

Real Estate

Group 32

Meet the Team

Group 32

- Dylan Beaumont
- Matthew Rush
- Nguyen Duc Le
- Jesse Cooper
- Yanbo Feng

Project Overview

- Collected all current and historical data
- Found a reasonable method of predicting rent prices
- Identified 10 suburbs we believe to have the highest growth rate
- Identified the most liveable and most affordable suburbs within Victoria

Scraping Properties

- Collected properties for rent within Victoria
 - Had to grab properties by postcode
 - Scraping resulted in 15,271 properties being collected

≡ Domain

VIC X Search

Filters Rent Price Beds Property types

14321 Properties for rent in VIC



 **Kristen Standish**
Sweeney Estate Agents Williamstown

\$630 ★

Unit 3/9 Roches Terrace,
WILLIAMSTOWN VIC 3016

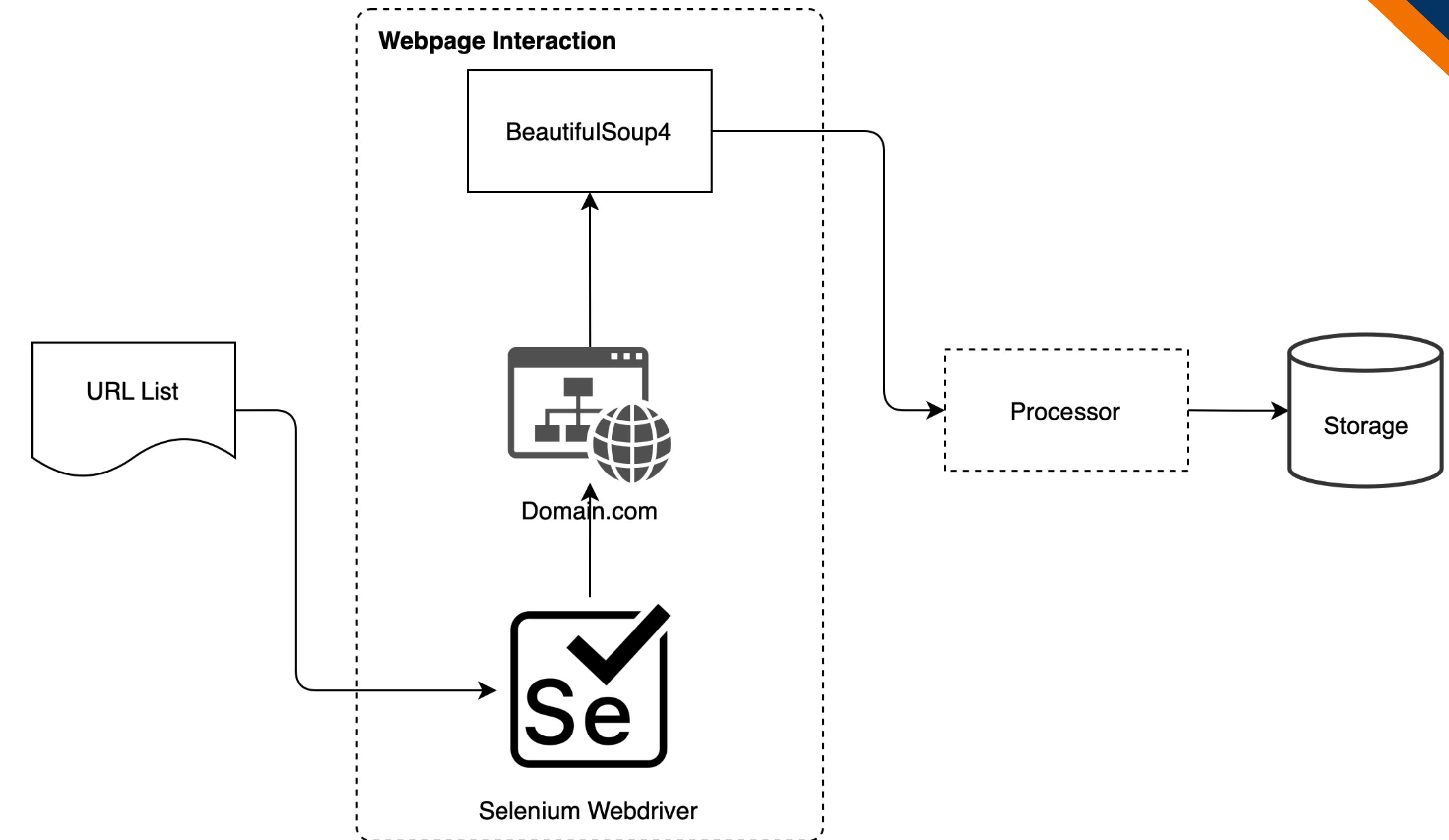
 2  1  1 • Townhouse

 Unfurnished •  pet friendly

 Williamstown VIC 3016

Scraping Historical Data

- To grab the historical data on suburbs we had to scrape interactive webpage data



Sales price range

MEDIAN PRICE

\$330k

ENTRY LEVEL

\$180k

HIGH END

\$585k

Sold this year

387

Rental median price

\$350

Auction clearance

40%

Average days on market

120

Higher = more competition

Lower = more competition

Sales and growth

YEAR	MEDIAN	GROWTH	# OF SALES
------	--------	--------	------------

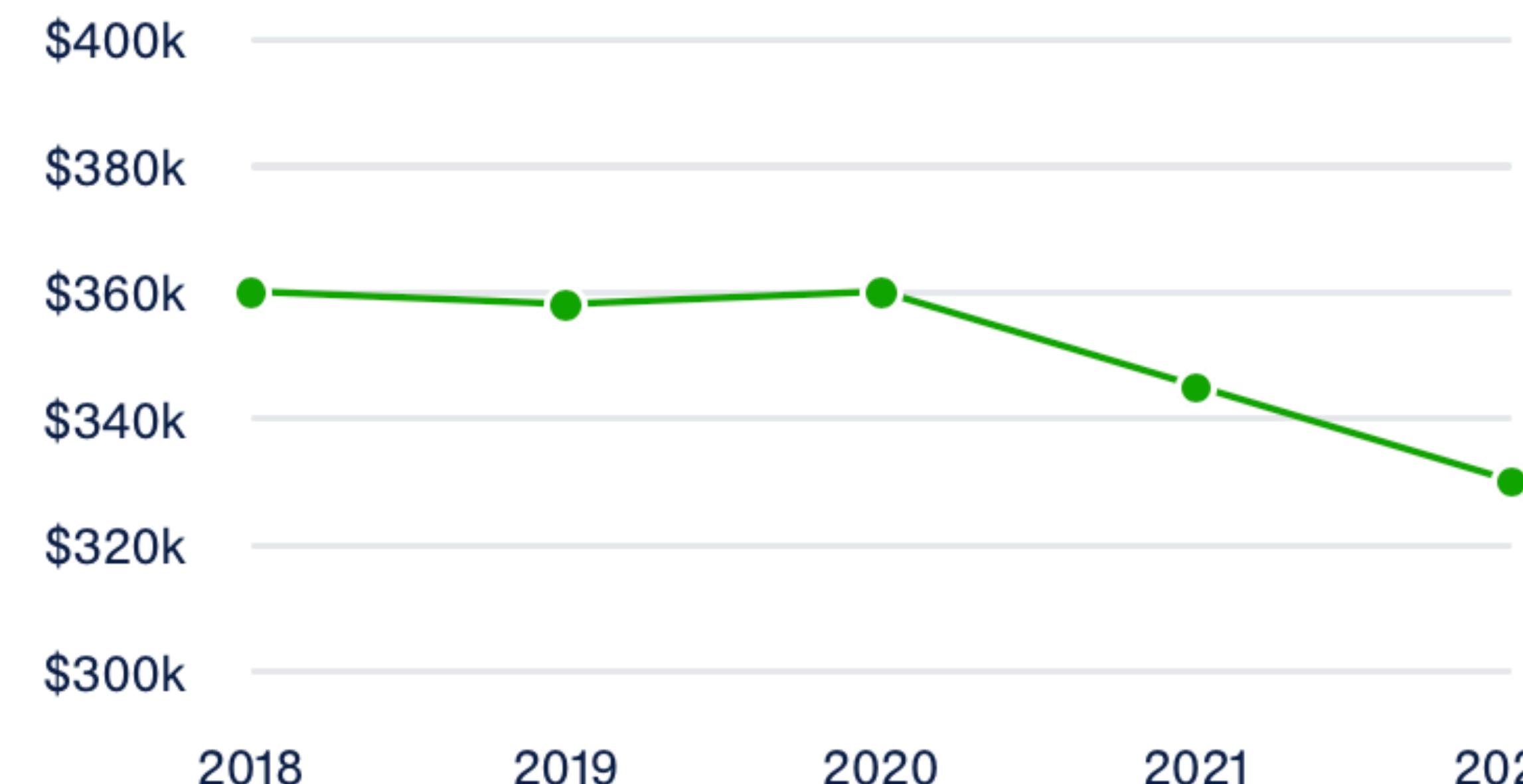
2022	\$330k	-4.3%	387
------	--------	-------	-----

2021	\$345k	-4.2%	341
------	--------	-------	-----

2020	\$360k	0.6%	420
------	--------	------	-----

2019	\$358k	-0.6%	479
------	--------	-------	-----

2018	\$360k	-15.7%	473
------	--------	--------	-----



Data Sources

Aurin

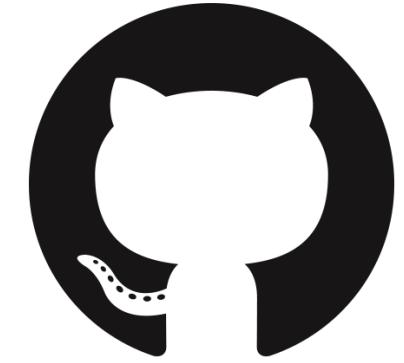


Public Transport Victoria
PT>



Domain

GitHub



Datasets

Areas & Locations

- Parks
- Shopping Centres
- SA2 Boundaries
- Postcode/Suburb Breakdown

Transportation & Services

- Mainline Public Transport Stops
- Schools

People & Statistics

- Current Population
- Population Forecast
- Income
- Historical Sales

Pre-Processing

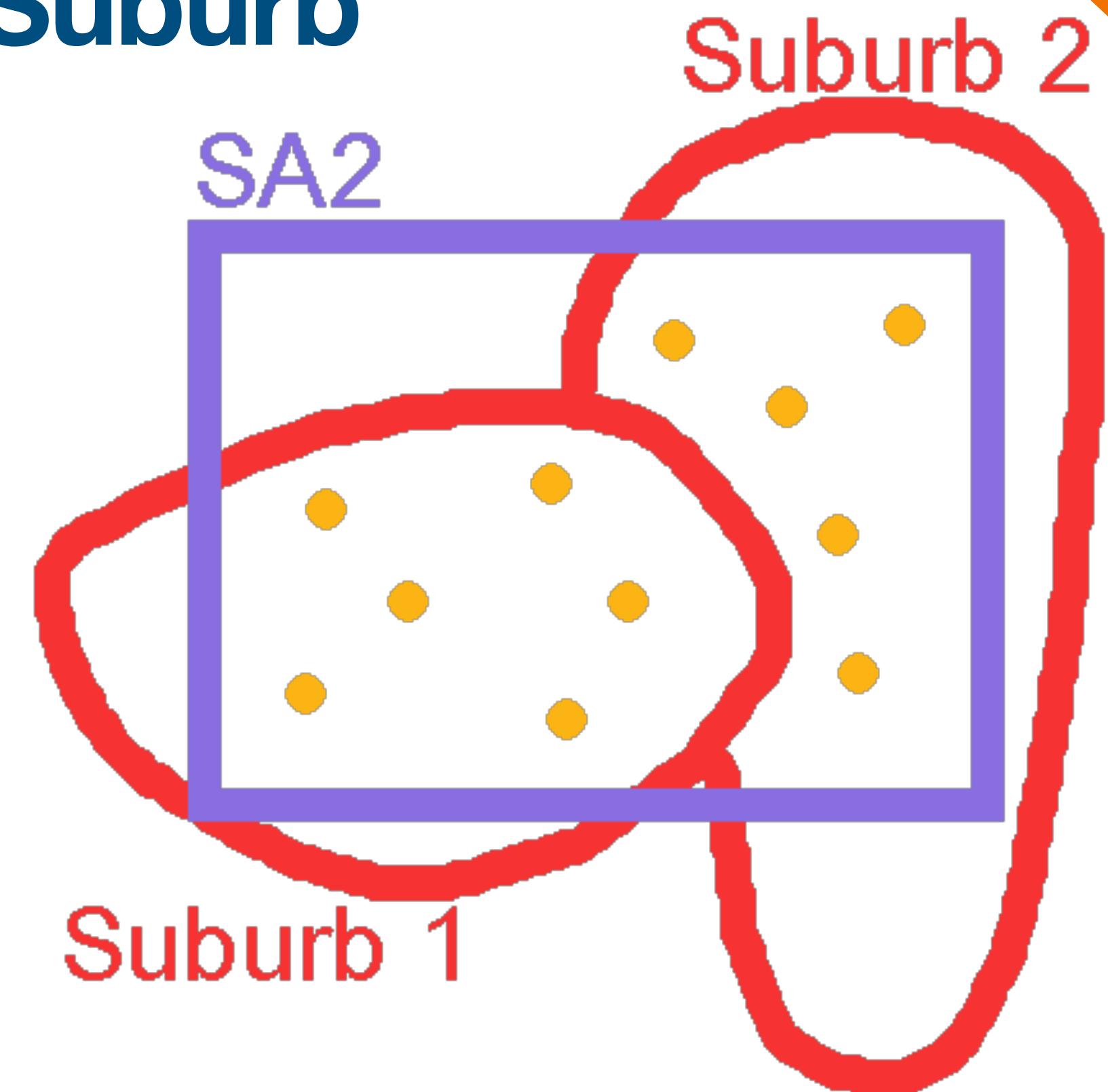
- Used regular expressions to clean fields scraped



Rent for \$180 per week
\$60
\$370 Per Week
\$375 PW / AVAIL. NOW
\$585
\$440pw
\$450 Per Week
\$2,173pcm/\$500pw
\$775/Week (\$3367/Month)
\$700.00
\$780 p.w.
\$780pw/\$3,390pcm
\$610 Per Week
\$355 p.w.
\$480 weekly
\$515 Per Week
\$350 pw / \$1521pm
Application Pending
\$355 per week / \$1543 PCM
\$600 per week / \$2607 pcm
\$430.00 weekly
\$370.00 Per Week
\$380PW

Converting between SA2 and Suburb

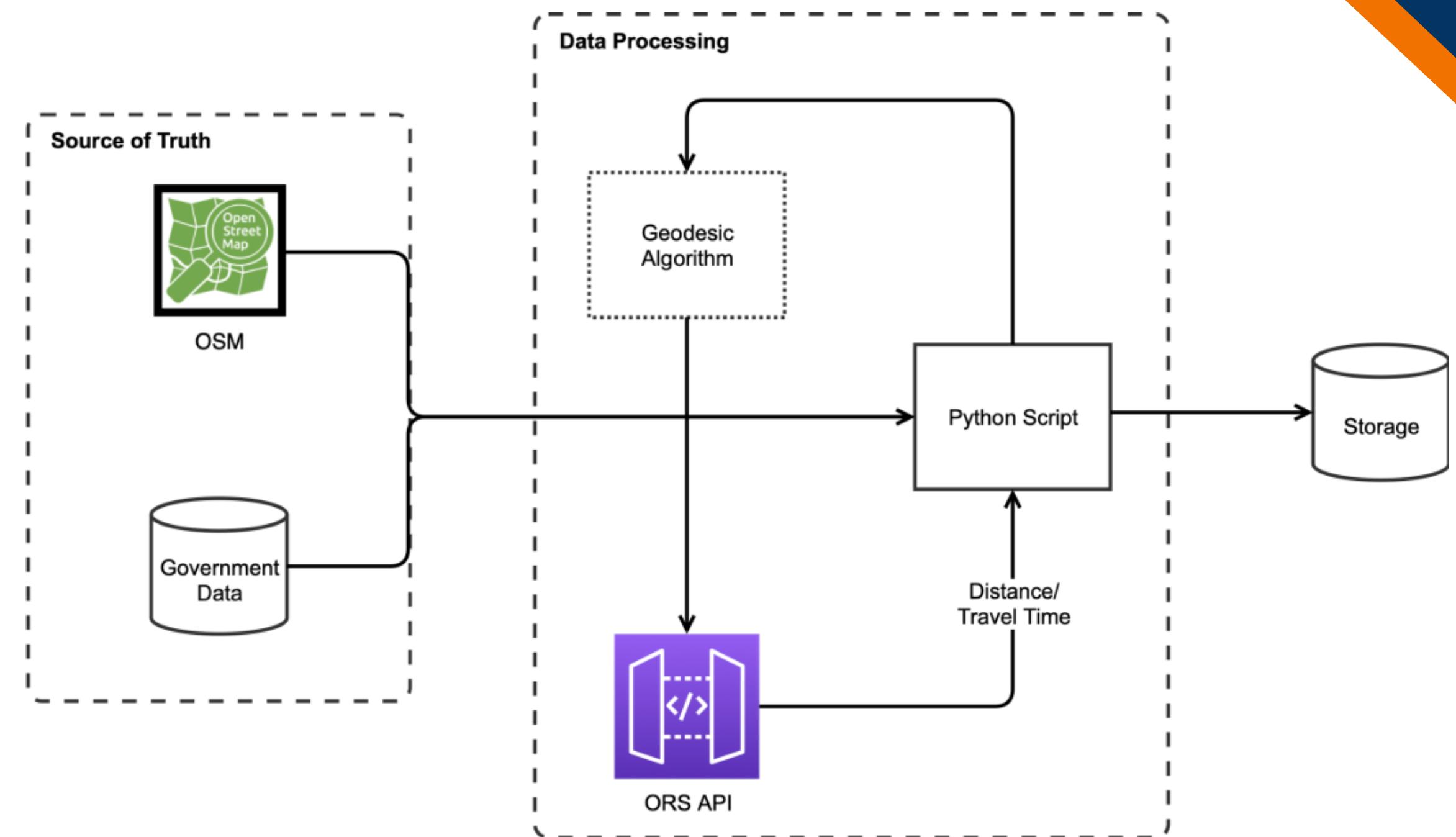
- Some data only provided in SA2 areas
- Properties were grouped by suburb, but had latitude and longitude
- Using each property's latitude and longitude they were placed in the appropriate SA2 zone
- To convert suburb to SA2 we used proportions



	suburb	SA2	count	sa2_count	SA2_fraction	SA2_population
0	abbeyard	212031558.0	1	20	0.050000	12432.0
1	abbotsford	206041506.0	4	117	0.034188	15998.0
2	abbotsford	206071139.0	46	49	0.938776	9262.0
3	abeckett street	206041504.0	18	228	0.078947	17439.0

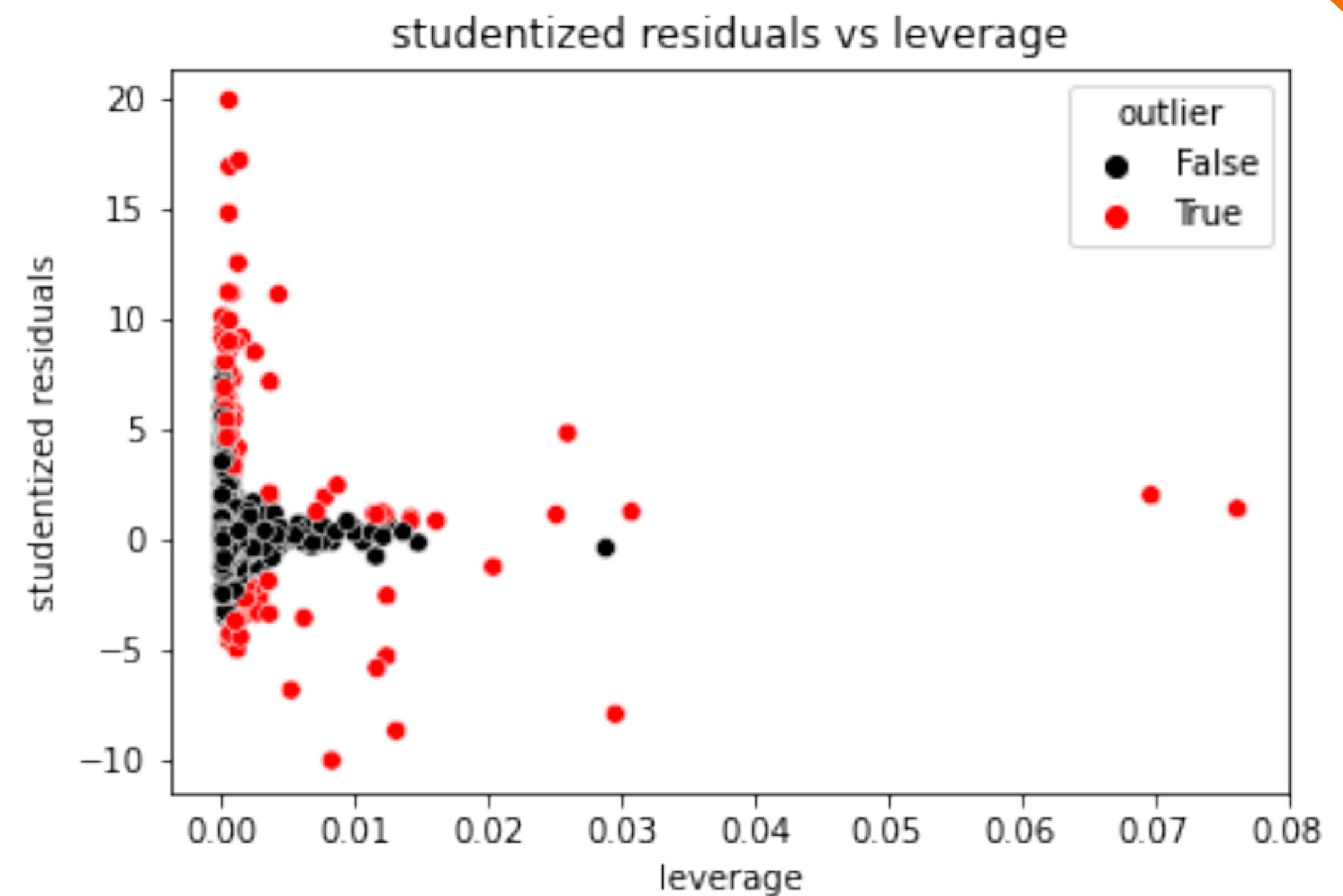
API process

- Used Open-Root to find the distance each property was from:
 - ↳ Schools
 - ↳ Parks
 - ↳ Shops
 - ↳ Trains Stations
 - ↳ Bus or Tram Stops
- Used a Geodesic Algorithm



Outlier analysis

- Scrapped data had quite a few point that would throw off analysis
- Used box-plot to remove obvious outliers
- Used Cook's Distance to remove points with too much influence
- Lost 1,963 'properties' during process
- Final number of properties: 13,308



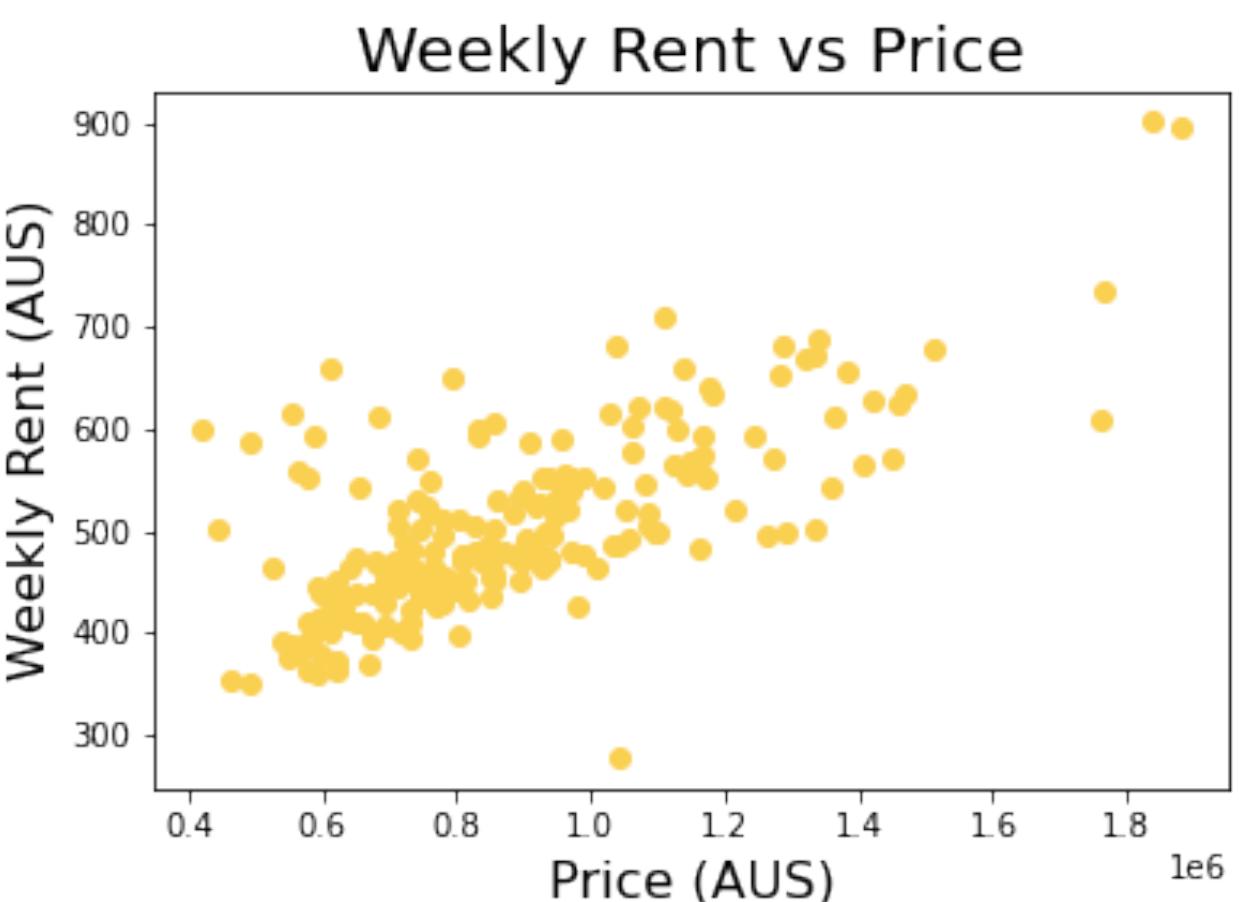
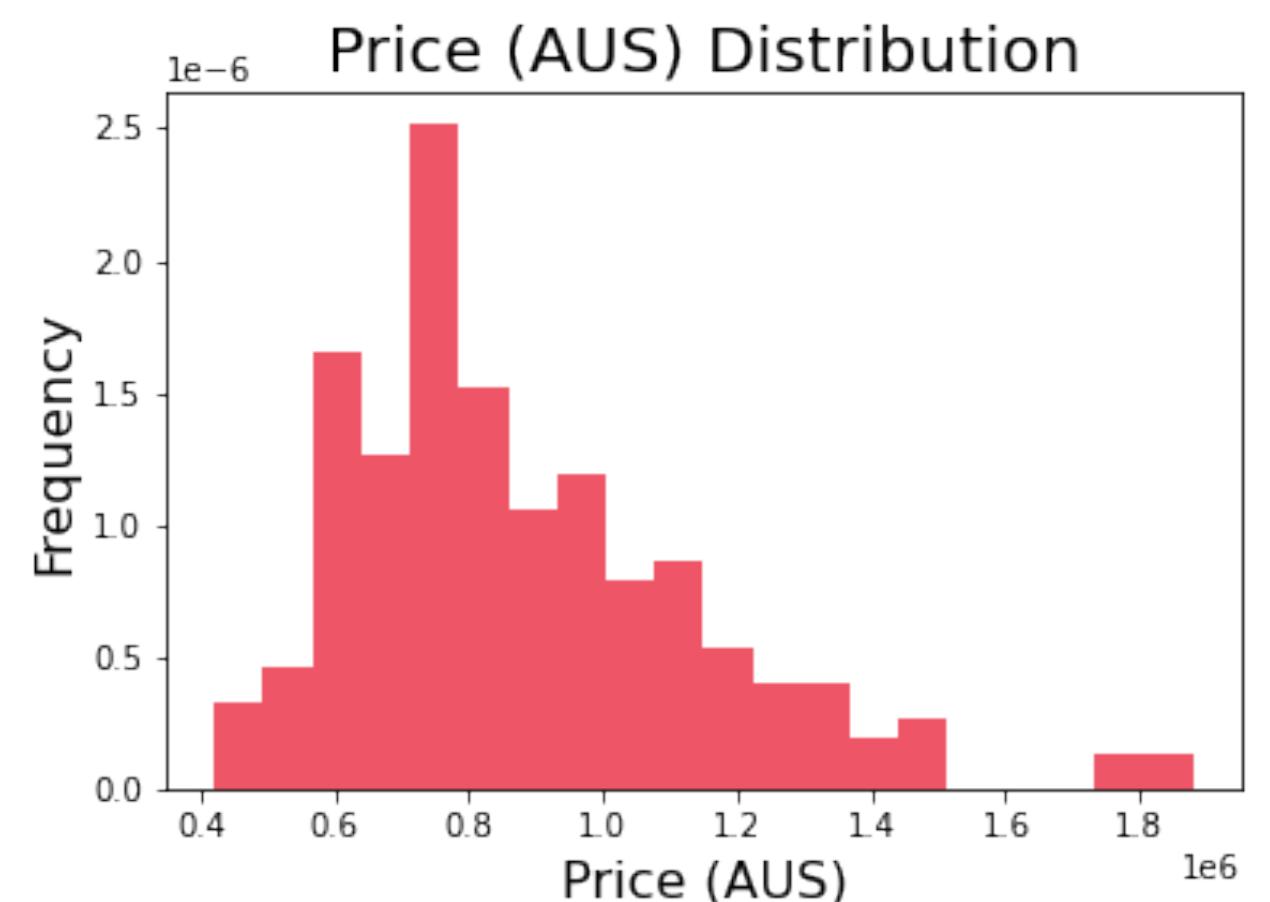
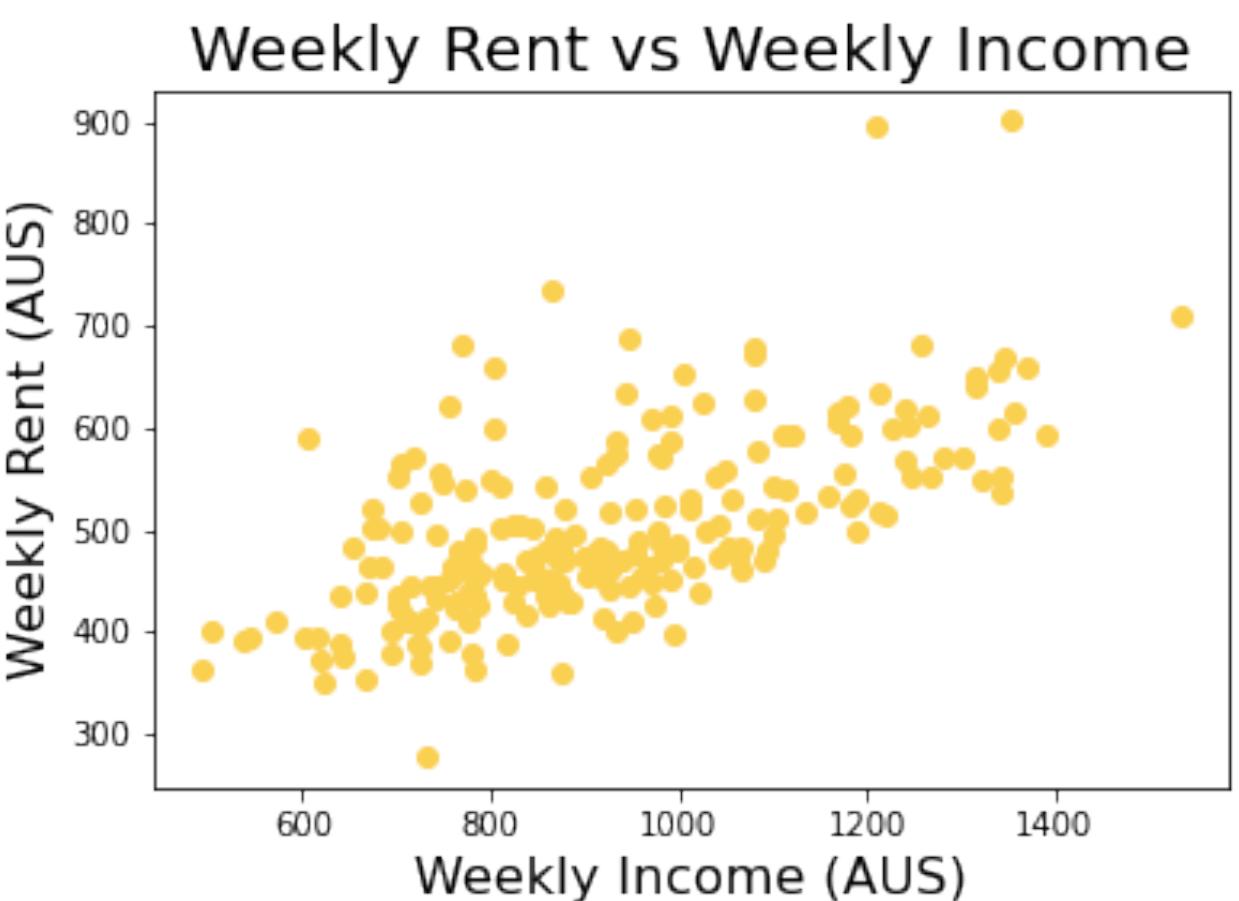
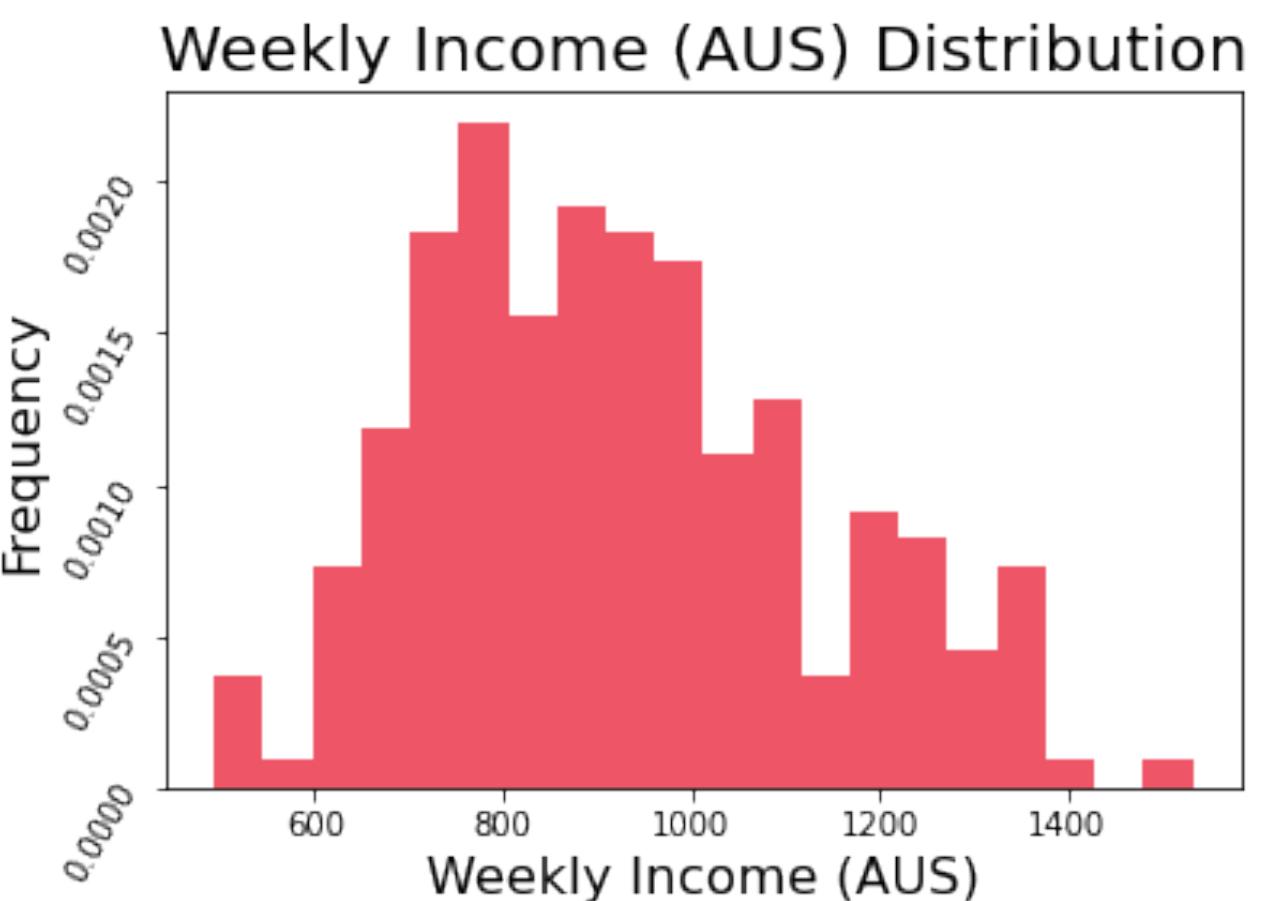
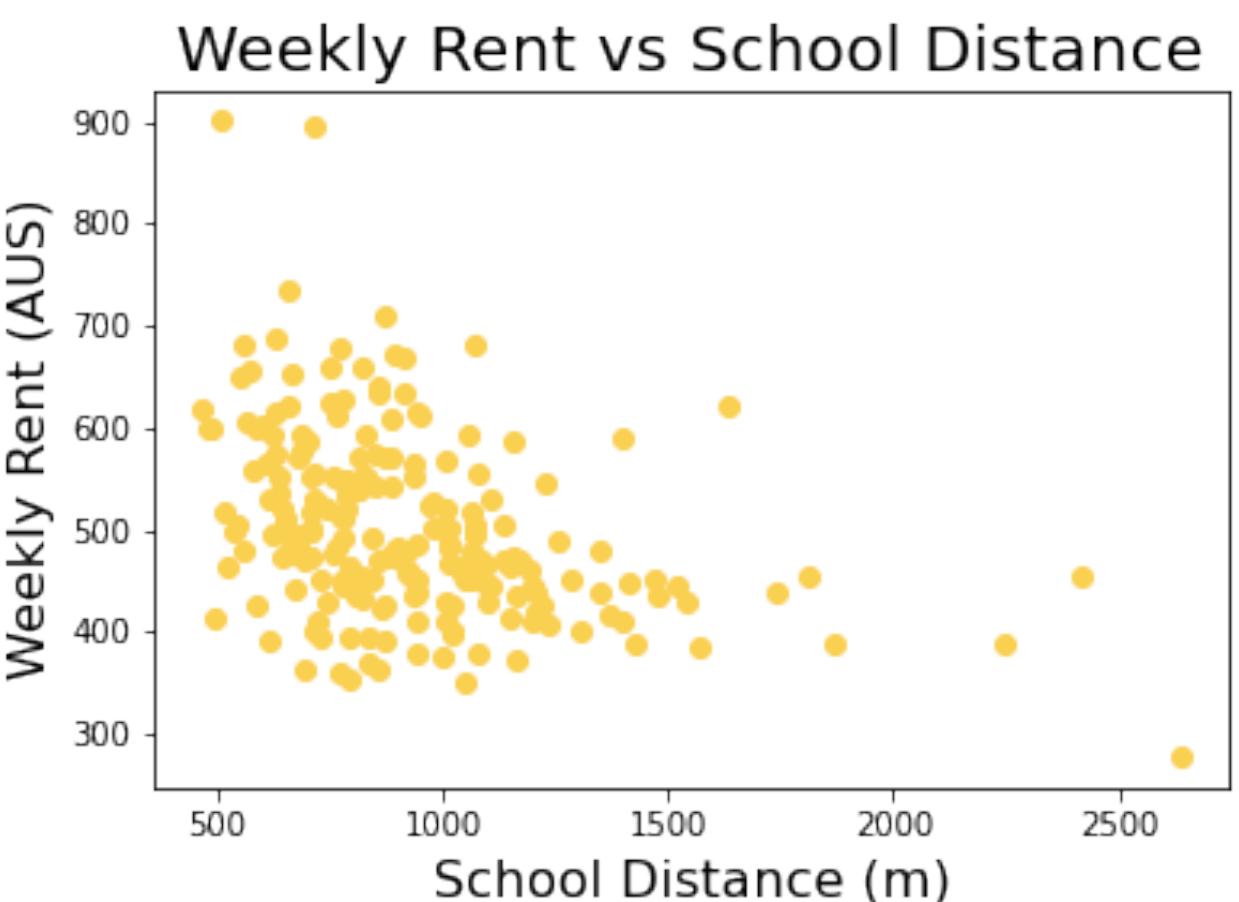
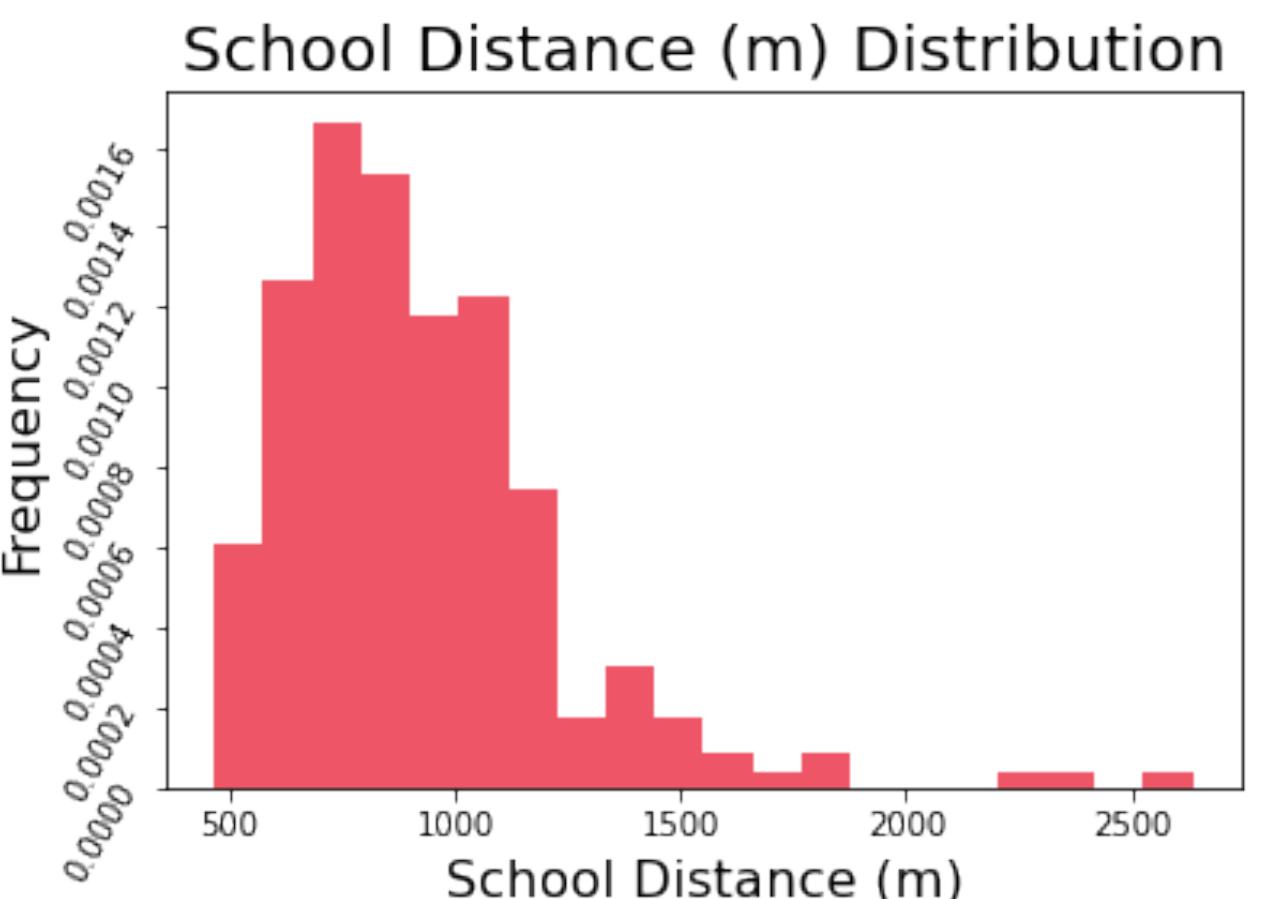
Question 1

The most important features in predicting rental prices

Most important Features

- Using F-Score to reduce the feature space
- Resulted in the 3 most important features in predicting weekly rent

1. Property price
2. Weekly income
3. Distance to school



Model 1

Linear Regression

- Using the most important features we fit a linear regression model
- Evaluated by a 8-fold cross validation
- Coefficient of determination

	Min	Max	Mean	Median
R^2	0.217	0.775	0.6	0.712

Model 2

Multi-layer Perceptron Regressor

- Using the most important features we also fit a regression neural network
- Evaluated by a 8-fold cross validation
- Coefficient of determination

	Min	Max	Mean	Median
R^2	-1.92	0.791	0.281	0.603

Usefulness of models

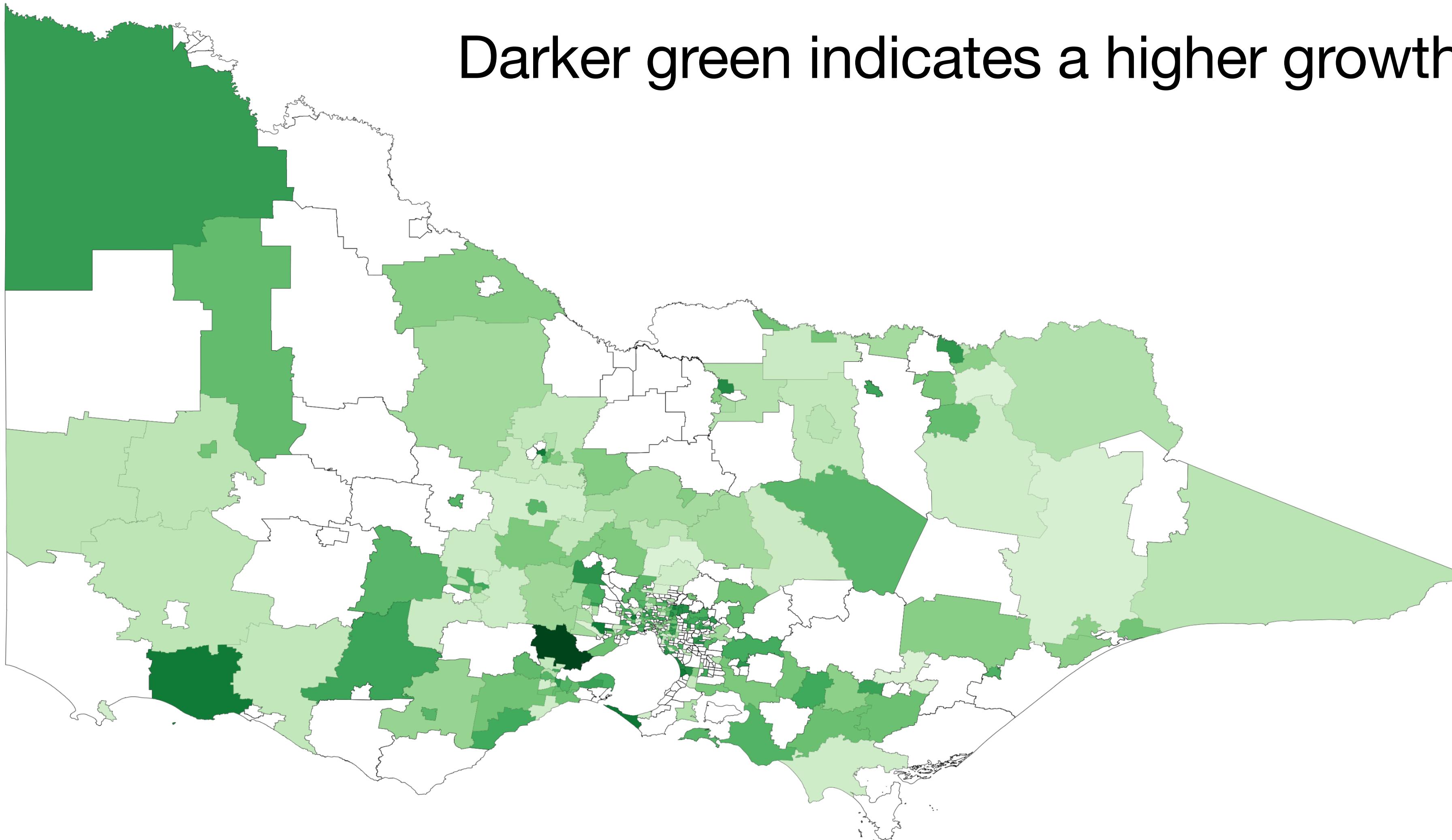
- Using the 3 most important features we can gain a reasonable prediction of what a weekly rent price should be
- This could be used by real-estate companies or individuals looking to rent out a property

Question 2

Top 10 suburbs with the highest predicted growth

Victoria by predicted growth by SA2 zones

Darker green indicates a higher growth rate.



Predict Future Growth

- Predicting which suburbs will have the highest growth benefits for both individual investors and businesses
- For an individual, knowing which suburbs have higher growth will increase their return on investment
- Development in an area with high growth rate, the future value of the property is likely be higher
- Growth is difficult to predict

Statistical Approach

- Originally we attempted to create a linear model
- Little relevant historical data for properties
 - ↳ Growth rate
 - ↳ Dwellings sold for each year
 - ↳ Building approvals.
- The Linear model was run, however we soon had to abandon this as the R^2 score (on the data the model was fit on) was an abysmal 0.06.
- May have been improved by adding in interaction terms

Heuristic Approach

- Instead of statistical approach we decided to take a heuristic approach
- This heuristic was based on observations from experts in the property market
- Key indicators found to make a ranking of suburbs
 - ↳ **Clearance rate** ⇒ high clearance rate = high demand
 - ↳ **Average days of market** ⇒ low days on market = high demand
 - ↳ **Non-residential building approvals** ⇒ higher approvals indicate new businesses ⇒ higher value
 - ↳ **Homes sold / population** ⇒ more sales relative to population suggest high demand
 - ↳ **New dwellings / population** ⇒ more houses built made reduce demand and decrease future value
 - ↳ **Growth in previous 3 years** ⇒ area has been increasing in value we assume it is likely to continue
 - ↳ **Growth in current year** ⇒ the same idea as above, but with more recent numbers

Limitations:

- No statistical method, it is simply based on research
- Data not exactly current
 - ↳ For instance we only have 2020 - 2021 building approvals
- The SA2 zones and suburbs don't perfectly line up
- Large amounts of missing data

Results

- Top ranking suburbs tended to be south east and or along the Mornington Peninsula
- These suburbs are generally holiday destinations for many people yet also meet many of our criteria, and have enjoyed recent growth.



Bellfield

Mornington

Blairgowrie

Rosebud

Camperdown

Seaford

Flinders

Toorgarook

McCrae

Warrnambool

Question 3

The most liveable and affordable suburbs

Liveability Scores are based on 8 factors

Percentile Based Scoring



Parks
Proximity & Travel Time



PTV
Proximity & Travel Time



Shopping Centre
Proximity & Travel Time

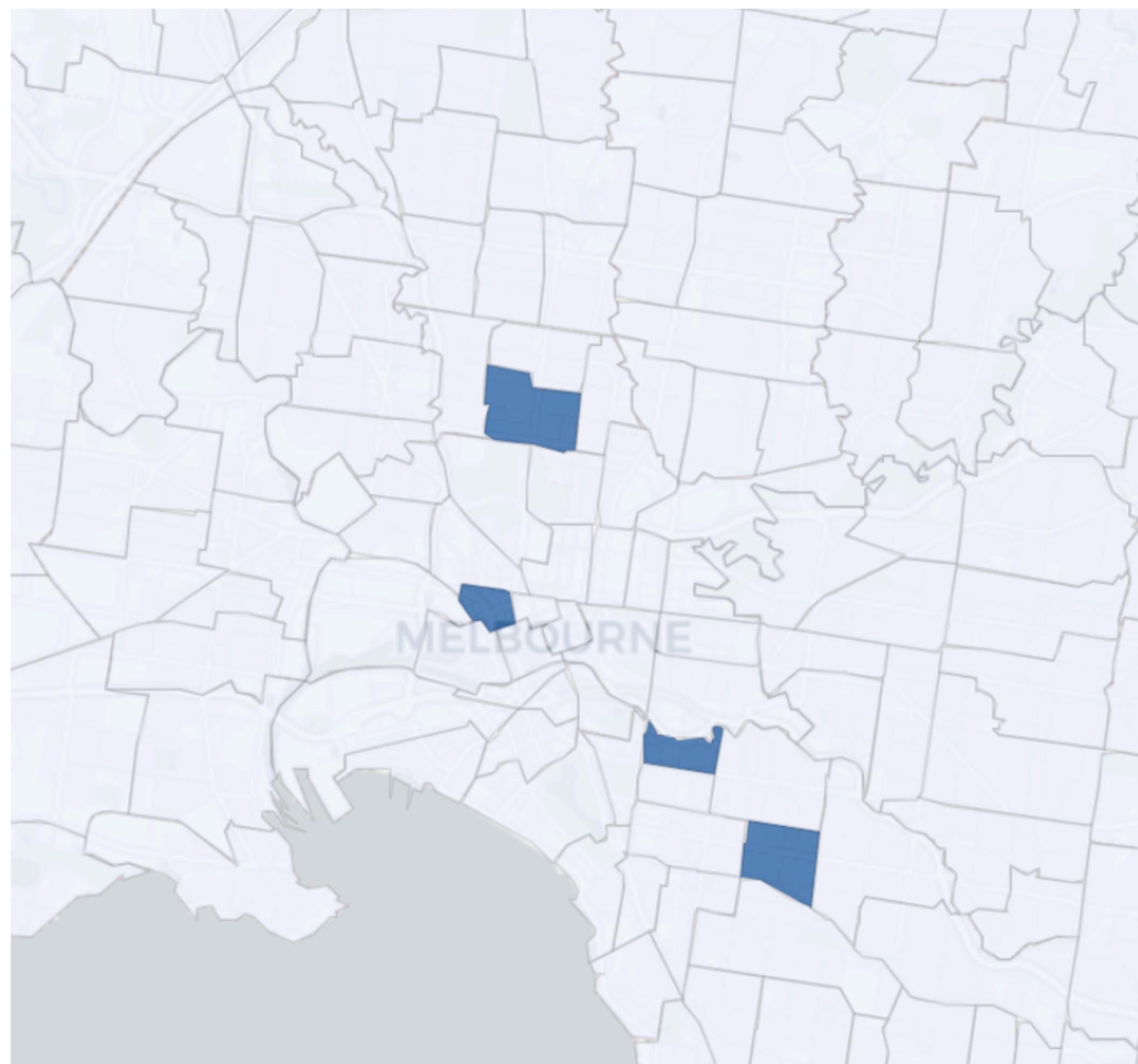


School
Proximity & Travel Time

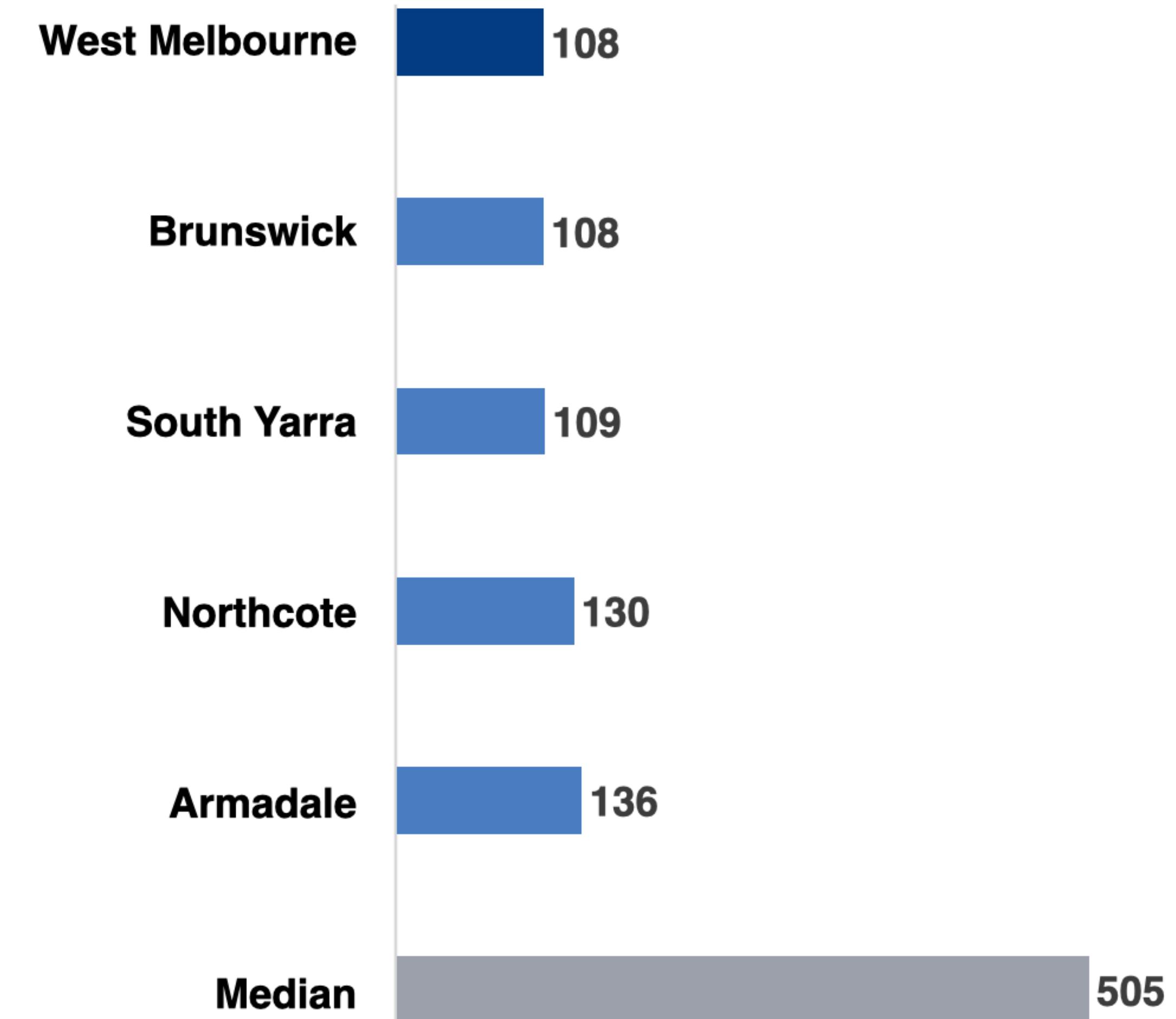


Inner Melbourne Suburb Dominate Liveability

Top 5 Most Liveable Suburbs

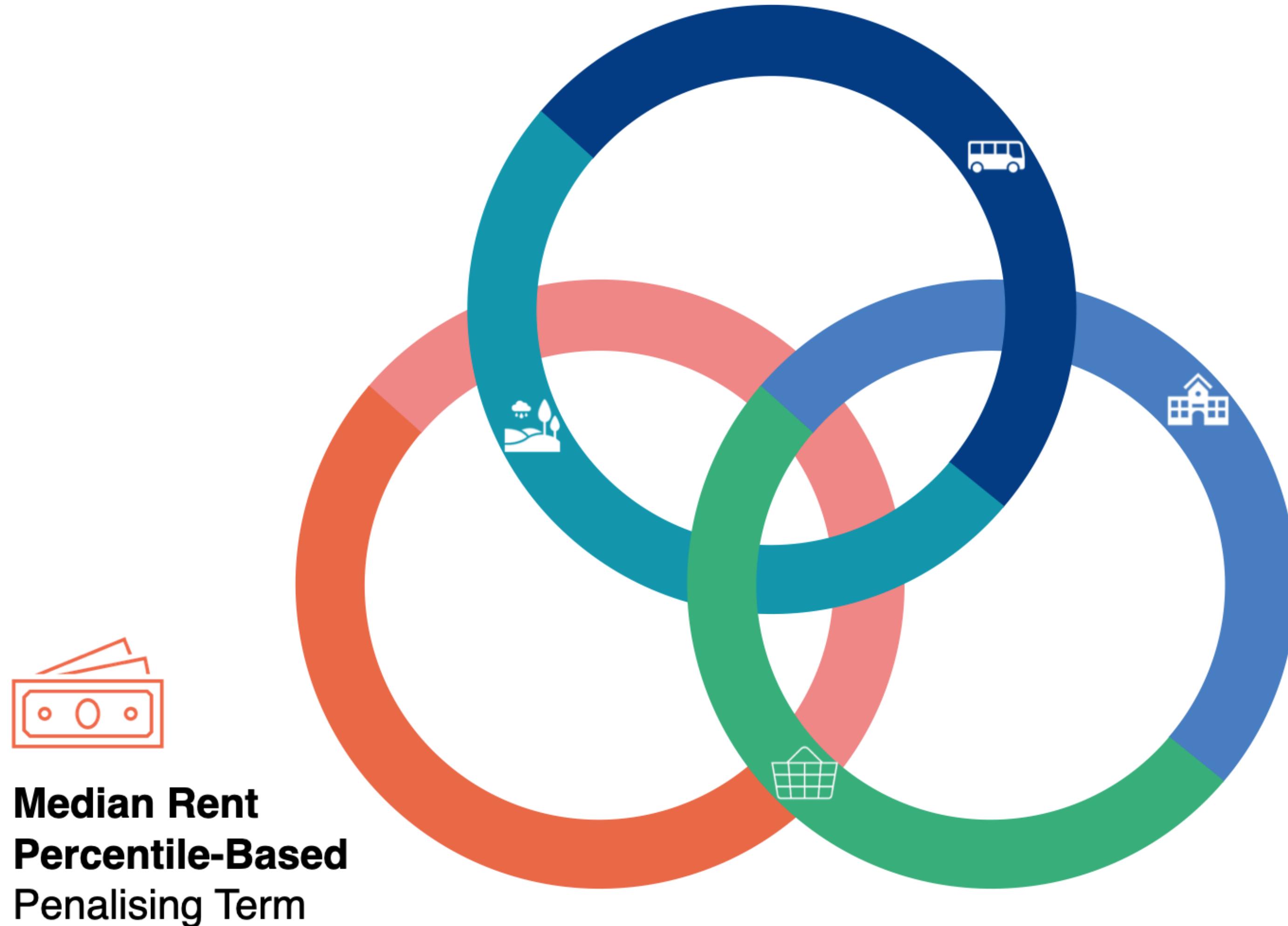


Liveability Score (lower is better)



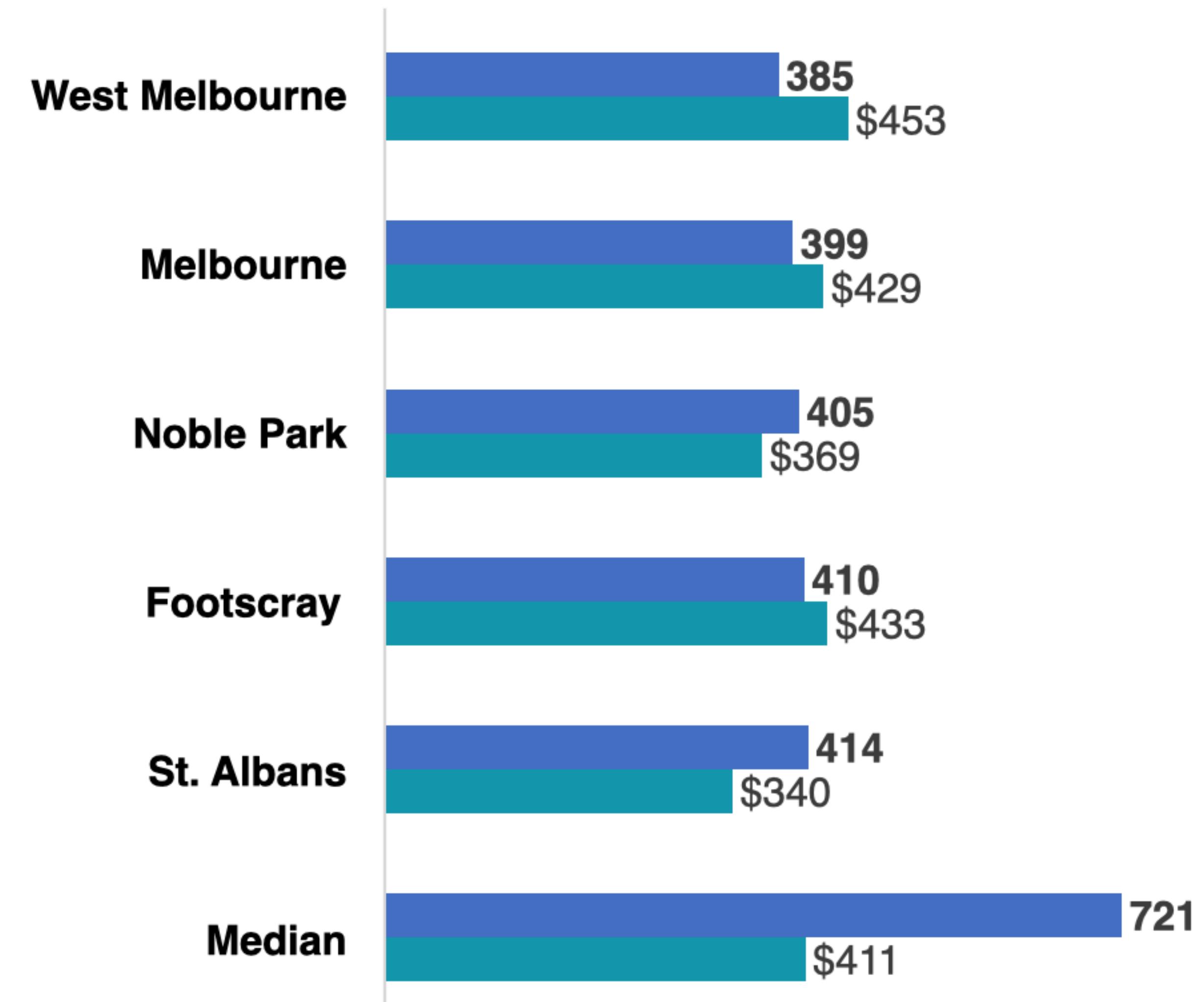
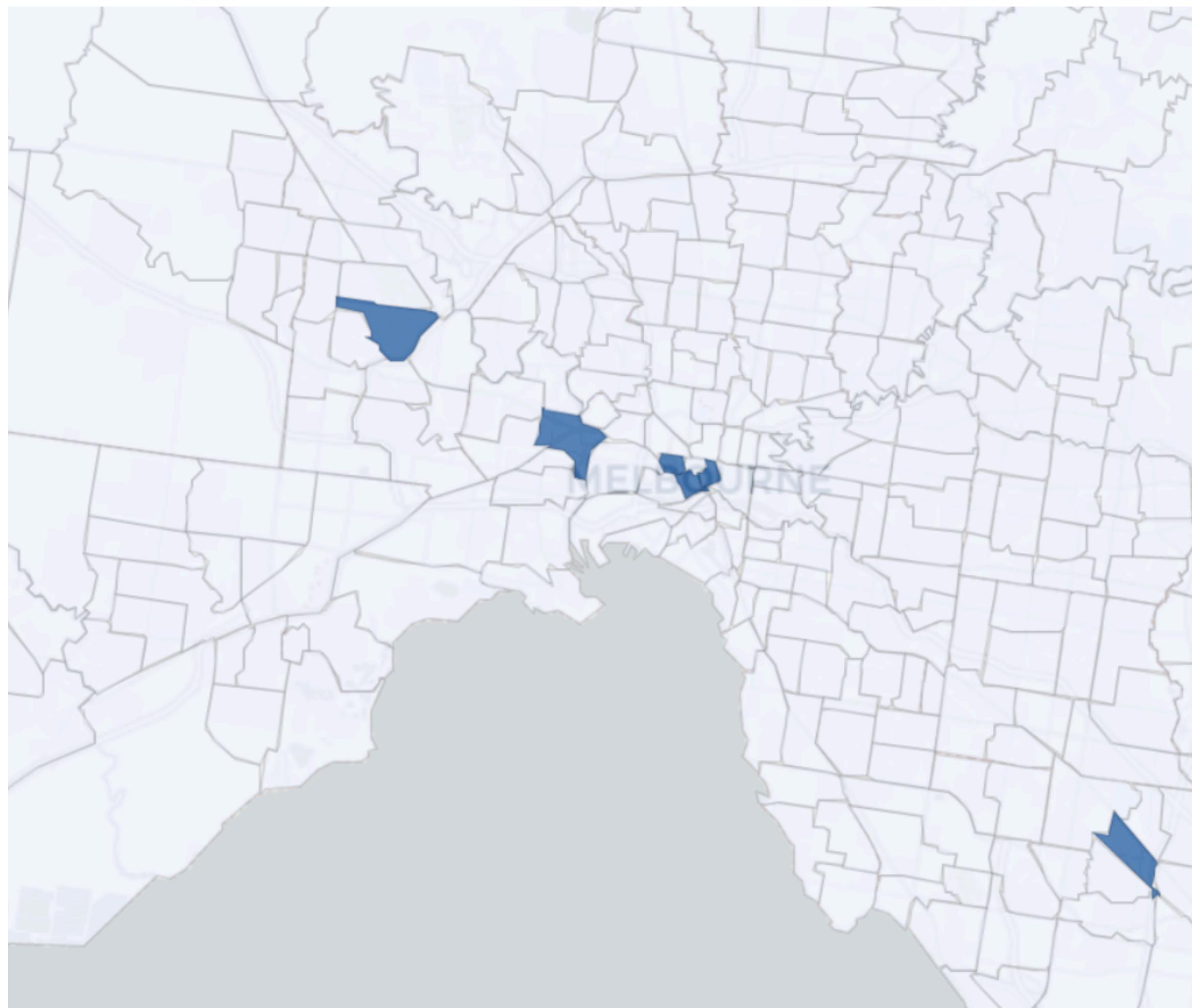
Penalise Rent toward the Median

Percentile Based Scoring



Outwards Pressure to outer Melbourne suburbs

Top 5 Most Liveable and Affordable Suburbs Liveability Score (lower is better) and Rent



References

- [1] <https://www.domain.com.au/news/what-makes-a-suburb-liveable-the-16-factors-that-make-or-break-a-neighbourhood-20160730-gqhdkw-281398/>
- [2] <https://propertyupdate.com.au/property-investment-melbourne/#is-it-the-right-time-to-get-into-the-melbourne-property-market>
- [3] <https://www.mmj.com.au/resources/blog/5-key-market-indicators-every-property-investor-should-know/>
- [4] <https://www.trilogyfunding.com.au/blog/7-key-market-indicators-every-property-investor-should-understand-april-2015/>
- [5] <https://propertyupdate.com.au/property-investment-melbourne/>

Datasets Used

[1] <https://data.aurin.org.au/dataset/au-govt-abs-abs-building-approvals-sa2-2020-21-sa2-2016>

[2] <https://data.aurin.org.au/dataset/au-govt-abs-abs-building-approvals-sa2-2018-19-sa2-2016>