32146 – Data Visualization and Visual Analytics

Assignment 1

Principles: *Data Collection and Visual Analytics (30%) – individual*

Student ID: *14344509*
Student Name: *Laila Lima Alves*

Goal: *This assignment aims to ensure that students understand the large variety of property data types and sources.*

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⹅ UTS

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Visualization Overview:

The data collected is from ABS and Price Finder, including 20x years of Census data between 2001 and 2021. The selected Neighbourhood is named Alfords Point. Alfords Point is a suburb in southern Sydney, 28 kilometres south of the Sydney central business district. The neighbourhood is nearly completely surrounded by bushland from the Georges River nature Reserve and Alfords Point Road within its eastern border running south to north onto the Alfords Point Road Bridge across the Georges River towards Padstow. Brushwood Drive is the only road to enter and exit Alfords Point.
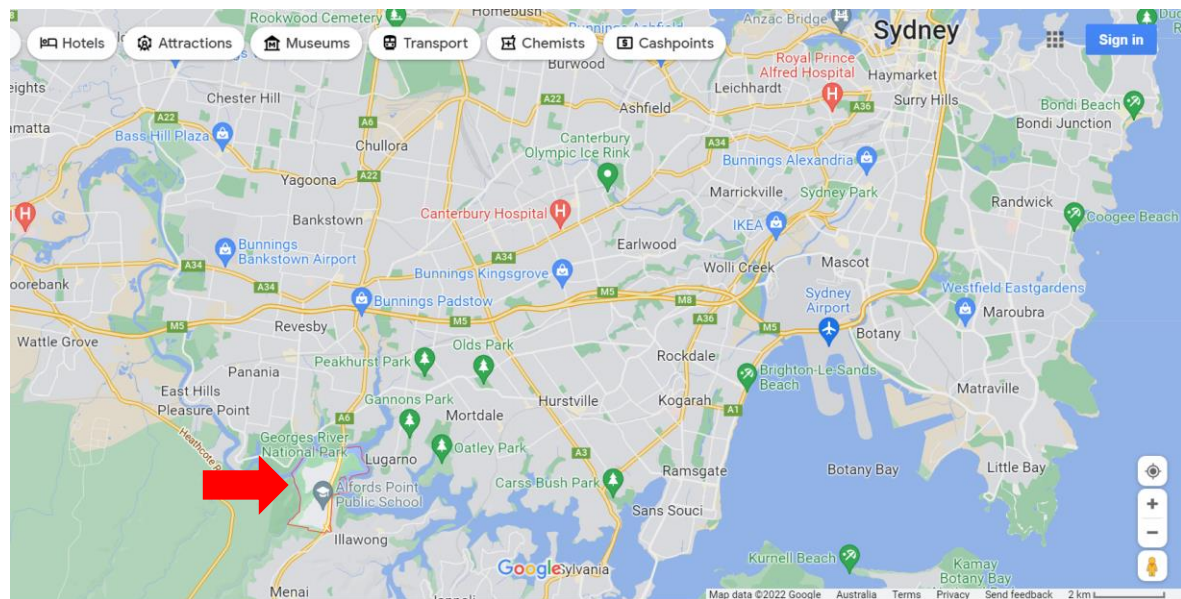
The dataset contains property median price, the suburb's house finance status, personal and family financial status, ownership and household information, dwellings information, family information, population and marriage status, unemployment and employment status. Even though most of the figures are available for all 5 periods selected, some adjustments needed to be done.

Information not available for the neighbourhood needed to be adapted, Alfords Point has no Data available for Median Unit Price in the years 2001, 2006 and 2016. In order to calculate the value for Unit I used the average from the prior and following years available at Price Finder.

Location	Alfords Point	Alfords Point	Alfords Point	Alfords Point	Alfords Point
Time	Y2001	Y2006	Y2011	Y2016	Y2021
MedianHousePrice	$495,000	$643,000	$830,000	$1,270,000	$1,602,50
MedianUnitPrice	$286,390	$597,500	$670,000	$942,500	$1,445,00

The visualizations chosen are very clean and in order to avoid "too much information" going round in the graphs, which leads to a loss in focal point and audience attention, I decided to keep it simple, including the main explanations during the description. All graphs include the main Topic required for the Visualization and the metrics used (%, AUD, numbers) as well as the period it refers to in the horizontal line (X).

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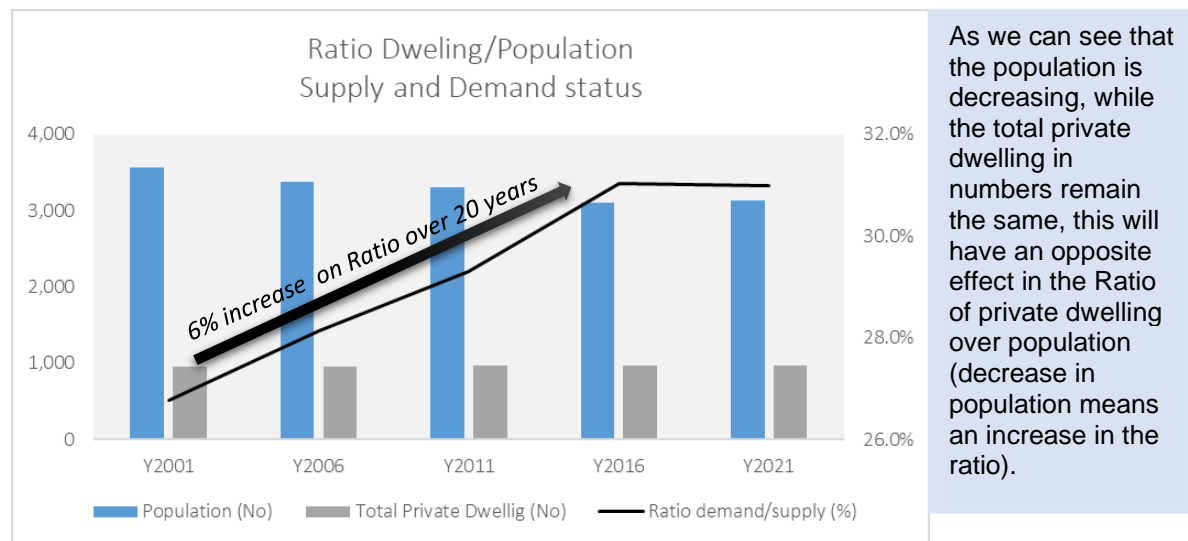
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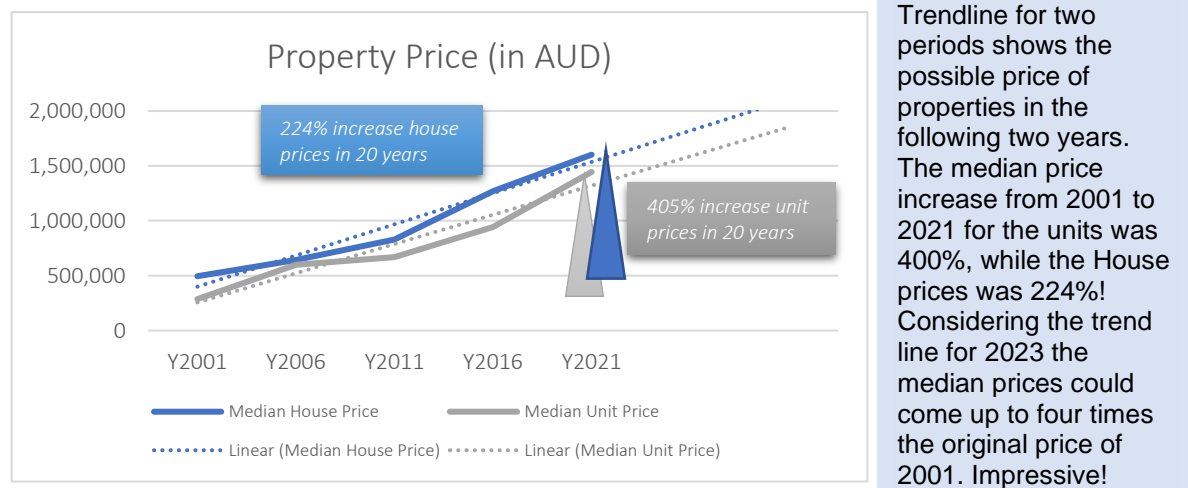
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1. Supply and Demand

The chosen Graph is a combination of numbers and percentage, because the variables related to supply and demand have different formats. Population and Total Private Dwelling figures are in numbers, while the Ratio of Private Dwelling divided by Population is in percentage.

Scale for the Numbers are from zero to the maximum of 4.000, which give a complete picture of the minimum and maximum values available for the variables, while the Ratio scale is defined between 26% and 32%, which increases the effect of the changes over time. Colours used are neutral and can be easily used in the overview, since it still provides a clear picture of the variables.

Ratio Dweling/Population Supply and Demand status

6% increase on Ratio over 20 years

Population (No)   Total Private Dwellig (No)   Ratio demand/supply (%)

As we can see that the population is decreasing, while the total private dwelling in numbers remain the same, this will have an opposite effect in the Ratio of private dwelling over population (decrease in population means an increase in the ratio).

2. Property Price

The Visualization relates to the Median Property price in Australian Dollars for House and Unit. Values were used in AUD and it shows the unit increase in dollars, which highlights the strong growth over time. The neighbourhood does not have a large gap between the House price and Unit price, therefore graphs dimension were not changed or highlighted. A Line graph was chosen for price visualization because it shows the trend upwards and also a continuity effect over time, which is a very good resource for prices development.

Property Price (in AUD)

224% increase house prices in 20 years

405% increase unit prices in 20 years

Median House Price   Median Unit Price
Linear (Median House Price)   Linear (Median Unit Price)

Adding a Linear Trendline for two periods shows the possible price of properties in the following two years. The median price increase from 2001 to 2021 for the units was 400%, while the House prices was 224%! Considering the trend line for 2023 the median prices could come up to four times the original price of 2001. Impressive!

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3. Finance

The first graph for finance relates to the price increase for the selected variables, the objective is to show how much the prices of houses have increased between 2006 and 2021 compared to the increase in Income, which will help understand other variances happening in the neighbourhood. To prepare the Graph I had to calculate the cumulative variance between home prices, unit price and income over time. The best way to see the Gap between the variables is a continuous line, which is a perfect and effective visualization that provides a clear picture of the huge discrepancy between them.

While income increased only 40% - 60% between 2006 and 2021, the house prices increased almost 150%.

Period	Y2001	Y2006	Y2011	Y2016	Y2021	Δ11/06	Δ16/06	Δ21/06
House Price	495,000	643,000	830,000	1,270,000	1,602,500	29%	98%	149%
Unit Price	286,390	597,500	670,000	942,500	1,445,000	12%	58%	142%
Family Weekly Income	-	2,056	2,483	2,607	2,978	21%	27%	45%
Personal Weelkly Income		592	707	841	965	19%	42%	63%
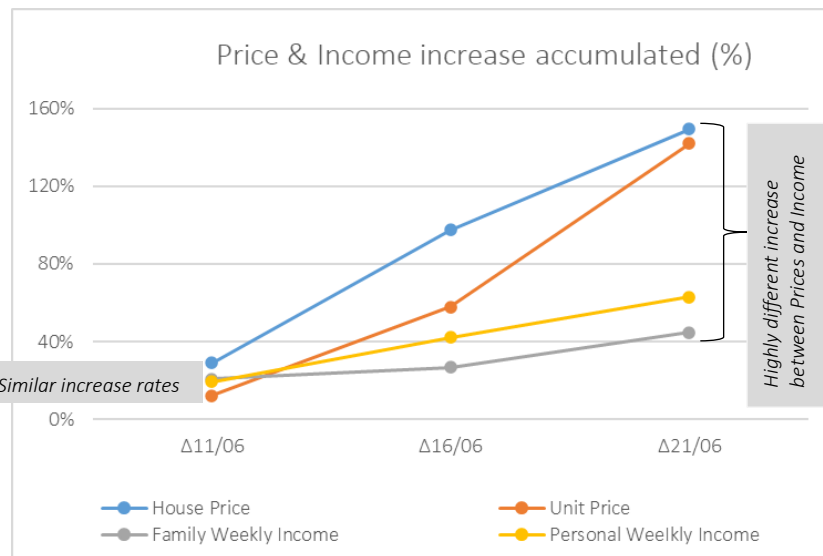
Home prices and affordability have been in focus since interest rates have been in the lowest levels ever seen globally, facilitating access to credit and investments. Though, the prices of homes are increasing much more than the average salary/income of the population, which will compromise the ability to pay for Mortgage. According to the Reserve Bank of Australia the average inflation from 2006 to 2021 was around 39%, which is much lower than the increase in the home prices seen in this region.

Source: https://www.rba.gov.au/calculator/annualDecimal.html

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The second graph shows the Household weekly income distribution in percentage, this data is only available for three different periods, as they have not been included in the statistics before. The information available shows the percentage of houses with income below 650AUD/Week and above 3000AUD/Week, which do not round to 100% of the total, therefore I included a middle term class, with income between 650AUD and 3000AUD based on the difference between 100% and the other two variables. Since the values should add up to 100% I choose to use an stack bar graph, hence the bars show the proportions in each of the available years. There is no need for continuity in this visualization, because data is not available and variances are less representative.

It is possible to see that the higher income level increased substantially over the past ten years period, differently to the middle income households (>650$ and < 3.000$) which decreased in inverted proportion. This development might be a related to the increase in the house prices, since income is not increase in the same proportion, families with middle level budget and no state support need to look for affordable neighbourhoods. The lower income household remained stable as they might get assistance from the government and be included in affordable house schemes.
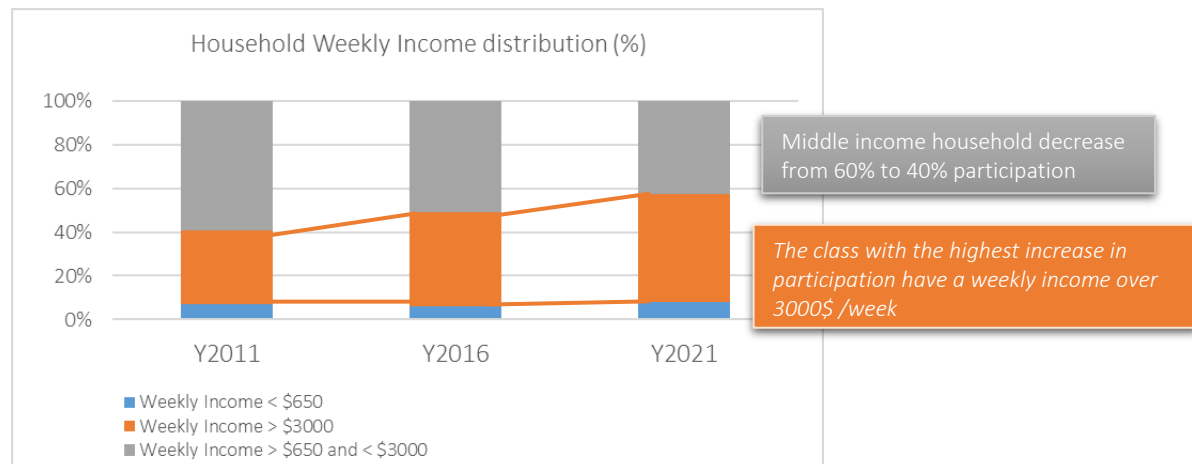
The next graph from Finance shows the Rent and Mortgage proportions to Income. The data is only available for the last three years of statistics survey. The line graph with the values displayed in each year is a good visualization about tendence and values change over time. In the graph, the vertical axis showing % was removed because each data point in the graph already has a label. For this reason, there is no need to keep the vertical axis showing the %.

The Graph shows a huge jump on all four variables from 2016 to 2021, which is a clear shift in tendence between the variables available. Rent and Mortgage payments increased considerably during this period and are taking a higher proportion of household income than the years before. Oppositely, households with a proportion lower than 30% from income decreased both in Rent and Mortgage payments.

This situation might be a reflection of the price increase in the Alfords point, as Rent prices respond faster to price increases than mortgage, the effect on the income is almost immediate, while the mortgage contracts need to be adapted and handled between buyers and lenders, which might take up some more time.
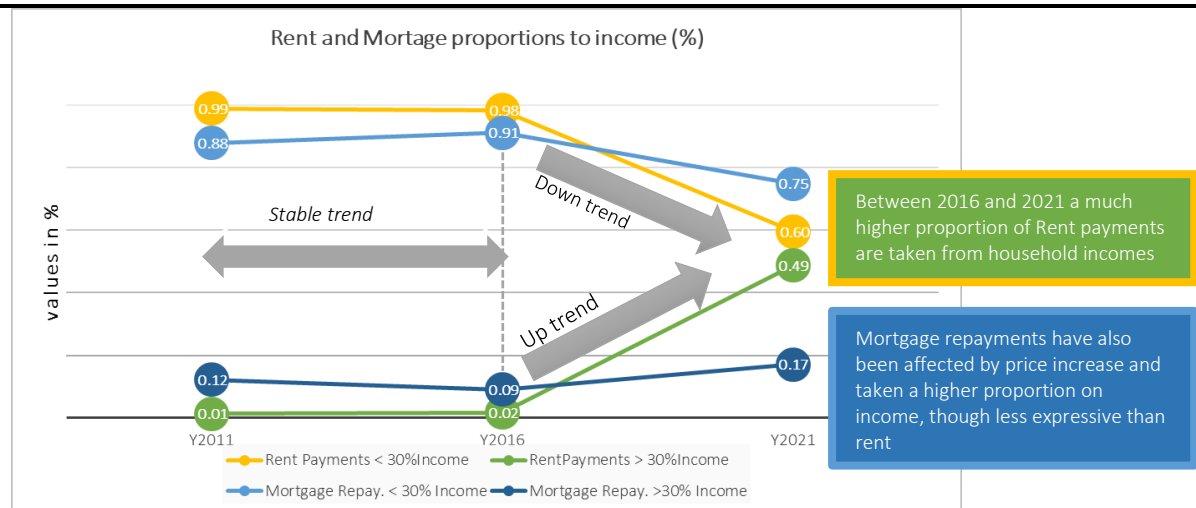
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Rent and Mortage proportions to income (%)

4. Population

The visualization has two different data formats, one with percentage and the other with numbers, therefore a composite graph was used with two different Y-Axis, the left one represents the marriage status in the neighbourhood, which has a total of 100% people. While the Y-Axis in the right shows the number of people living in Alfords Point in numbers.

The Population has been decreasing over time and the selected scale used for the graph intensify this effectively (Min and Max value), even though the decrease in % is only around 10%.

The Marriage status bars are stacked and show which % of the total each option has, since the maximum is 100% the bars provide a clear sign about the changes in proportion over time. The colours are stronger because some variables are less representative and if not highlighted in different colours they might be mixed with more representative one. Stacked bars are very useful for proportion changes over time, as they evidence the changes in a visual and easy way.

Marriage status (%) & Population (No.) Alfords Point

5. Ownership

The Visualization is done for different years with a combination of Doughnut charts for all years. Even though the data provided does not add to 100%, the sum of ownership status must represent the total of the available Households, therefore a variable "Other" was created to close the gap

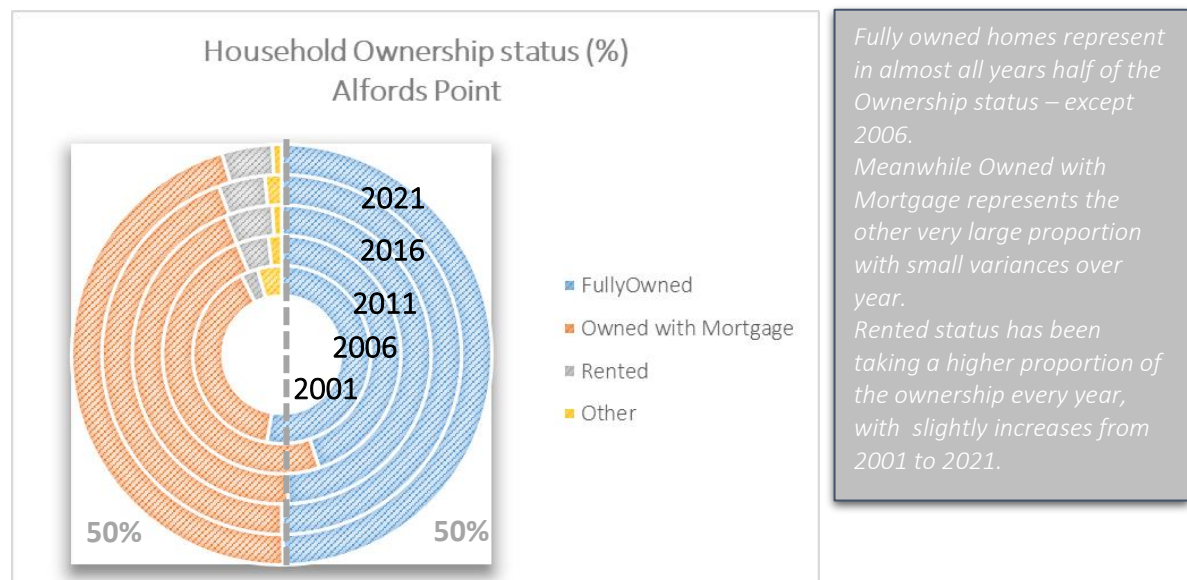# 32146 – Data Visualization and Visual Analytics

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between available data and the missing values to total (100%). Once all variables are in percentage and the sum represents 100% of the total ownership status, the graph is visually perfect to compare the changes over the years. Even though the doughnut circles in the different years are different (smaller or bigger than all others), it is possible to compare the proportion of each category on the total size of the doughnut. It is possible to see that the percentage for Rented homes have increased over time. The percentage for Fully Owned and Owned with Mortgage are very high and represent the majority of the Ownerships in Alfords Point, despite changes the proportions are still high.

Fully owned homes represent in almost all years half of the Ownership status – except 2006.
Meanwhile Owned with Mortgage represents the other very large proportion with small variances over year.
Rented status has been taking a higher proportion of the ownership every year, with slightly increases from 2001 to 2021.

6. Workforce

The Workforce Visualization is a Radar Graph, due to the lack of information about 2021 it includes only four years of visualization. Since the available data has only four inputs, a square shape fits the information perfectly. All variables are relative stable over time and the percentage values do not change much, therefore the variables keep a similar square format in all parts of the graph. The values in the vertical sequence show the percentages evolution and it is possible to see that each variable follows the pattern of the original shape. The three different colours for each variable have a strong contrast which allows a clear visualization of the values and evolution over the years. It is clear that most people work full-time (60%), while part-time percentage is between 0.4 and 0.2, while unemployment rates is very low, almost close to zero.

Period	Y2001	Y2006	Y2011	Y2016
Full-time	0.631	0.604	0.605	0.62
Part-time	0.318	0.302	0.319	0.303
Unemployment	0.022	0.024	0.028	0.037

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Workforce profile is very stable in the region

Most residents (>60%) are employed in Full-time jobs.

A very low proportion of residents are jobless

7. Dwelling

The first graph for Dwelling relates to the Dwelling type - Occupied or Unoccupied, which represent proportions of the total adding 100% over the different years. The selected overview for this information is an Area chart, which shows a continuous area for all variables over time.

It is a continuous chart that gives a good idea of the numbers evolution, and since unoccupied dwelling is very low, the contrast of colours used is strong in order to highlight the presence of this variable.

Other variables related to Dwelling include the Dwelling structure and average number of bedrooms/people.

Time	Y2001	Y2006	Y2011	Y2016	Y2021
Separate House(dwellings%)	99%	100%	98%	99%	99%
Semi Detached(dwellings%)	1%	0%	2%	1%	1%
Flat Unit Apartment(dwellings%)	0%	0%	0%	0%	0%
Average No Bedrooms Per Dwelling			4.00	4.10	4.10
Average No People Per Household		3.70	3.60	3.40	3.30

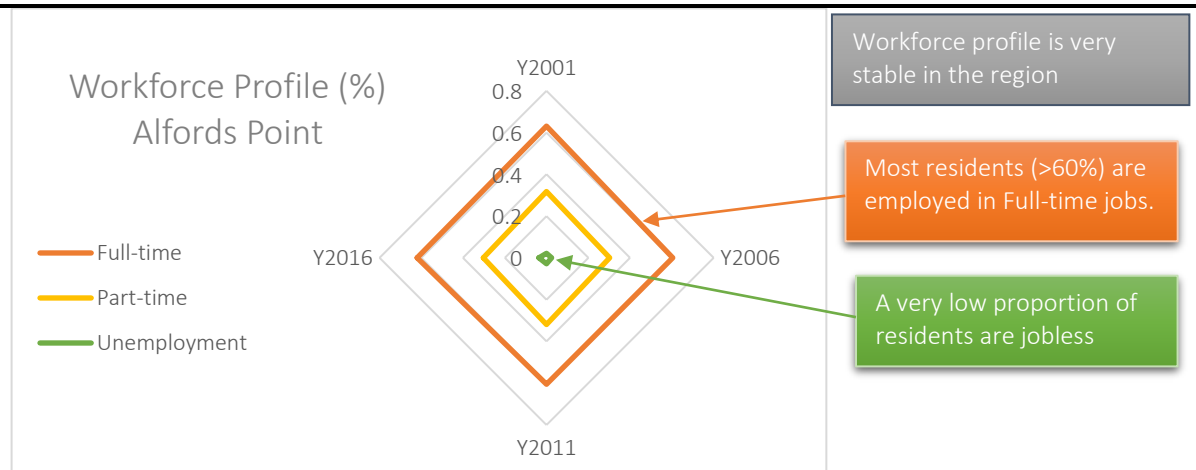# 32146 – Data Visualization and Visual Analytics

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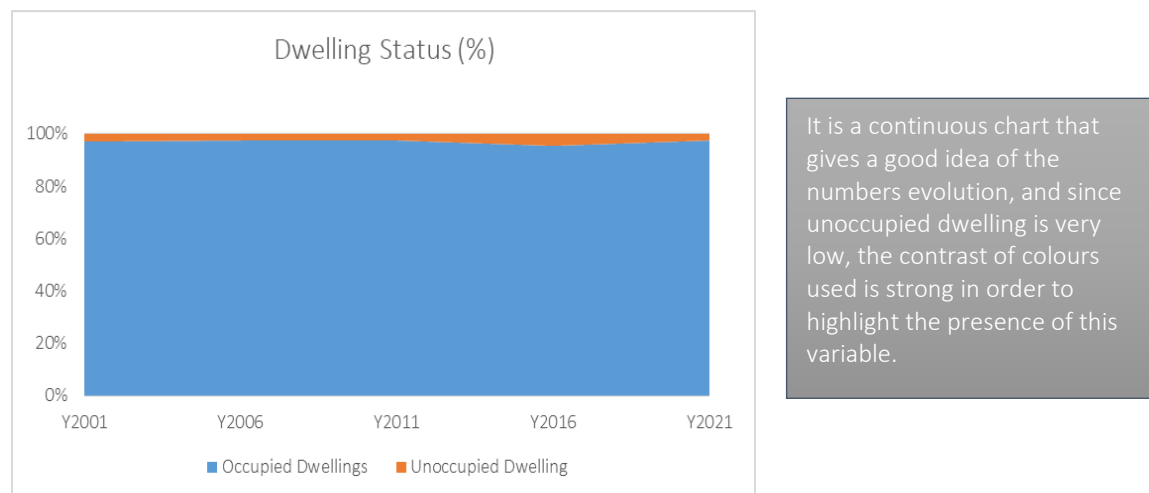
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In order to show the evolution over time for the different variables, I assigned an Area chart for the proportions (%) combined with an additional Y-Axis on the right for the numerical variables, when the numbers are available.

The scale for proportions are from 90% to 100%, which highlights the small portion of Semi Detached homes in the Dwellings %.
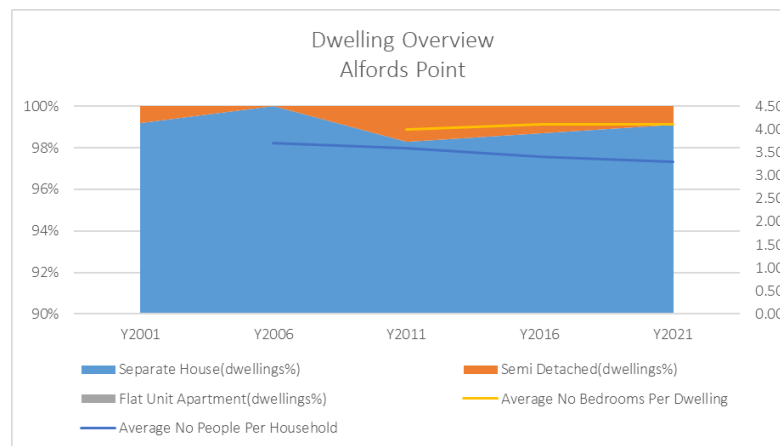
The scale for numerical variables can start at zero and goes to max. 4.5, which shows two stable lines over time with very few variances in the selected scale.
This view seems to have low variance on the number of people per Household and No. Bedrooms per Dwelling.
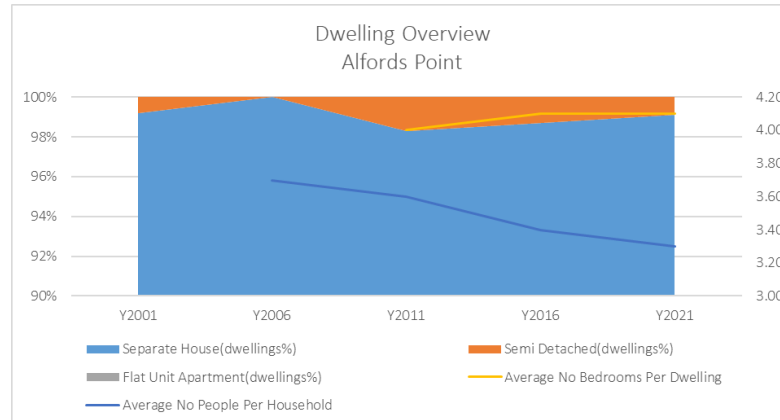
An scaled option from 3.0 to 4.2 shows more variance on Numerical variables (No. People per Household + No. Bedrooms per Dwelling).
It is even possible to see an increase in the No. Bedrooms per Dwelling, which seemed stable in the previous graph.
The decrease in No. People per Household looks more prominent than before.

8. Family

Family Status is a variable with proportion and different periods of time, therefore an stacked bar fits the purpose of visualization in the best way. Again the sum of all variables must add to 100% of the total and five different years of information can be displayed in the vertical bars available.
The first visualization which considers an scale from 0% to 100% shows that most of the Households are families (>90%), giving little space to see the two other variables in details.
Meanwhile, the second graph reduced the scale for 86% to 100% and it is possible to see in details the values for other two Household types more clearly.

There has been a reduction in the number of Family Households , already seen in the population overview. A decreasing number of Family Households are being overtaken by single person Households. While Group Household remained stable over time.
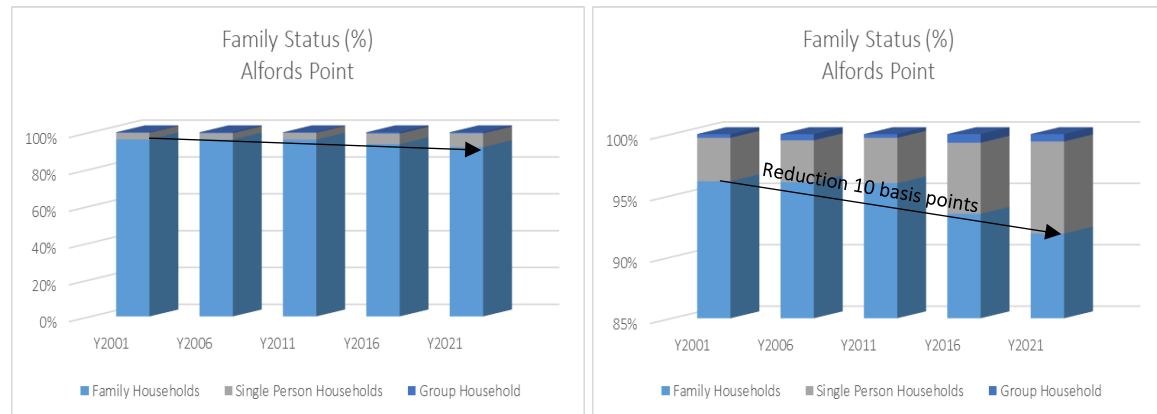
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Family Status (%) Alfords Point — bar charts (Y2001, Y2006, Y2011, Y2016, Y2021) with Family Households, Single Person Households, Group Household. Left chart 0%–100% scale. Right chart 85%–100% scale with annotation "Reduction 10 basis points".

Conclusion

Alfords Point home prices have skyrocket in the last twenty years, resulting in some changes in the neighbourhood structure and profile. Cost related to Mortgage or Rent is taking a considerable amount of the financials at Households, which have to adjust their Budget and stretch their priorities. Higher income Households have increased their share in the market, while middle income is moving out to other regions. No information regarding government subsidy or support to low income individuals is available, though a very small percentage of the population has income lower than 650$/week and might be unemployed.

Family size is decreasing, a phenomenon present in entire Australia[1], meanwhile single Households with people that have never been married before is taking a higher proportion of the neighbourhood profile.

A Stand Alone conclusion about the present home prices and future possibilities will be very limited, as other regions Sydney may have more logistic and economic advantages, as well as more prospective investments in infra-structure.

Alfords Point seems to be a very calm and exclusive neighbourhood, surrounded by nature and with few possibilities to increase rapidly its population density. It is close to the beach and surrounded by a national park and George River, which would impose limitations to horizontal expansion.

Because home prices in Australia since 1972, nationwide, have risen significantly faster than average household incomes, house-building construction costs, and average rents[1], I would definitely consider using all data related to the different neighbourhoods for deeper understanding and decision making process on where to invest in property market in Sydney. It will surely be a good profitability investment in the future, as it has been in the past.

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Source :

1. Reserve Bank of Australia. Some Observations on the Cost of Housing in Australia. https://www.rba.gov.au/speeches/2008/sp-so-270308.html#fn9