Heat map for 2009



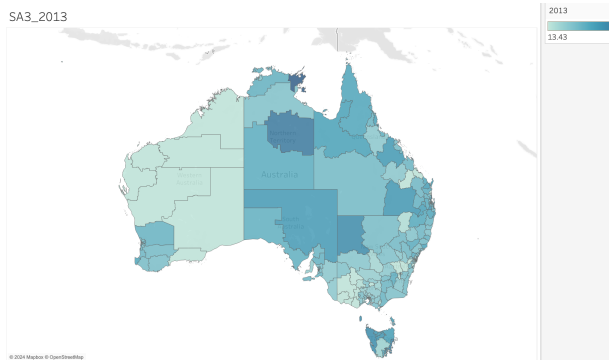
(e) Heat map for 2010



(f) Heat map for 2011



(g) Heat map for 2012



(h) Heat map for 2013

Fig. 23: Heat maps for SA3 areas 2005 to 2013 (Part 2).

Key Observations and Insights:

- Color Scheme: Darker teal shades represent higher attrition rates, and lighter shades indicate lower rates across the years (Figures 22 and 23).
- Regional Trends: Northern regions, particularly in Queensland, consistently show darker shades, reflecting higher attrition rates.
- Southern and Western Regions: Southern regions exhibit lighter shades, indicating lower attrition. Western areas also appear lighter, likely due to imputed minimum attrition rates where data was missing.
- Attrition Stability: Minor variations in attrition rates are observed, but the overall distribution of high and low attrition regions remains stable across the years.
- Heatmap Utility: The heatmaps effectively visualize the intensity of student attrition across regions, highlighting geographical and temporal patterns.
- Color Choice: Teal is selected for its neutral and professional appearance, offering clear contrast between high and low attrition areas.

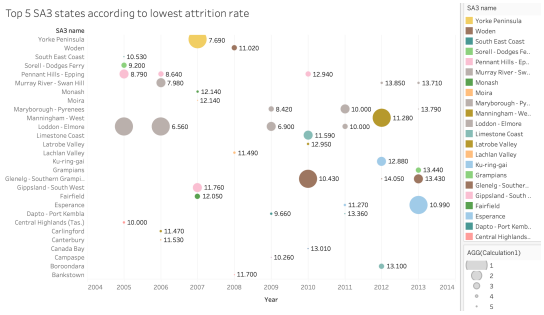


Fig. 24: Scatter plot for top 5 states(based on SA3) with lowest attrition rate across years.

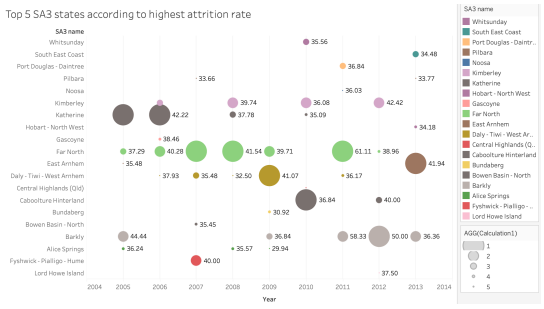
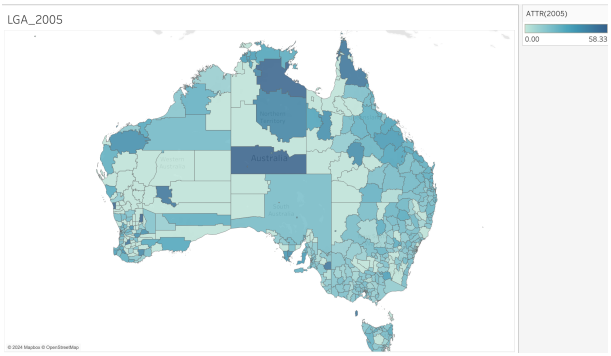


Fig. 25: Scatter plot for top 5 states(based on SA3) with highest attrition rate across years.

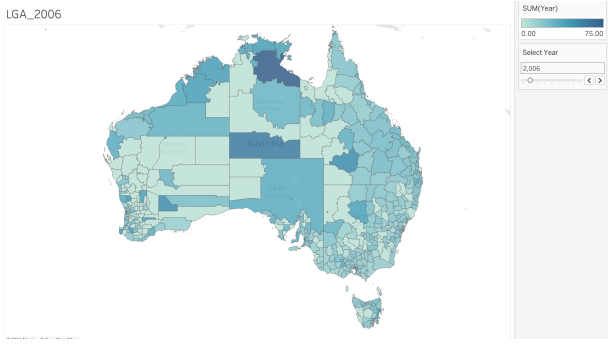
We have plotted bubble charts (Figures 24 and 25) to visualize the top 5 states with the highest and lowest attrition rates across different years for SA3 regions. Key observations and insights are:

- Figures 24 and 25 use circle size to represent attrition rates. Larger circles indicate regions with the highest or lowest attrition rates, while smaller circles represent regions with intermediate rates.
- Figure 24 displays the top 5 states with the lowest attrition rates across years. Regions like Loddon-Elmore (grey), Glenelg-Southern (brown), and Murray River (pink) consistently appear on the map, indicating their lower attrition rates over time. In 2013, the states with the lowest rates are Esperance (10.99%), Glenelg-Southern (13.43%), Grampians (13.44%), Murray River-Swan Hill (13.71%), and Marlborough-Pyrenees (13.79%).
- Figure 25 shows the top 5 states with the highest attrition rates across years. Regions such as Far North (light green), Barkly (grey), and Kimberley (light purple) frequently appear, indicating consistently high attrition rates. In 2013, the states with the highest rates are East Arnhem (41.94%), Barkly (36.36%), Port Douglas (34.38%), Hobart-North West (34.18%), and Pilbara (33.77%).
- The bubble charts ensure that the size of the circles is proportional to the attrition rates, making it easy to identify regions with the highest and lowest rates. Larger circles stand out clearly.

2) Based on LGA area analysis:: Figure 26 and 27 shows different heat map for attrition rate across different years from 2005-2013 according to LGA regions of Australia.

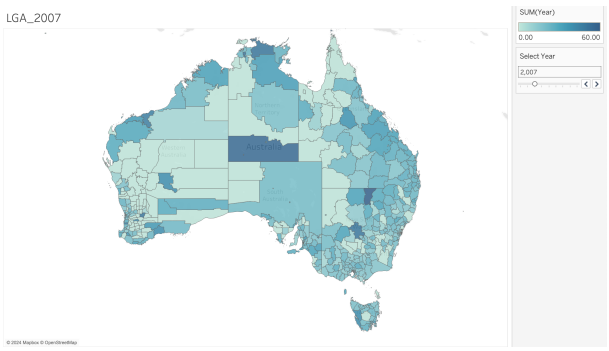


(a) Heat map for 2005

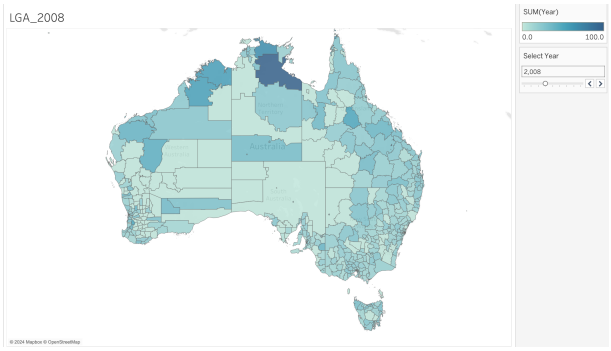


(b) Heat map for 2006

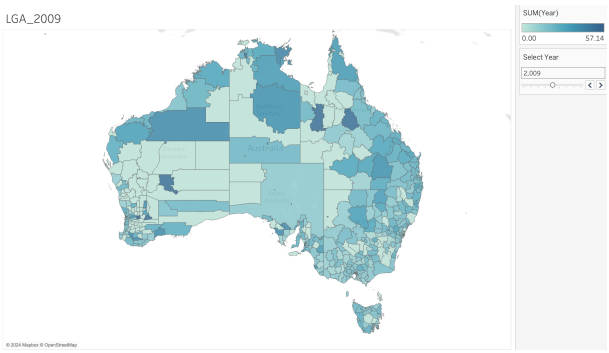
Fig. 26: Heat maps for LGA areas 2005 to 2013 (Part 1).



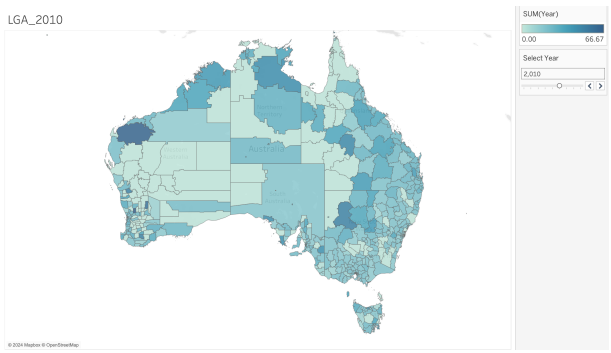
(a) Heat map for 2007



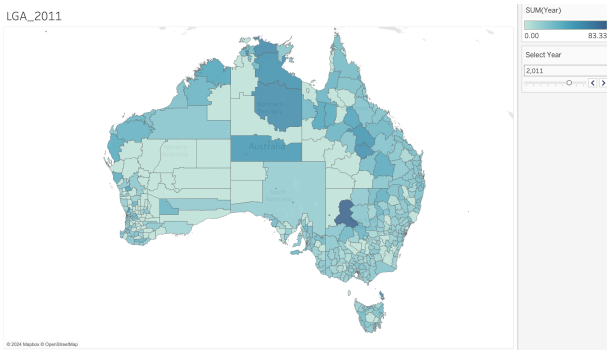
(b) Heat map for 2008



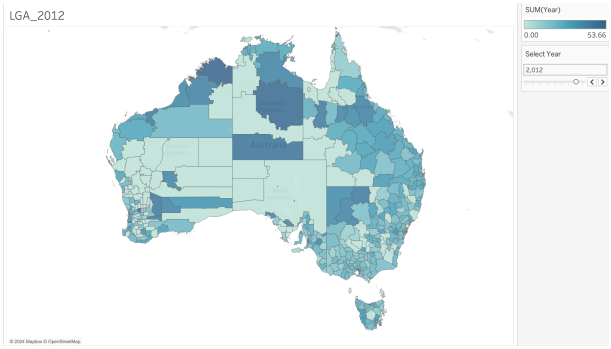
(c) Heat map for 2009



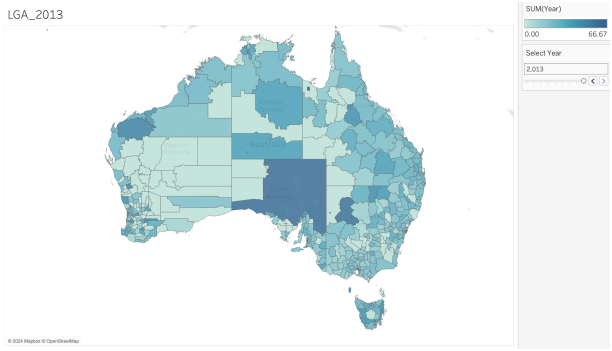
(d) Heat map for 2010



(e) Heat map for 2011



(f) Heat map for 2012



(g) Heat map for 2013

Fig. 27: Heat maps for LGA areas 2005 to 2013 (Part 2).

Key Observations and Insights:

- Color Scheme: Darker teal shades represent higher attrition rates, while lighter shades indicate lower rates for the years 2007 to 2013 (Figures 26 and 27).
- Regional Trends: Northern regions, particularly in Queensland, consistently show darker shades, reflecting higher attrition rates.
- Southern regions, including parts of New South Wales and Victoria, exhibit lighter shades, indicating lower attrition rates. Eastern coastal areas generally maintain moderate to low attrition rates, with some fluctuations across the years. Western areas also appear lighter, likely due to imputed minimum attrition rates where data was missing.
- Certain regions, such as Tasmania and parts of Western Australia, show increasing attrition rates over time, with noticeable darkening from 2007 to 2013. However, most central and southern areas exhibit stable trends with minor fluctuations.
- Heatmap Utility: The heatmaps effectively visualize the intensity of student attrition across regions, highlighting geographical and temporal patterns.
- Color Choice: Teal is chosen for its clarity and neutral tone, creating a strong visual contrast that emphasizes regional differences in attrition rates. The palette ensures that regions with minimal data or low attrition rates remain distinguishable from those with higher rates.

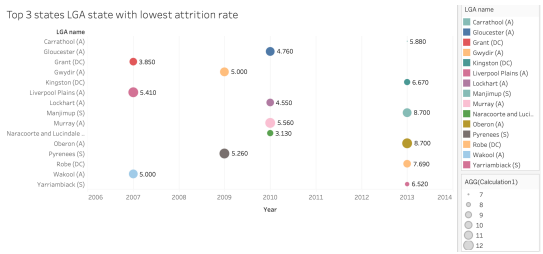


Fig. 28: Scatter plot for top 3 states(based on LGA) with lowest attrition rate across years.

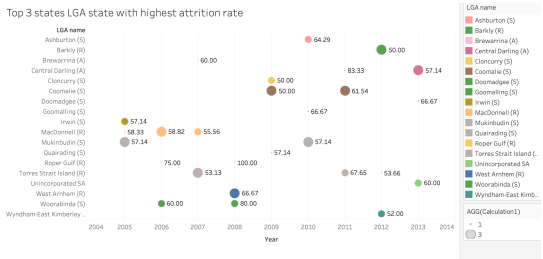


Fig. 29: Scatter plot for top 3 states(based on LGA) with highest attrition rate across years.

We have plotted bubble charts (Figures 28 and 29) to visualize the top 3 states with the highest and lowest attrition rates across different years for LGA regions. Key observations and insights are:

- Figures 28 and 29 use circle size to represent attrition rates. In Figure 28, smaller circles indicate regions with the lowest attrition rates, and in Figure 29 indicate regions with the highest attrition rates.
- Figure 28 shows the top 3 states with the lowest attrition rates across years. There is no consistent pattern across years. In 2013, the states with the lowest rates were Carathool (A) (5.88%), followed by Yarriambiack (S) (6.52%) and Kingston (DC) (6.67%).
- Figure 29 displays the top 3 states with the highest attrition rates across years. There is some consistency with states such as MacDonnell (R) (light orange), Torres Strait Island, and Mukinbudin (S) (grey). In 2013, the states with the highest rates were Doomadgee (S) (66.67%), followed by Unincorporated SA (60%) and Central Darling (A) (57.14%).
- The bubble charts use inverse proportionality for circle size relative to attrition rates. This approach was chosen because direct proportionality resulted in circles that were too small to visualize effectively.

3) Comparision between LGA and SA3 area Analysis::
It is observed that LGA area provide more detail compared to SA3 areas,since LGA is distributed into more areas as compared to SA3 areas. We have plotted heat map for average rate of change of attrition rate per year across different states according to SA3 (Figure: 30) and LGA (Figure: 31) areas.

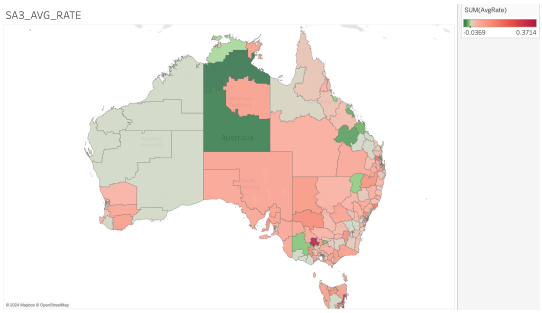


Fig. 30: Heat map for average rate of change of attrition rate per year across different states according to SA3.

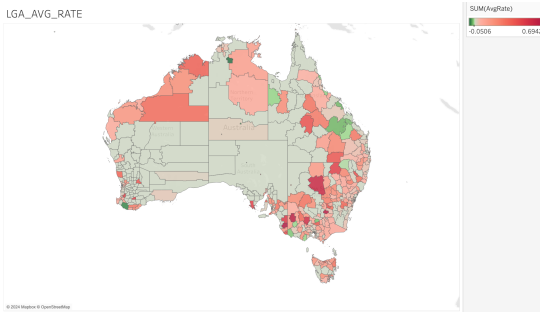


Fig. 31: Heat map for average rate of change of attrition rate per year across different states according to LGA.

Key observations and insights:

- In Figures 30 and 31, red represents a positive (increasing) average attrition rate, while green indicates a negative (decreasing) rate. Red highlights regions where the attrition rate is rising, signaling areas of concern, while green signifies declining rates, which is a positive trend for those regions.
- Regional Trends:
  - In Figure 30, many regions show a lighter red, indicating a slight increase in attrition, while northern, eastern, and southern areas show a green color, reflecting a slight decrease over time.
  - Figure 31 shows that northern, southern, and eastern areas display a lighter shade of red, indicating a marginal increase in attrition.
- Data Gaps: In both Figures 30 and 31, the lightest green shades likely correspond to missing data or regions not available in the dataset.
- Insight: The overall trends suggest a mix of rising and falling attrition rates, with some regions benefiting from declining rates. These regions may offer potential areas for further investigation to understand factors contributing to these positive trends.

Summary: Both heat maps show consistency with color variations. Red dominates in northern and eastern regions, indicating increasing attrition rates, while green areas in parts of the east reflect decreasing rates. The lightest green regions, especially in the west, likely represent missing data. These visualizations offer key insights into regions with both rising and falling attrition rates, which could guide targeted research and interventions.

D. Summary:

The analysis of attrition rates from 2005-2013 reveals several key trends. Overall attrition rates increased annually, with a notable exception in 2008, likely due to the Global Financial Crisis and improved student support systems. Age and gender differences were significant—students aged 25-39 had the lowest attrition, while those over 39 had the highest. Females had a higher overall attrition rate compared to males, with gender-based rates becoming more similar post-2008. Part-time students faced higher dropout rates than full-time students, and external study modes showed the highest attrition due to reduced engagement.

Attrition rates also varied across socio-economic backgrounds, with consistent rates for low-income students and a gradual increase for non-English-speaking and disabled students. Indigenous students showed improved retention, particularly after 2009. Additionally, students with higher ATAR scores consistently had lower attrition rates. The analysis highlights that factors like mode of study, socio-economic background, and academic preparedness strongly influence student attrition trends.

VI. Visualizations

Following are the visualizations that are used and described in detail in the section above.

1) Bar plots
2) Scatter Plots
3) Pie Charts
4) Bubble Chart
5) Line Plots
6) Area Plots
7) Treemap
8) Heatmap

Also in each of the types wherever applicable, we have employed various marks and channels for making the visualizations more expressive for someone to get the maximum insights at the first glance.

VII. Member wise contributions

As the sole team member, I independently handled all tasks for the project.

All tasks were completed individually to ensure comprehensive coverage and cohesive results for the final project and report.