To study the Real Estate Market of Melbourne, Australia and analyse the effect of various factors on the Real Estate Prices

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ABSTRACT

Background: Real estate has long been considered a sound investment, and for a good reason. It has become a very popular investment instrument over the past few years. In Australia's long history, booms and busts have been an integral part of life. At present it is clear that Australia is once again gripped by a boom which is partially created by a large imbalance in supply and demand, this time in the nation's real estate market. A thorough study and analysis of what factors affect the housing prices can benefit both the investors and the buyers in finding a great deal for themselves.

Objective : This research aims to study the 'Melbourne Housing Market' from 2016 to 2019 to analyse the different factors affecting the housing prices and to develop insights of what shall be a profitable investment. It will also predict the housing prices for 2020 and 2021 to assess the likelihood of high real estate prices.

Methodology : This paper is built on analyzing the data of the Melbourne Housing Market from 2016 to 2019 using Python. It involves cleaning and modifying the data as per requirement and using matplotlib and seaborn function to do data visualisation of different factors. Prices for the future have been predicted using a linear model and an ideal investment type has been constructed.

Conclusion : It appears from the market analysis that the ongoing property boom is likely to continue in the coming years in Melbourne. The number of rooms and bathrooms in a property have shown to have the highest impact on price of the property. For investment, units or condos in the Southern Metro Region have a great potential of growth. To be precise, properties with two rooms and one bathroom will be recommended to the investor or buyer.

1. INTRODUCTION

In Australia's long history, booms and busts have been an integral part. From the gold rushes of the 1850s to a long list of commodity price booms, Australia has long enjoyed the joy that comes from a booming economy and the anguish that comes from the inevitable busts. Till date this pattern continues resulting in pretty much the same conditions. At present the Australian market is once again in a bullish state majorly affecting the nation's property market.

Between a combination of record low interest rates, pandemic driven factors like remote working and several government stimulus programs, the demand for property in Melbourne, Australia has actually skyrocketed to all time highs contrary to have dropped off significantly due to pandemic. Melbourne's housing prices have increased by 19.5% in the past year and the prices have reached a monthly growth rate of 2.4% which is the fastest four week increase the city has ever experienced in the past three decades as shown in Figure 1. Unsurprisingly, Melbourne's rental market has shown record high rents in March 2020 with the vacancy rate being at their lowest point i.e. 3.1%. It is further predicted by the Australia and New Zealand Banking Group (ANZ) that the Melbourne house prices are expected to lift by 7% over the course of next year.

In these times of record breaking growth of real estate prices in Melbourne and the prediction of high prices in the coming years as well, investors would not want to leave a chance to not invest in the most profitable sites and enjoy the gains from it in the near future. The industries that seem to be most beneficial from the surging housing prices are the real estate industry, the building and construction industry and the architecture industry whose primary focus is investment in housing, renovating them and selling them to the buyers. Analysing the information related to the housing market and studying the factors thereof will assist these industries to choose their ideal investment and thus will be the focus of this research.
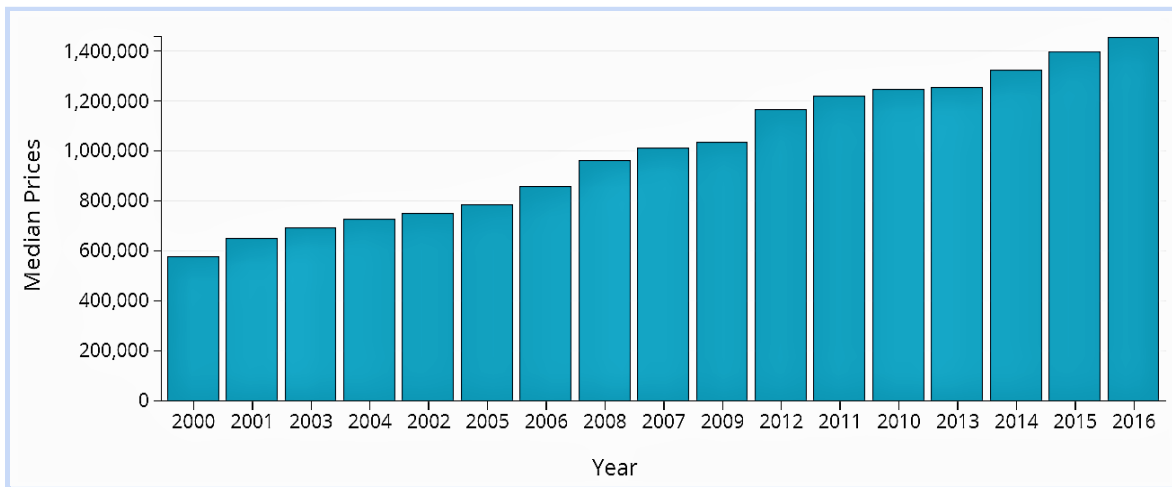
Figure 1: Melbourne's median house prices surge over years
Source : City of Melbourne

2. METHODOLOGY

This research project aims to visualize the contents of the Melbourne Housing Data in order to do an in-depth review of the Melbourne property value over the years and it's trend for the upcoming years. To provide valuable knowledge it is extremely essential to firstly clean and manipulate data as per the needs and requirements of the study. After this step, we shall determine how different factors affect the housing prices using matplotlib and the seaborn function of Python. In the end we will predict the Melbourne Housing Prices for the upcoming years for the investors and buyers to know where the market is going in the future. After all is done the research will show the ideal housing market type to acknowledge the geographical area with the highest growth.

2.1 Data Cleaning

Data Cleaning is the process of preparing data for analysis by removing or modifying data that is incorrect, incomplete, irrelevant, duplicated or improperly formatted. This data is usually not necessary when it comes to analyzing data because it may hinder the process and provide inaccurate results. To maximize the accuracy of our data set we have done the following :

- Changing the data type to be able to plot all variables for analysis; changing all data types to category and date to date time.
- Removing a few variables which are similar to avoid data duplication.

- Dropping variables that will not be used in our analysis.

2.2 Missing Values

It is essential to carefully handle the missing values in order to prevent inaccurate inference about the data. Figure 2 shows the missing values present in the data.
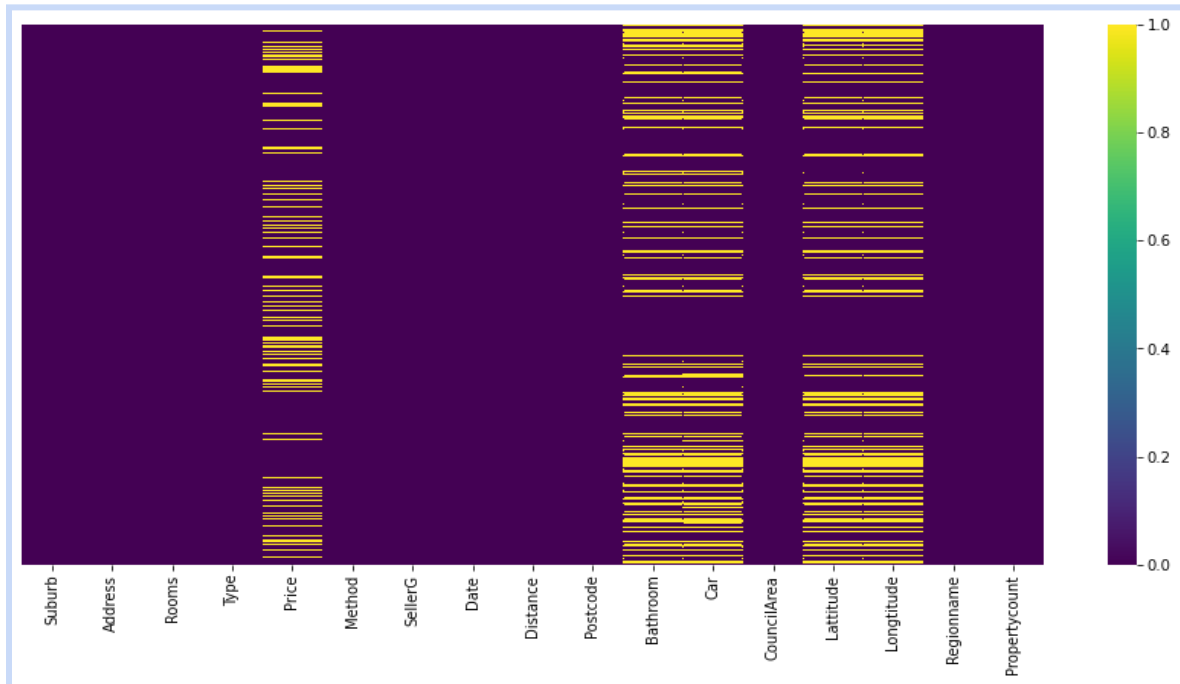

Figure 2: Missing Values in Melbourne Housing Data

Our most important variable 'Price' has 21% missing values. Variables 'Bathroom', 'Car', 'Latitude' and 'Longitude' have around 23% to 25% missing values. For price the missing values were dropped rather than imputing them. Missing values for other independent variables were replaced by their mode.

2.3 Treating Outliers

Outlier treatment is another important step before data is made available for analysis. Outliers can adversely and significantly affect the outcome of the analysis. Hence, it is beneficial to remove or treat all outliers before proceeding further. Melbourne Housing Data had quite a few outliers in 'Price' and 'Rooms' which were dropped off. Figure 3 shows that the data after treatment of outliers has no extreme values and is not skewed. It is thus ready for data analysis.
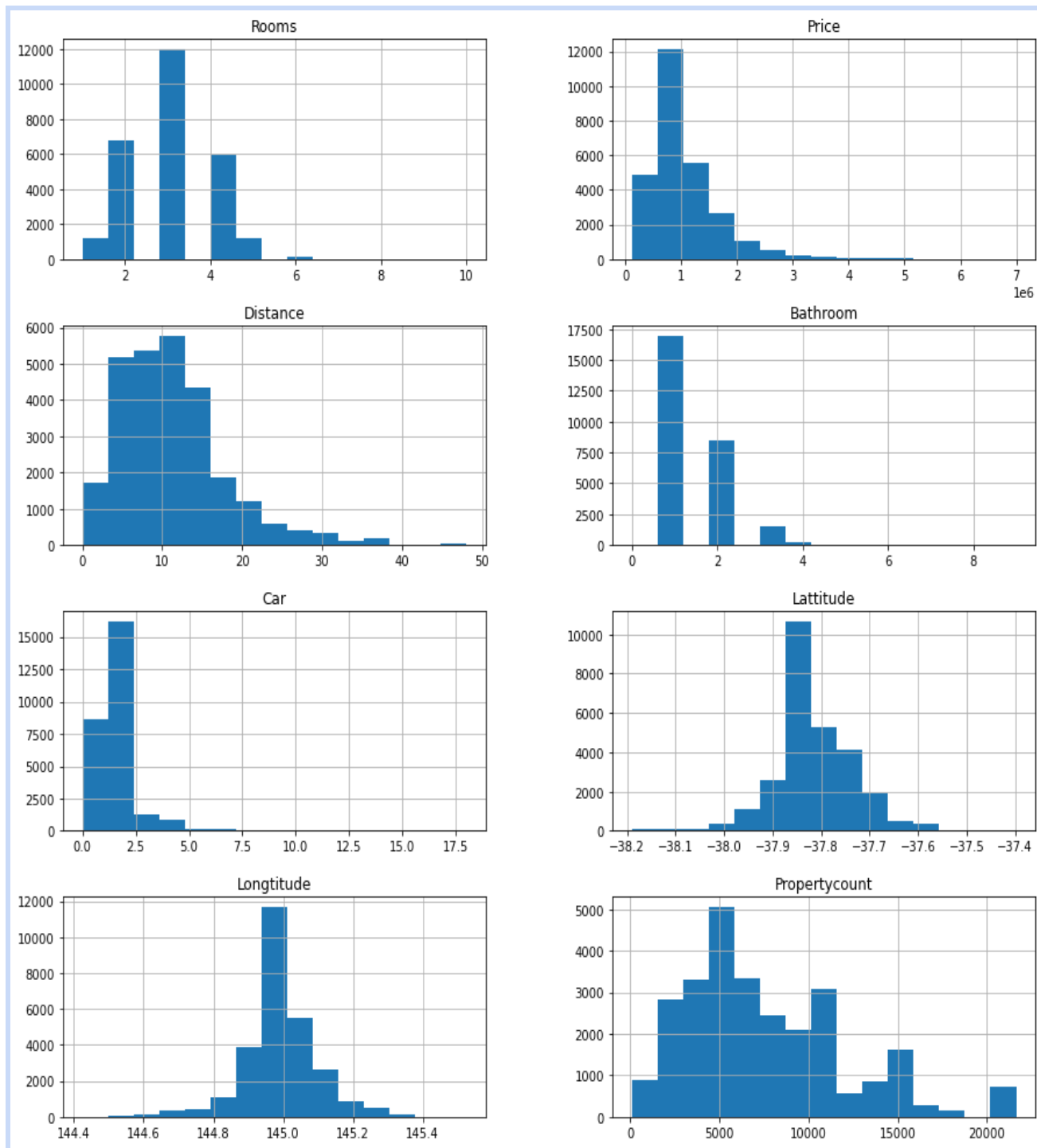
Figure 3: Treatment of outliers

3. DATA ANALYSIS AND VISUALIZATION

CoreLogic's head of residential research Eliza Owen says 'Melbourne's typical house value is getting towards that million dollar mark and rents are generally rising too, which makes things hard if you are trying to save for a deposit. Melbourne house prices are tracking near historical highs which can also be seen from Figure 4. The breakdown of different house types can be understood from the figure. It shows that over the years the prices of condos have increased and so have the prices of townhouses. Contrary to them, the prices of houses have decreased from 2016 to 2018 in Melbourne.
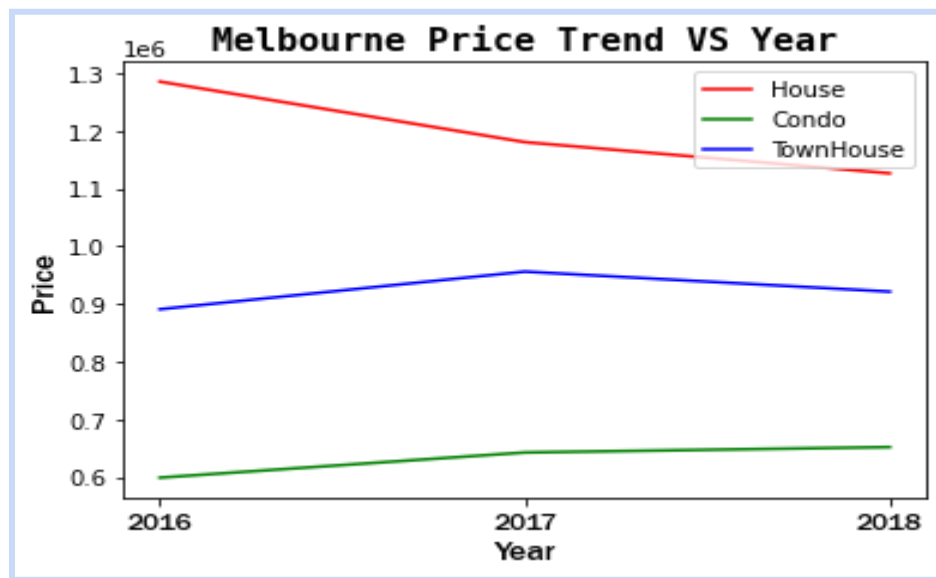

Figure 4: Melbourne Price Trend over the years

For the developer it might be the time to build condos because the prices of condos are expected to increase as per the graph. Since the house prices have fallen drastically, it is the time for the house buyers to buy houses for themselves before the property market boom hits the house prices as well.

3.1 Correlation of different factors with Price

Figure 5 is a heatmap that explains the correlation of all relevant factors with the prices of housing. It helps us determine what factors have the most impact on the housing prices so we further analyse them in detail to develop more insight.
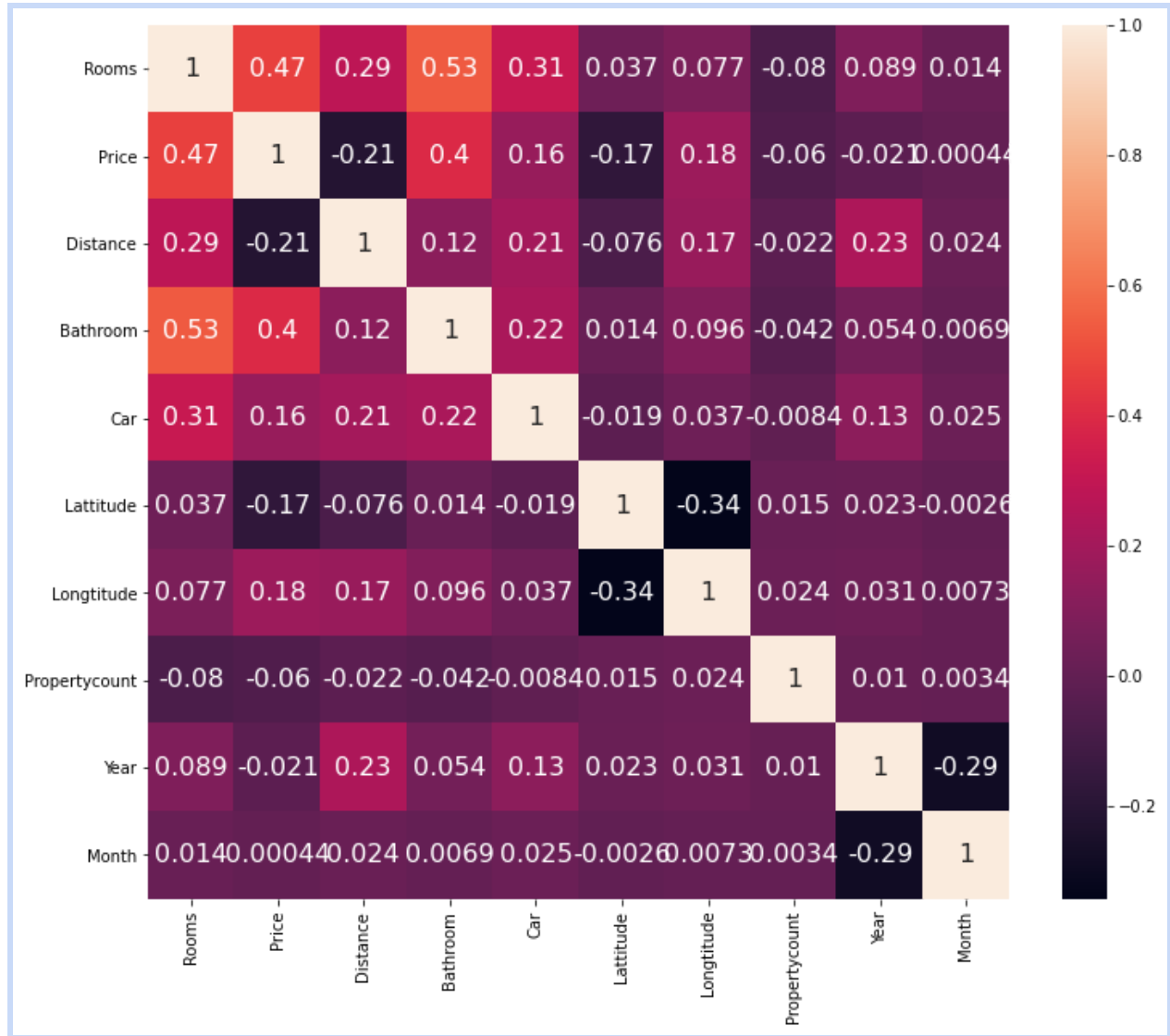
Figure 5: Correlation Heatmap

The correlation heatmap shows that the number of rooms and bathrooms have the highest correlation with the price of the property that is 0.47 and 0.4 respectively. It means that a property with more rooms and bedrooms will be more expensive than the others. Distance has a negative correlation with price i.e. -0.12 which means that the distance of the property negatively affects the price of the housing.

3.2 Relationship of Housing Factors with Property Prices

In order to study the real estate market and the housing trends, the relationship of various factors with the property prices develops a great understanding. Knowledge of how different factors

affect the prices of property help the buyers in making a wise decision while choosing an accommodation and provides an insight to the investors on what factors should be considered while constructing or investing into property.

3.2.1 Rooms VS Prices
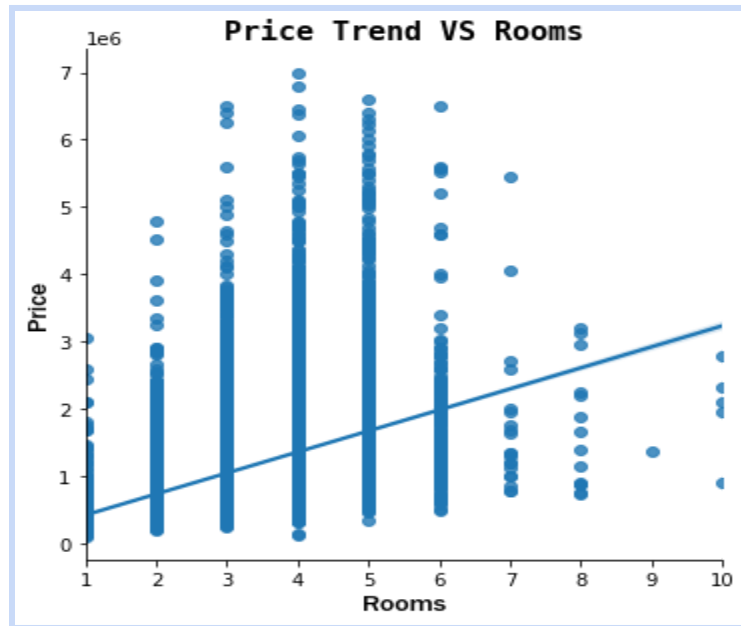
Figure 6: Relationship of Property Prices with Rooms

Figure 6 shows the relationship of number of rooms with the prices of property. We know that rooms have a strong correlation with the property prices. The figure proves this correlation by showing that as the number of rooms in a property increase, the prices of the property keep increasing. There is a positive correlation between prices and rooms.

3.2.2 Distance VS Prices
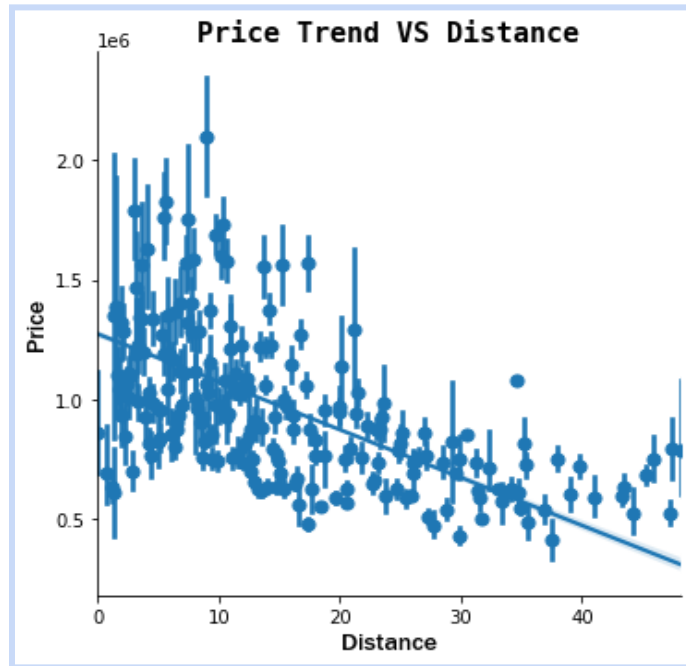
Figure 7: Relationship of Property Prices with Distance

Figure 7 shows the relationship of distance from the city with the property prices. The correlation of distance and prices was found to be -0.12 from the correlation heatmap. A similar negative trend can be seen here where as the distance of the property increases from the city, the prices keep falling. It means that houses near or in the city are much more expensive than those farther away from the city.
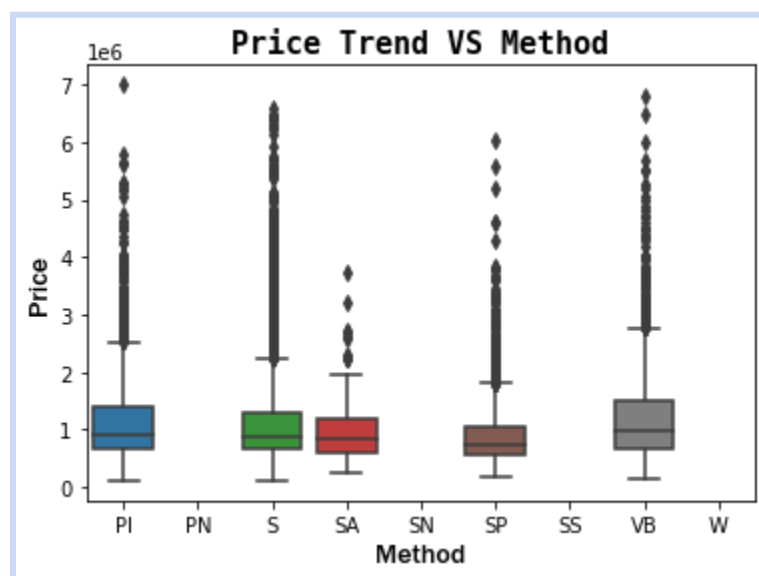
3.2.3 Cars VS Prices
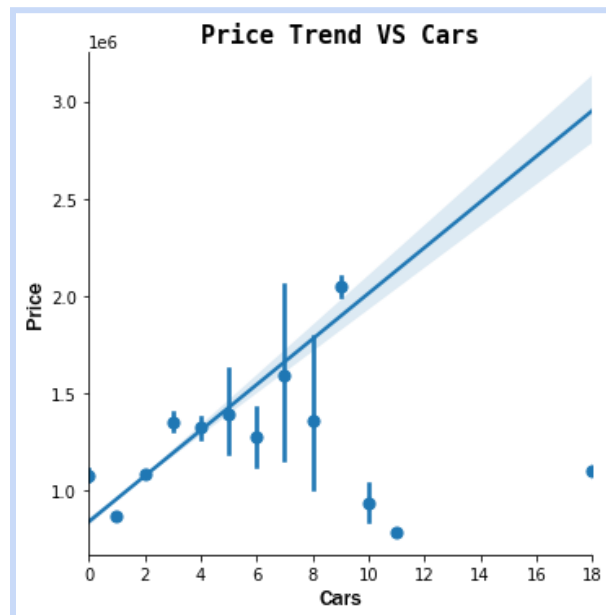
Figure 8: Relationship of Property Prices with Cars

Figure 8 visualises a very simple theory that the more the number of car parkings a property has, the more will be the prices of that property because of factors like more area needed, more space covered etc. So, there is a positive relationship between prices and car parkings.

3.2.4 Method VS Prices

Figure 9: Relationship of Property Prices with Sales Method

Figure 9 shows the relationship of property prices with the sales method used for the property. This analysis is mainly for the investors to understand how different methods of selling a property might affect the prices of property. But as we can see in Figure 9, the boxplots of all sales methods show the same price range. It means that the type of sales method used does not affect the prices of the property.

3.3 Property Sales Analysis
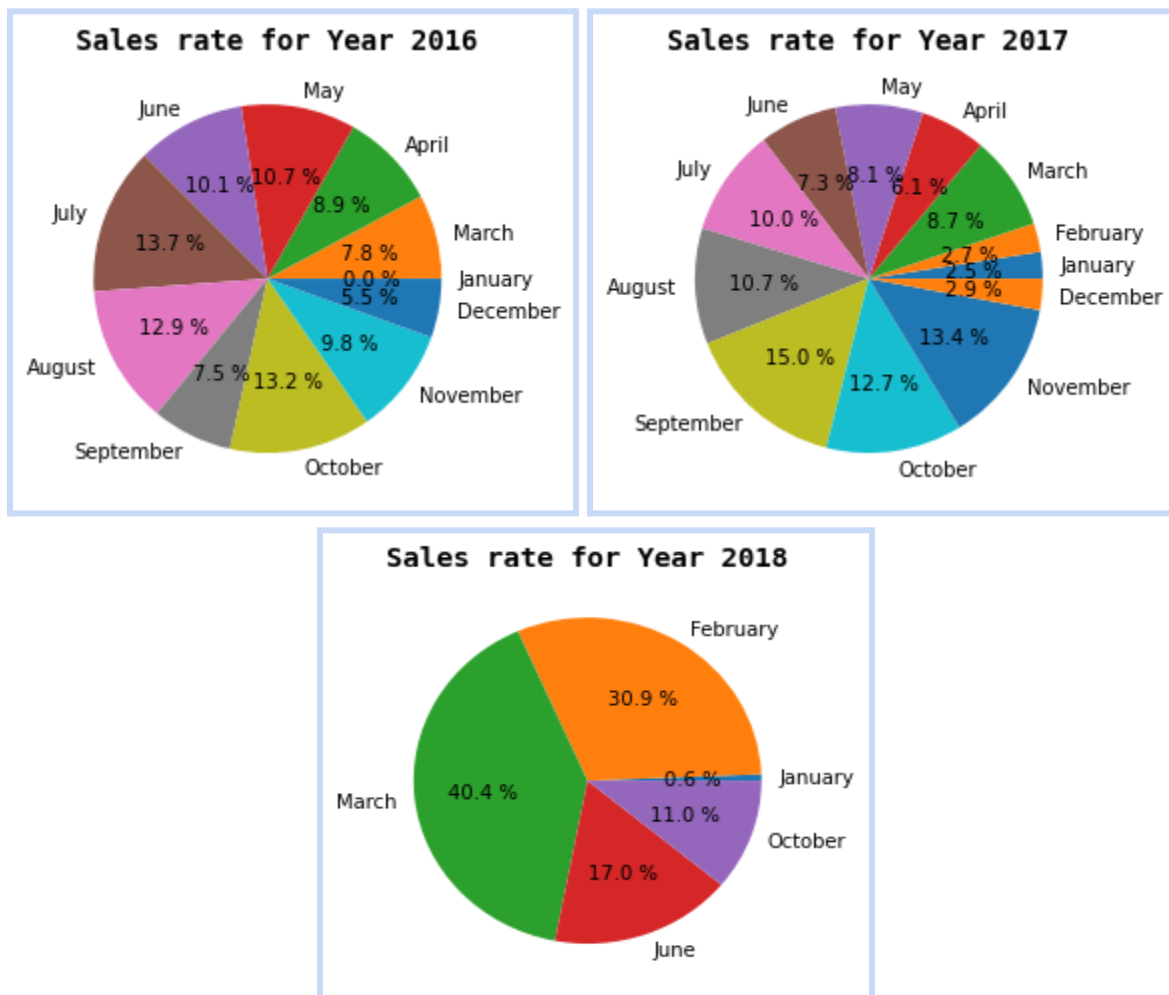
Figure 10 : Sales Performance of Housing Property

Figure 10 analyzes the sales of property houses in different seasons over the course of 2016, 2017 and 2018. It can be inferred that the sales performance has not been quite good during winter months for any year whereas in months like June, August and September the sales rate has been around 15%. It brings us to the conclusion that investors face a loss during the months of winter as their sales do not seem to generate any revenue.

3.4 Price Prediction

Lastly, the aim of this research was to predict the housing prices of Melbourne Region in the years 2019, 2020 and 2021 from the data used and determine if it follows the real life trend of the housing market in Melbourne currently. Our price prediction done using the linear regression gives us the results presented in Table 1.

Year	Prices for Southern Melbourne (AUD)	Prices for Eastern Melbourne (AUD)
2019	7,95,272	8,39,868
2020	8,40,695	9,05,054
2021	8,86,119	9,70,239

Table 1 : Price Prediction of Property Prices

Table 1 shows that the prices of property shall increase in the upcoming years for both the Southern and the Eastern Melbourne Region. It is what we are facing today in Melbourne where the housing prices have touched an all time high due to an imbalance of supply and demand factors.

4. CONCLUSION

As it stands, it appears that the ongoing property boom is likely to continue in Melbourne, Australia. Even as the number of home buyers plummet due to increasingly finding themselves priced out of the market, the number of investors buying into the market continues to strengthen. For the investors considering housing markets our analysis on how different housing factors are affecting the prices of housing over the years and the price prediction of property in the upcoming years shall be useful. It is also a great knowledge for the home buyers while deciding to buy a property as it gives them a fair idea of what is going on in the real estate market in Melbourne.

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