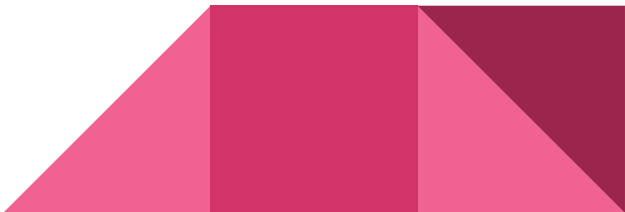


An Analysis of Crime and Property Statistics in Suburban and Regional Victoria

Jeremy Oliver
Roberto Sammassimo
Hieu Nghia Doan
Andrew Fellowes

*“Does local crime affect
local property value?”*

Summary

- Data Collection, Clean Up and Exploration - (For the Data Scientists)
 - Crime
 - Property
 - Merge Issues
 - Python methods we found useful
 - Results and Conclusions (For the Criminologists and Real Estate Agents)
 - Crime v Median House Price
 - Assaults vs. Other Crime types
 - Increase in Crime vs Increase in Median House Price
 - Top 20 Assault Offences then and now by Suburb
 - Breakdown of Crime within Suburbs
 - Next Steps
 - Conclusions
- 

Data Collection, Clean Up and Exploration

Crime Data

VIC.GOV.AU | DATA VIC

- Crime Statistics Agency Data tables - Recorded offences
- <https://discover.data.vic.gov.au/dataset/data-tables-recorded-offences>
- The Crime Statistics Agency (CSA) is responsible for processing, analysing and publishing Victorian crime statistics, independent of Victoria Police.



18.6MB

Last updated	16/03/2023
Organisation	Crime Statistics Agency
License	Creative Commons Attribution 4.0 International

Data Collection, Clean Up and Exploration

Crime Data

VIC.GOV.AU | DATA VIC

- Table 1** Offences recorded and rate per 100,000 population by police region and local government area - January 2013 to December 2022
- Table 2** Offences recorded and rate per 100,000 population by offence type, local government area and police service area - January 2013 to December 2022
- Table 3** Offences recorded by offence type, local government area and postcode or suburb/town - January 2013 to December 2022
- Table 4** Offences recorded by location type and local government area - January 2013 to December 2022
- Table 5** Offences recorded by investigation status and local government area - January 2013 to December 2022
- Table 6** Select drug offences by drug type and local government area - January 2013 to December 2022

Data Collection, Clean Up and Exploration

Crime Data

VIC.GOV.AU | DATA VIC

...	Year	Year ending	Local Government Area	Postcode	Suburb/Town Name	Offence Division	Offence Subdivision	Offence Subgroup	Offence Count
0	2022	December	Alpine	3691	Dederang	A Crimes against the person	Other crimes against the person	Other crimes against the person	2
1	2022	December	Alpine	3691	Dederang	B Property and deception offences	B40 Theft	B42 Steal from a motor vehicle	1
2	2022	December	Alpine	3691	Dederang	B Property and deception offences	B40 Theft	B49 Other theft	1
3	2022	December	Alpine	3691	Dederang	D Public order and security offences	D10 Weapons and explosives offences	D11 Firearms offences	1
4	2022	December	Alpine	3691	Dederang	D Public order and security offences	D20 Disorderly and offensive conduct	D22 Drunk and disorderly in public	1

Year:	10	Postcode:	693	Offence Subdivision:	25
Year ending:	1	Suburb/Town Name:	2851	Offence Subgroup:	106
Local Government Area:	79	Offence Division:	6	Offence Count:	739

(35,7852 rows x 9 columns)

Data Collection, Clean Up and Exploration

Property Data



Department
of Transport
and Planning

- Annual and quarterly property sales statistics from Valuer-General Victoria
- <https://www.land.vic.gov.au/valuations/resources-and-reports/property-sales-statistics>
- The data is compiled using information lodged every time a property sale is completed. It provides property statistics for Victoria's 79 municipalities and yearly medians by suburb over a 10-year period



293KB

Data Collection, Clean Up and Exploration

Property Data



Department
of Transport
and Planning

	locality	Median 2011	Median 2012	Median 2013	Median 2014	Median 2015	Median 2016	Median 2017	Median 2018	Median 2019	Median 2020	Median 2021	Median 2022	Change 2020-2021	Change 2011-2021	Growth PA
0	ABBOTSFORD	730000	714000	792500	862500	925000	1187500	1280000	1192500	1050000	1200000	1375000	1517500.0	15.0	88.0	6.5
1	ABERFELDIE	994000	852500	947500	1045000	1207500	1300000	1471000	1498500	1390000	1520000	1880500	1575000.0	24.0	89.0	6.6
2	AINTREE	-	-	-	-	600000	600000	571000	557500	575000	640000	719000	760000.0	12.0	NaN	NaN
3	AIREYS INLET	680000	634000	664000	625500	680000	715000	737500	869000	985000	1132500	1775000	1750000.0	57.0	161.0	10.1
4	AIRPORT WEST	557500	495000	532000	575000	635000	742000	845000	845000	795000	812500	960000	919500.0	18.0	72.0	5.6

(820 rows x 16 columns)



Data Collection, Clean Up and Exploration

Clean Up

Crime Data

1. Use `.groupby()` & `.sum()` to remove lowest crime category **Offence Subdivision**
2. Drop **Year Ending** column

Property Data

1. Use `.astype(str).str.title()` to convert case of **locality** to allow merge with **Suburb/Town Name**
2. Drop **Change 2020-2021**, **Change 2011-2021**, and **Growth PA** columns
3. Cast all the Median house price columns to float datatype
4. Use `.melt()` method to transform property table to same format as crime table (years in rows instead of columns)

Data Collection, Clean Up and Exploration


Problems with the data merge

- Additional columns in Crime table, (**Local Government Area** and **Postcode**) did not have unique relationship with **Suburb/Town Name**

Year	Local Government Area	Postcode	Suburb/Town Name	Offence Count
2013	Banyule	3083	Bundoora	102
2013	Darebin	3083	Bundoora	51
2013	Whittlesea	3083	Bundoora	106

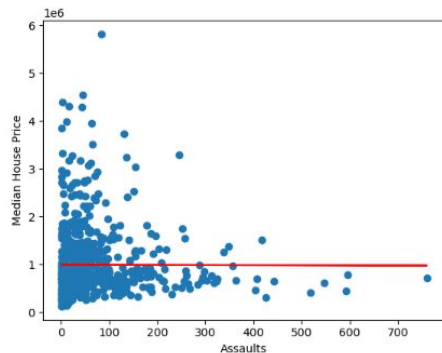
- Resulted in inflation of Median house prices for these suburbs
- Used `.idmax()` method to filter to rows with highest **Offence Count**
- Used AusPost API query to resolve Postcode conflicts
- Used `.pivot()` ('opposite' of `.melt()`) to reformat Crime table to match Property table

Our Approach

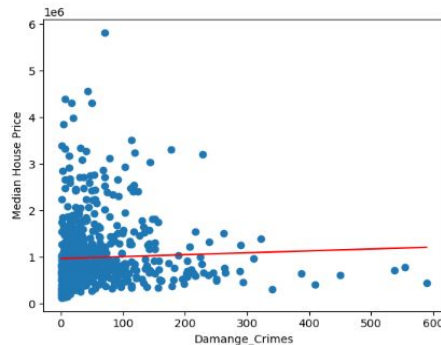
- Clean and merge data tables
 - Perform correlation and regression analysis between crime types and median house price
 - Perform correlation and regression analysis between crime types
 - Calculate change in crime and change in median property values over the period studied
 - Look for significant median house price differences across groups of highest to lowest crime increase
 - Plot crime breakdown by sub-division, year and suburb
 - Use appropriate null hypothesis and statistical tests
- 

Results and Conclusions

The correlation between Assaults and Median House Price is 1.0



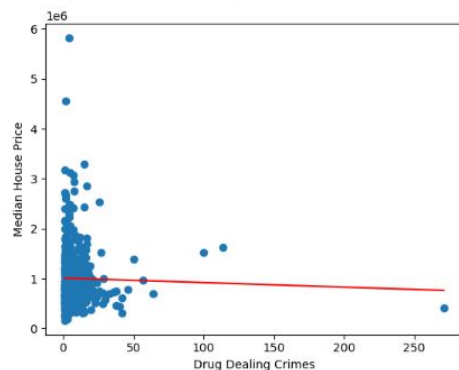
The correlation between Damage Crimes and Median House Price is 1.0



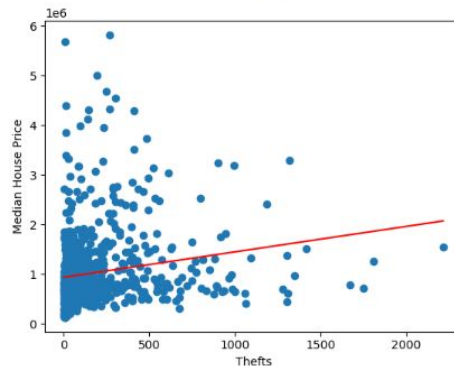
Crime vs Median House Price 2022

Do suburbs with higher house prices experience the same levels of crime as other suburbs?

The correlation between Drug Dealing Crimes and Median House Price is 1.0



The correlation between Thefts and Median House Price is 0.18

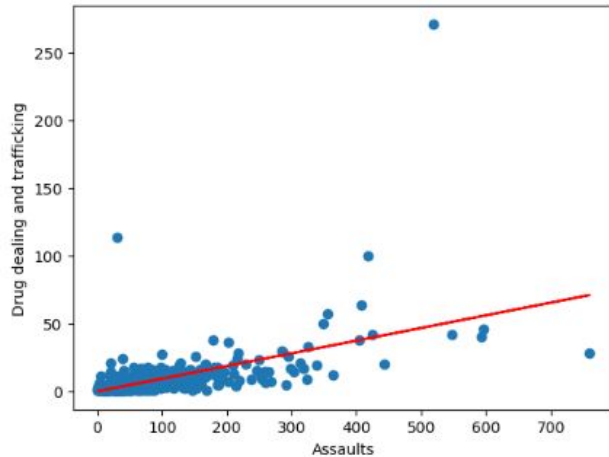


Results and Conclusions

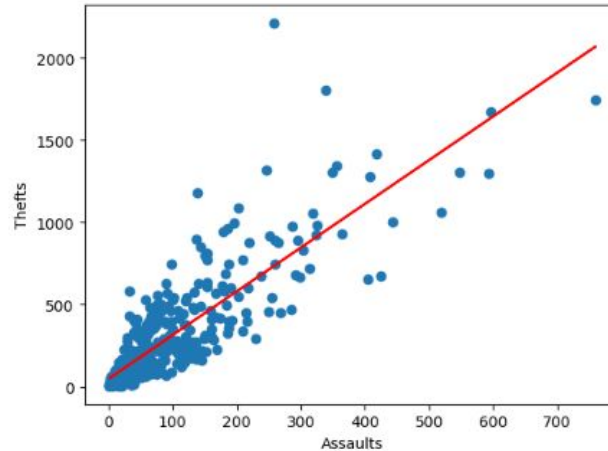
2022 Plots of Assaults vs Other crime times in Victoria Suburbs/Towns

Are crime numbers for different types of crime are independent of each other?

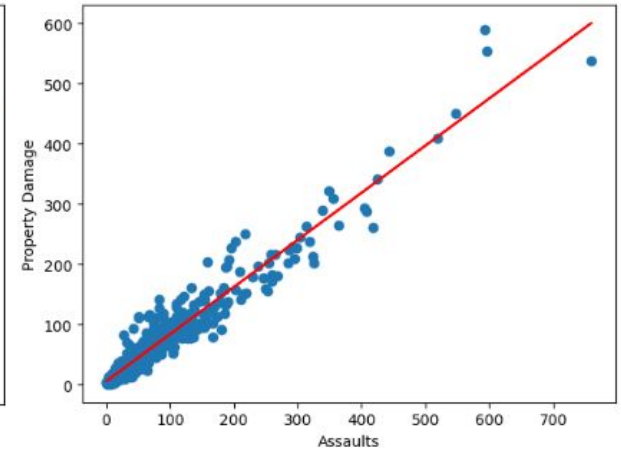
The correlation between Assaults and Drug dealing and trafficking is 0.56



The correlation between Assaults and Theft is 0.84



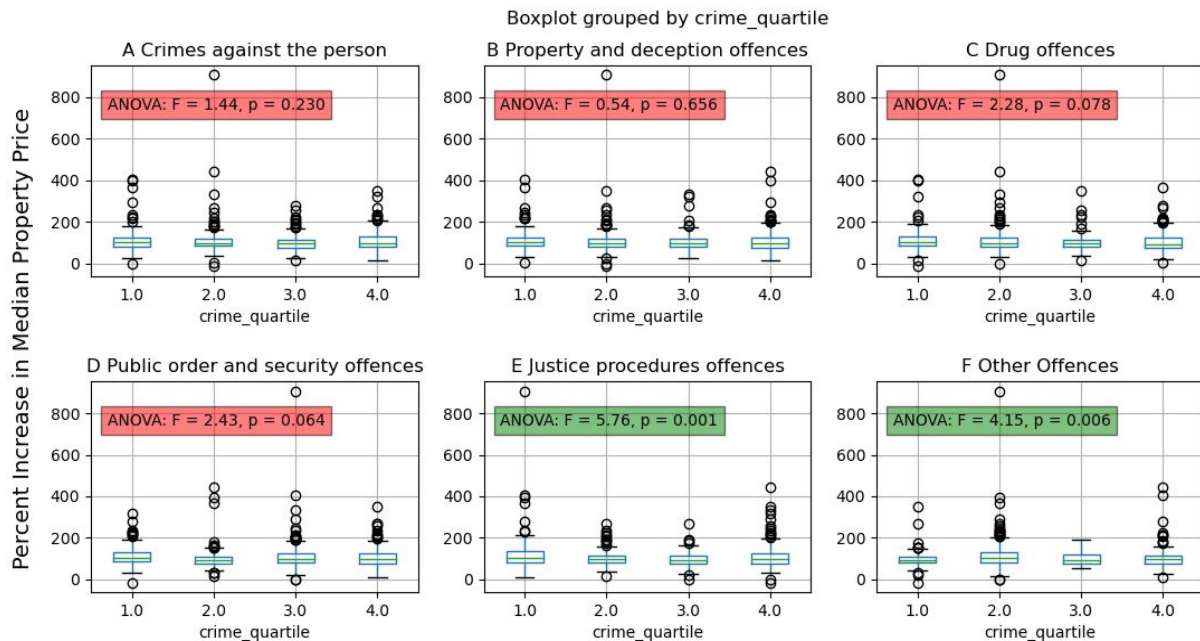
The correlation between Assaults and Property Damage is 0.96



Results and Conclusions

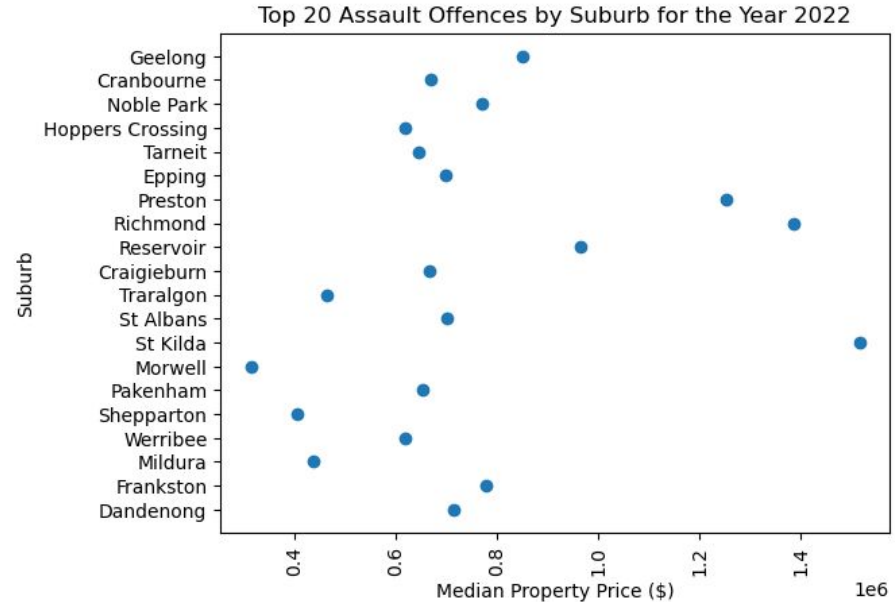
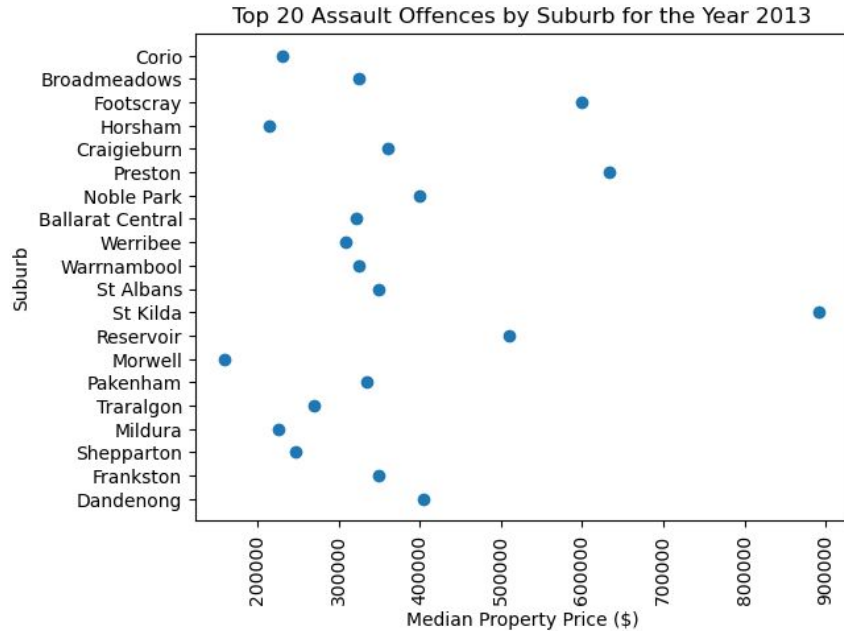
Crime Rate Change vs. Median Property Value Change

Do the suburbs with the biggest increase in crime experience the same median house price increase as other suburbs?



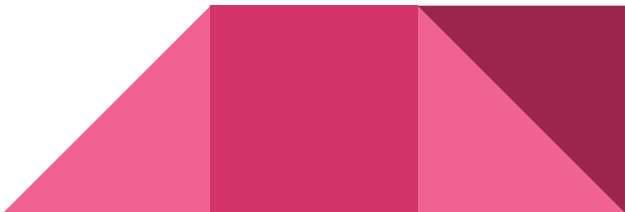
Quartiles of Percent Increase in Crime Incidents

Top 20 Assault Offences then and now by Suburb



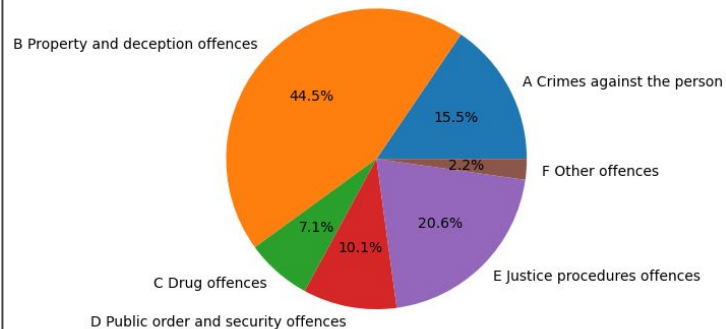
Top 20 Assault Offences then and now by Suburb

What can we see from this?

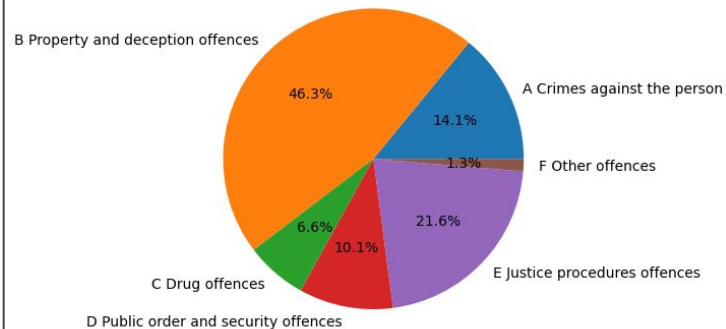
- We can see that the majority of the top 20 highest Assault related cases occurred in suburbs with a lower median property value
 - Similar results for both 2013 and 2022
 - St Kilda over the decade has been involved in the top 20 with the highest median price
 - Morwell over the past decade has been involved in the top 20 with the lowest median price
- 

Breakdown of Crime within Suburbs

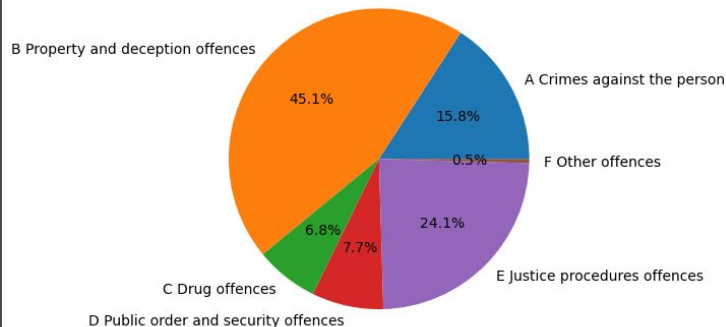
Offence Division Distribution in Dandenong 2013-23



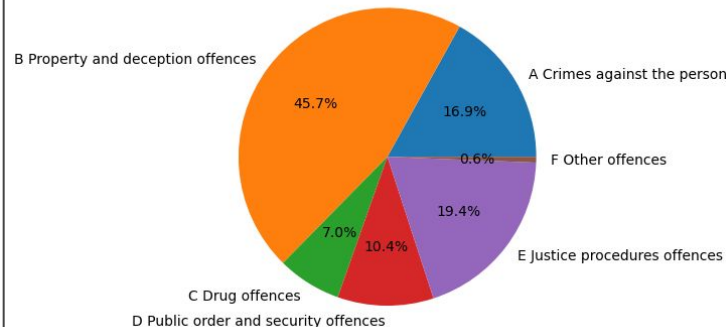
Offence Division Distribution in Frankston 2013-23



Offence Division Distribution in Shepparton 2013-23



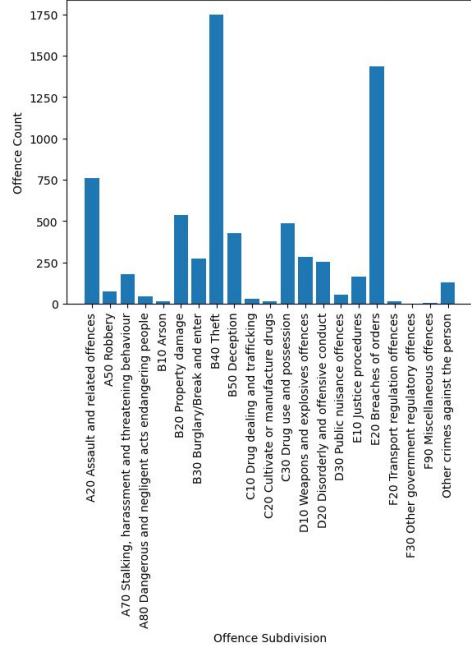
Offence Division Distribution in Mildura 2013-23



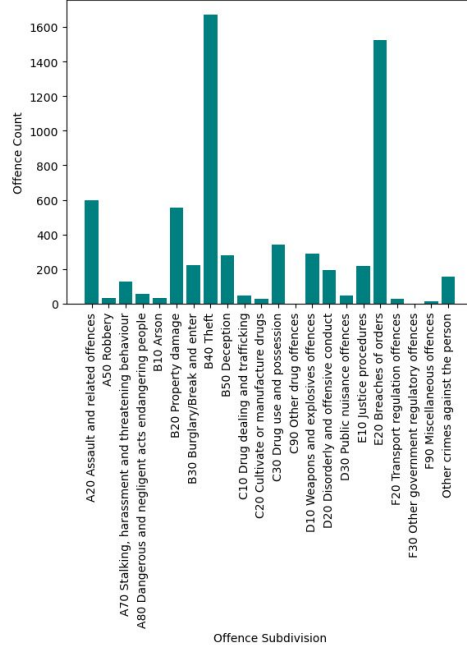
Breakdown of Crime within Suburbs

1st Highest: Theft
2nd Highest: Breaches of Orders
3rd Highest: Assault and Related Offences

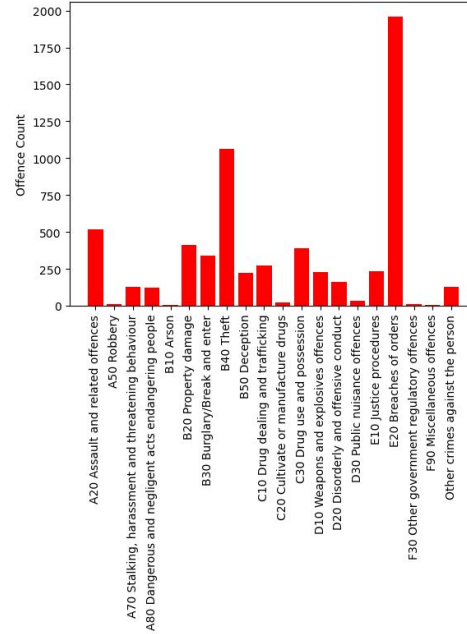
Offence Division Distribution in Dandenong 2022



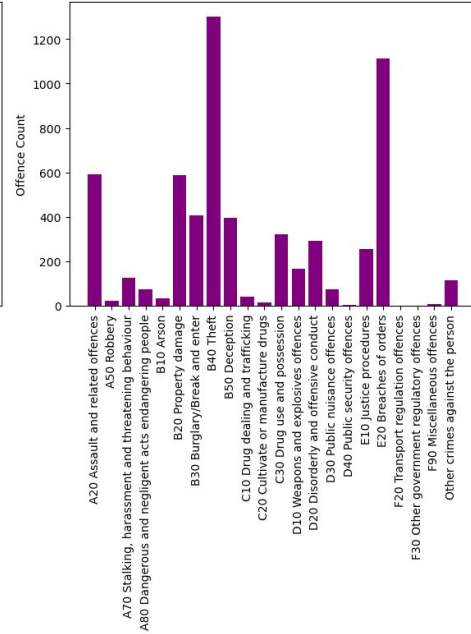
Offence Division Distribution in Frankston 2022



Offence Division Distribution in Shepparton 2022



Offence Division Distribution in Mildura 2022



Next Steps

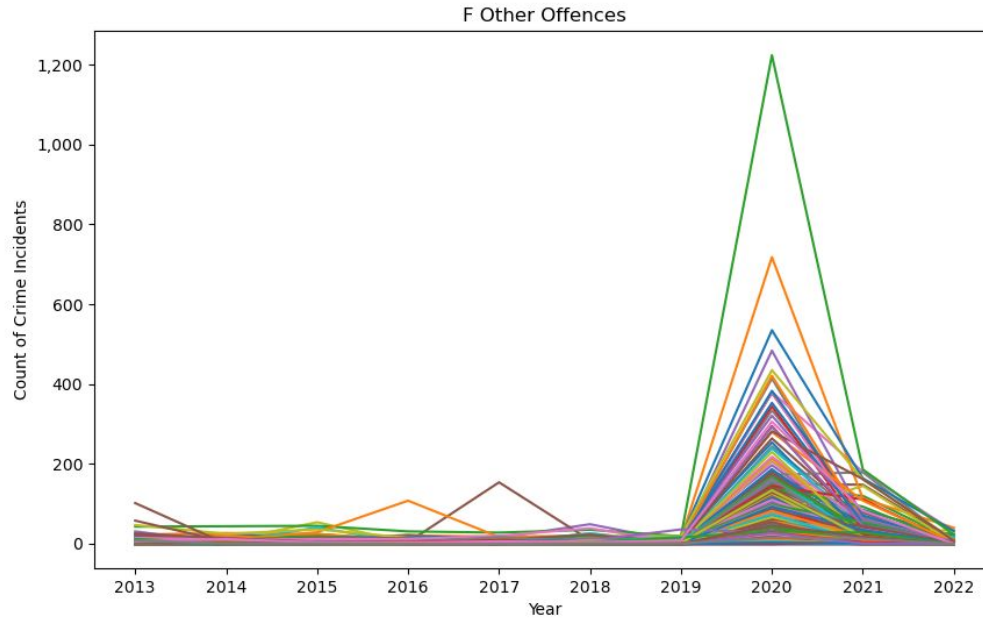
- Obtain population data and perform analysis using crime rate (per 100,000) instead of absolute amount of crime per suburb/town
- Perform mapping to look for regional correlations with crime rate (Eastern Melbourne vs. Western Melbourne, Regional vs. Urban Victoria)
- Investigate influences that could explain why justice and other offences vary significantly by median house price quartile (e.g. COVID lockdown)



Next Steps

Other Offences 2013- 2022

What happened in 2020?



Conclusion

- There are many evidences to prove that the suburbs with higher prices have the same number of crimes as other suburbs. And besides that we figure out there are relationships between Assaults offenses and other crimes in Victoria suburbs and towns.
- There is little evidence to prove that the level of crime has no effect on increasing the house price between the suburbs.
- Finally, our research will conclude that the levels of criminal cases in suburban has no relationship with the house price between Victoria suburbans and regions.



Executive Summary

- We saw no association with crime numbers for high level crime groups, and median house price, across regional and suburban Victoria however some crime types occurred more frequently in some suburbs
- The numbers of crimes of different types were strongly correlated with each other across the entire data set.
- Increase in property value over the period analysed was not significantly different in the suburbs that experienced the biggest increase in crime over the same period (top quartile for change in crime 2013-2022) for crimes against people, crimes against property, drug offences, or public order offences
- Justice and other offences appear to show a different trend but this needs further investigation

