AIRBNB AND ANALYTICS: SOLUTION TO ENHANCE GUEST EXPERIENCE

By:

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Background and Project Objective

Airbnb is an American online marketplace and hospitality service brokerage company, founded in 2008, that aims to provide unique home and experiences throughout the world. It began when two designers Brian Chesky and Joe Gebbia shared their space with three travellers who were looking for a place to stay. The company was designed to turn its apartment in a bed and breakfast after the founders placed an air mattress in their living room to offset the large cost of a rental at San Francisco. The original name of Airbnb is Air Bed and Breakfast(McCann, 2015). They created a platform where locals can host their space and traveller can choose their place to stay for a certain period. Now they have been recognized as of the best and unique accommodation provider anywhere in the world. Airbnb uniquely leverages technology to enable people around the world to earn money by sharing their spaces, passions and talents to become entrepreneurs of hospitality. The marketplace of Airbnb's accommodation is now providing access to 191 countries and around 100,000 cities. (Airbnb Press Room, 2010). Airbnb helps facilitate, enjoy and secure sharing. Airbnb has a review system that allows guests and hosts to rate each other after their stay. It has done more to change people's way of being away from home than anyone else.

Even if Airbnb doesn't own any of the real estate listings, it aims to enhance the guest experience and thereby increasing their revenue through the commissions from each booking. Visser, Erasmus, and Miller (2017) found that the phenomenal growth of Airbnb over the past few years has made it the world's largest accommodation provider with over two million listings in 191 countries. Therefore, in the case of Airbnb, it now needs to focus on customer retention with the same importance as customer attraction. According to Ranaweera and Prabhu (2003), the ability of an organization to satisfy its customer base determines the ability of that organization to retain its customers. The satisfaction of the guest of Airbnb can be enhanced through additional precautionary measure taken in terms of guest safety and through being at the right place and right time.

According to Gurran and Phibbs (2017), the rapid growth of Airbnb listing in Sydney since its expansion to Australia resulted in the doubling of rental properties each year to 15,468 properties in 2016. Therefore, it is a high time for Airbnb-NSW to focus on customer attraction as well as customer retention to increase the profitability as well as efficiency from their operations. In a study conducted by Keiningham, Perkins-Munn, Aksoy, and Estrin (2005), many researchers have proposed a virtuous chain of effects from improved customer satisfaction to profits. The satisfaction is believed to improve share-of-spending which in turn lead to higher revenue and profitability Keiningham et al. (2005). To enhance the guest experience of Airbnb, the report proposes the two distinct strategies with a common goal. The first strategy is to preserve their guest experience by enhancing their safety. In parallel, the second strategy is to provide incentives for the hosts near Sydney airport to list their apartments and invest on targeted ads for cosy accommodations to desperate commuters stuck in the airport to enhance customer experience and ramp up the revenue.

The report aims to provide the recommendation in line with the described strategy through findings from the following objective specific questions:

i. Which quarter of the year generates the highest potential revenue for Airbnb in the NSW region?
ii. What is the general trend of potential revenue across twelve months in NSW region?
iii. What is the preference of Airbnb hosts regarding the length of guest's stay in the NSW region?
iv. What are the average prices of rental properties by a quarter in NSW region?
v. What factors contribute towards pricing of accommodation in NSW region?

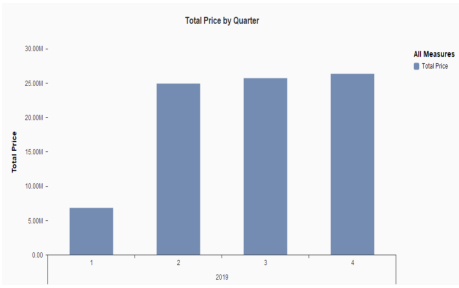
vi. Predict the price based on these factors and find the differences between the actual price in NSW.
vii. Identify subregions that have the highest potential revenue in NSW.
viii. What is the average price of rental properties in these subregions?
ix. What is the average rent for each of the listed room types?
x. Identify the incident rate in each suburbs of NSW region.
xi. What are the top 5 suburbs by the number of crime incidence?
xii. Identify the top 4 offence category that is most likely to ruin the guest experience.
xiii. Which offence category is committed highest in NSW region?
xiv. What is the potential revenue of Airbnb from top 5 crime committed suburbs?
xv. What is the trend of precipitation in Sydney Airport area?
xvi. Which quarter of the year has the highest precipitation in the Sydney Airport area?
xvii. Which month of the quarter has the highest precipitation in the Sydney Airport area?
xviii. According to recent data, what is the precipitation total in Sydney Airport area by month?
xix. According to historical data since 1929, what is the trend of precipitation in Sydney Airport Area?
xx. What is the predicted total precipitation in Sydney Airport area in the next 5 years?
xxi. What is the trend of wind speed around Sydney Airport area in the last 9 years?
xxii. Which quarter of the year has the highest mean wind speed near Sydney Airport area?
xxiii. In which month wind speed is highest in Sydney Airport area?
xxiv. What is the forecast for wind speed near Sydney Airport area in next quarter?

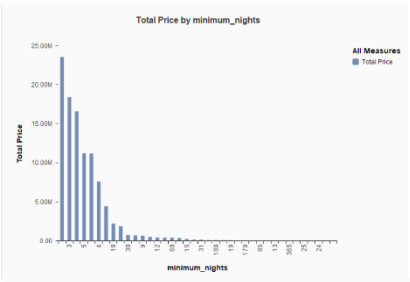
Assumptions:

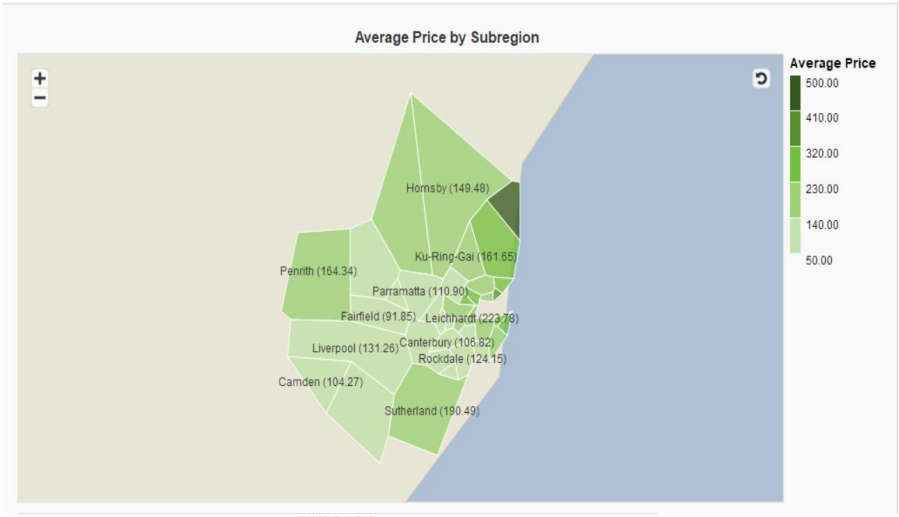
i. The data are obtained from the authentic sources ie. Listing data from Airbnb, Crime data from BOCSAR, Rainfall and Wind data from Sydney Weather Station ID: 066037 and therefore the results obtained are presented in an as accurate way as possible.
ii. The Rainfall and Wind dataset is specific to Sydney Airport area and not of the whole NSW.
iii. The crime dataset consists of only those suburbs of New South Wales that are also listed in Airbnb accommodations.
iv. Suburbs make up the geographical hierarchical data model.
v. Not all suburbs in NSW have listed the property in Airbnb.
vi. Rather than a minor traffic offence, offence category such as assault, theft, robbery, and harassment that are more likely to spoil the experience of Airbnb guest are used in the analysis.
vii. Due to maintenance, Station 066037 has not recorded wind data for April and May.

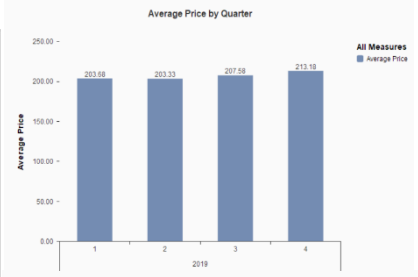
Dashboards for Operational Manager

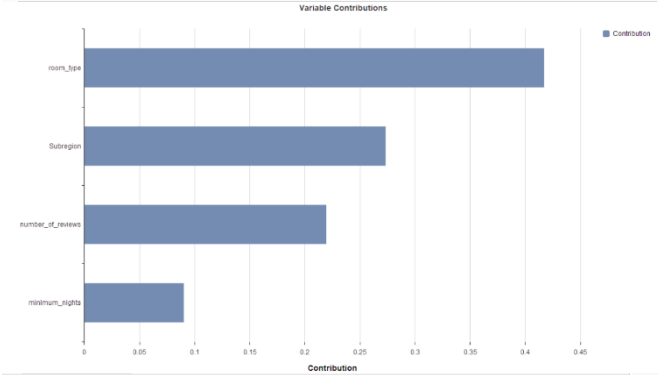
Potential Revenue Dashboard

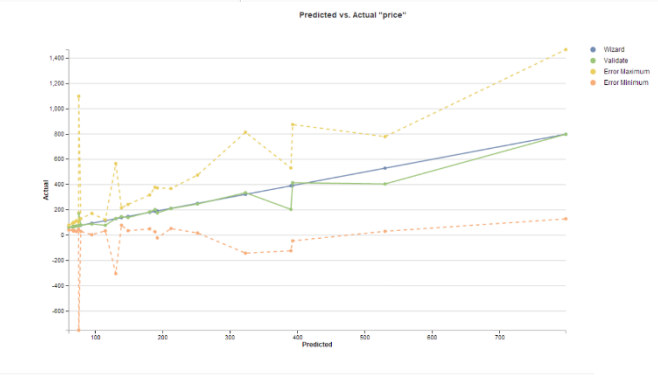


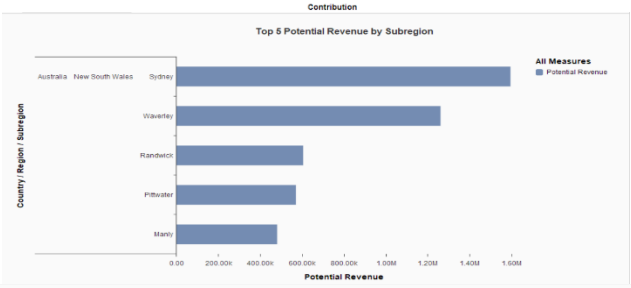


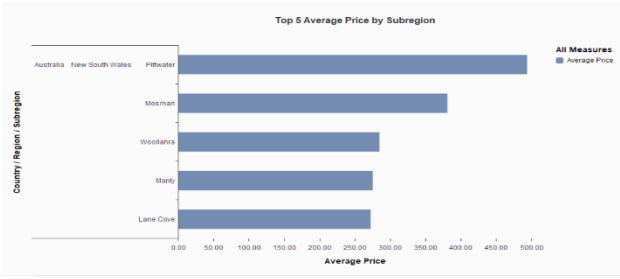


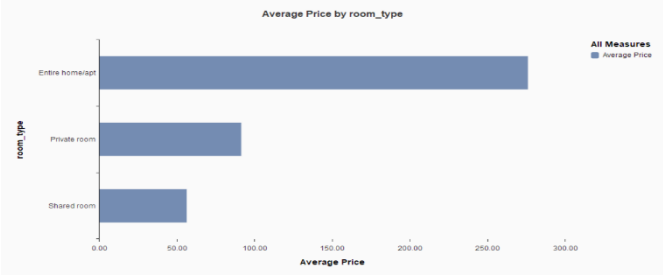


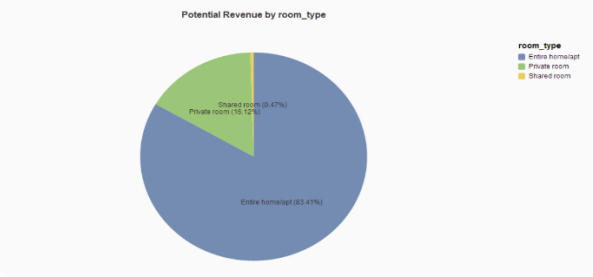








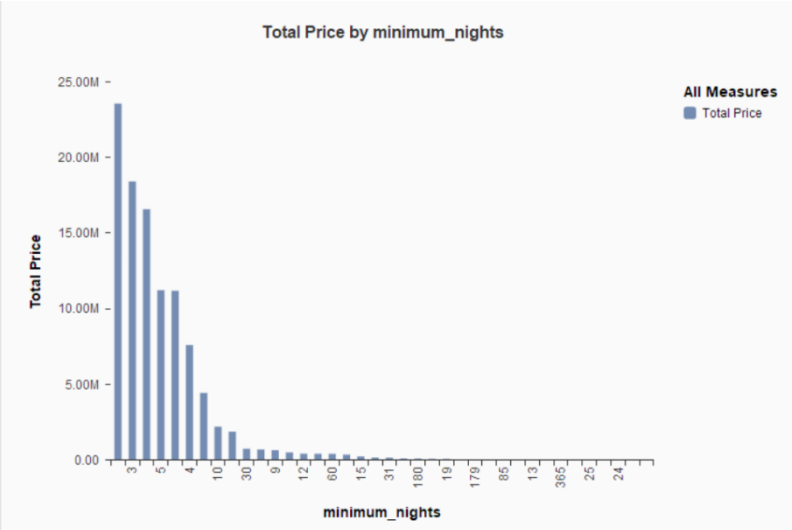


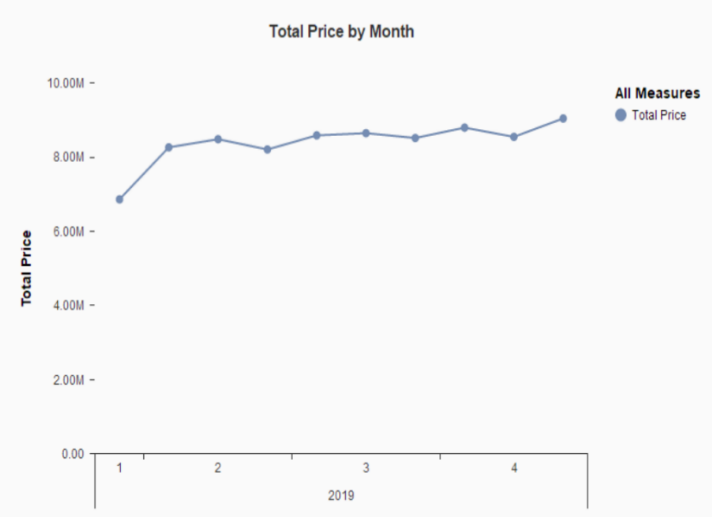


The objective of the revenue dashboard is to provide insight into the potential revenue of Airbnb in 2019 based on the listed accommodation and their availability throughout the year 2019. The first row of the dashboard describes the potential revenue by quarter, month and the preference of Airbnb hosts regarding the stay length of a guest. The second row will provide the idea of average price across the suburb of New South Wales, the average price in each quarter and each month. The third row will discuss how certain characteristics such as room type, suburb, reviews and minimum nights are correlated to the price and find the difference between the actual and predicted prices. The fourth and last row of the dashboard is produced to identify the highest potential revenue generation by subregion and room type and identifies the five subregions and three-room type with the highest average price. The overall aim is to provide the information to the CEO regarding the importance of each of the regions to Airbnb operations.

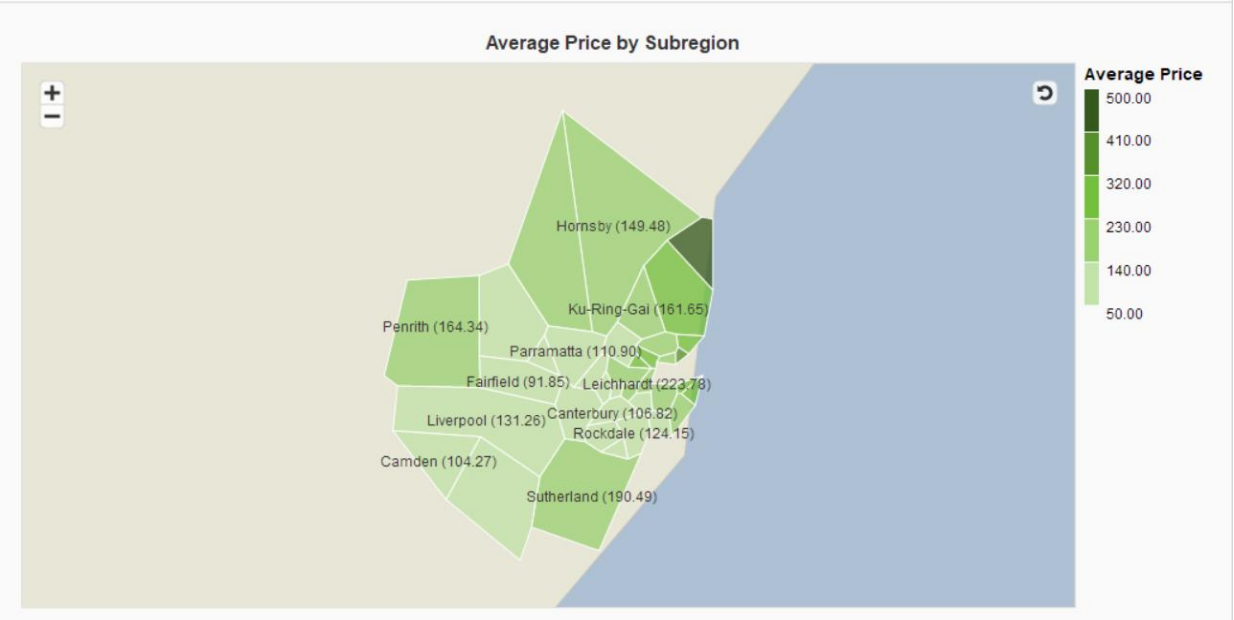
The following bar chart for the total price of listed accommodation in New South Wales by quarter is used to give the idea of potential revenue for Airbnb in each quarter of the year. Based on the chart, the fourth quarter has the highest potential revenue which is then closely followed by the third and second quarter.

As per the bar chart of the total price by minimum nights, Airbnb hosts prefer short-term guests over long-term guests. Thereby, inferring that there is a high probability of disparate guests being accepted by the Airbnb hosts because of their short stay. As introduced in the prescriptive operation to Airbnb, the disparate guests are those unlucky guests who suffer from flight cancellation due to extreme weathers and are in desperate need for lodging in nearby areas.

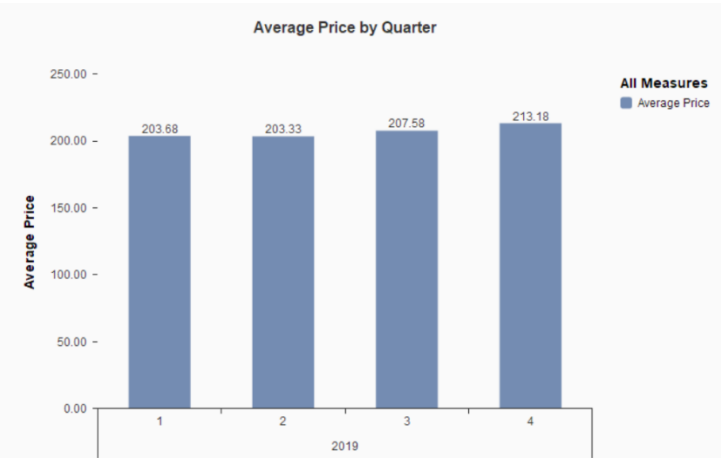




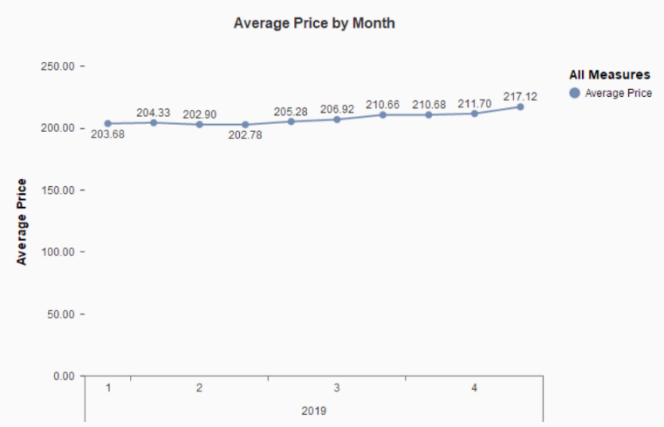
The Line chart for the total listed price of accommodation by month in the year 2019 depicts that the potential revenue can jump as it moves from first quarter to fourth quarter. From the data, we can infer that either host will increase their rent during the final quarter of the year, or a greater number of hosts list their apartment during October, November and December.



The above geo choropleth graph of average price by subregion of New South Wales is used to compare the average rents of listed accommodation in Airbnb.

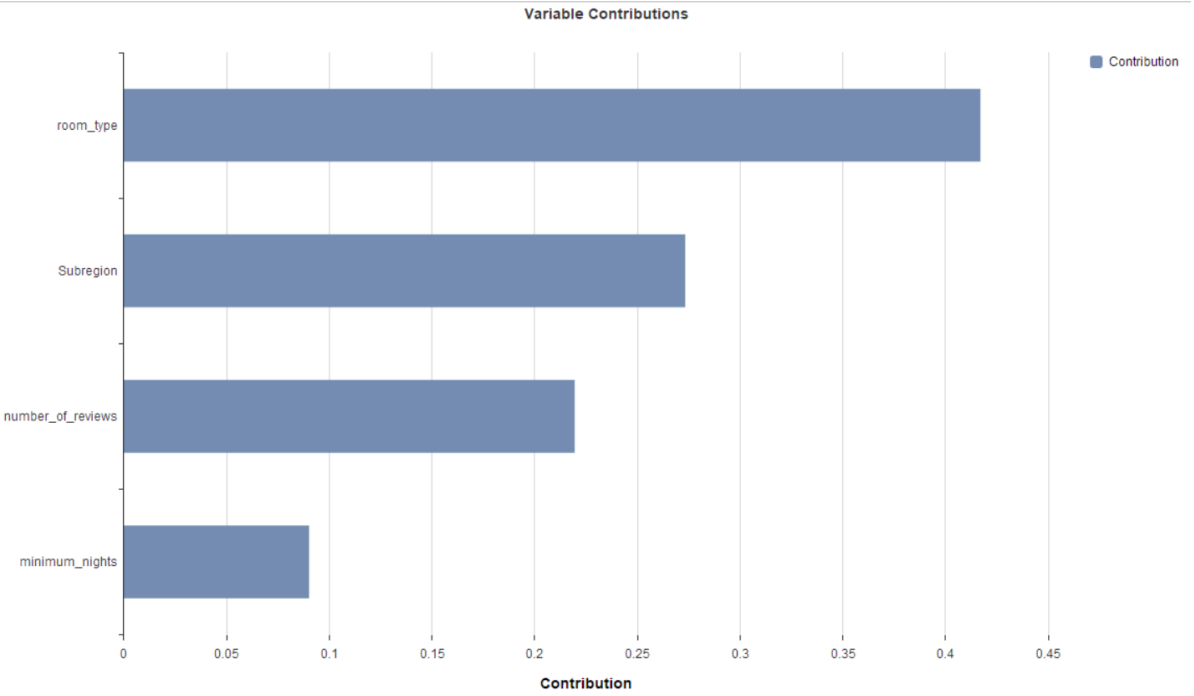


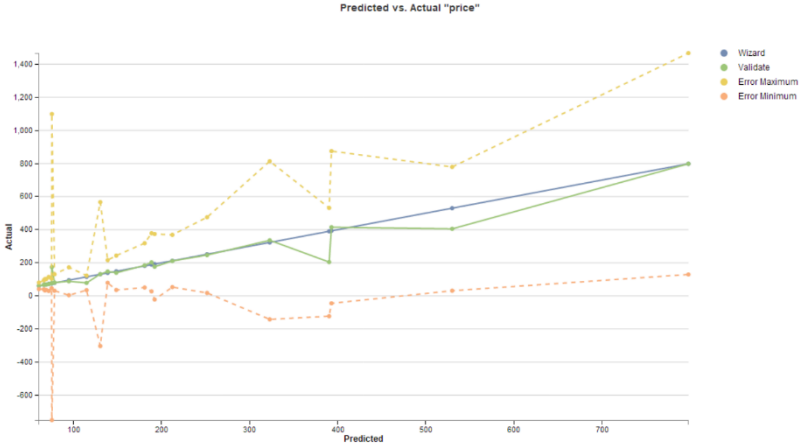
According to the bar chart for an average price by quarter, the rent for listed accommodation in NSW is significantly raised by the Airbnb hosts. Thereby, proving the previously claimed hypothesis that hosts increase their rent during October, November and December in NSW area resulting in potential revenue growth of Airbnb.



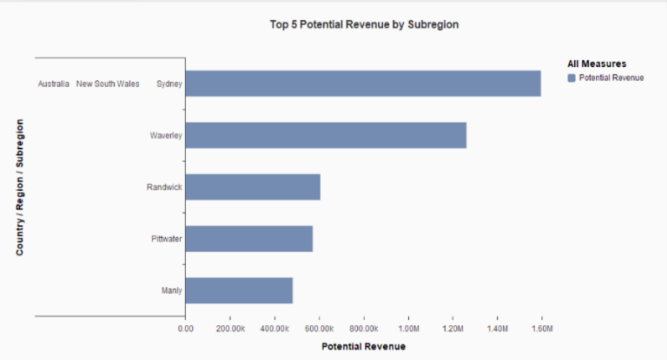
The line chart of Average price by Month is used to depict the steady rise of an average of listed rents from January to December of 2019.

Furthermore, through the regression model, the price of listed accommodation is correlated to room type (Entire home/apt, Private room, Shared room), suburb, number of reviews and minimum stay lengths.



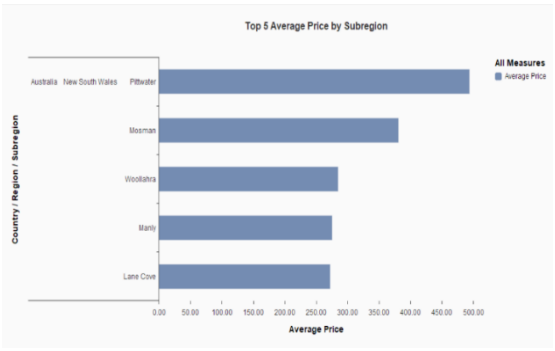


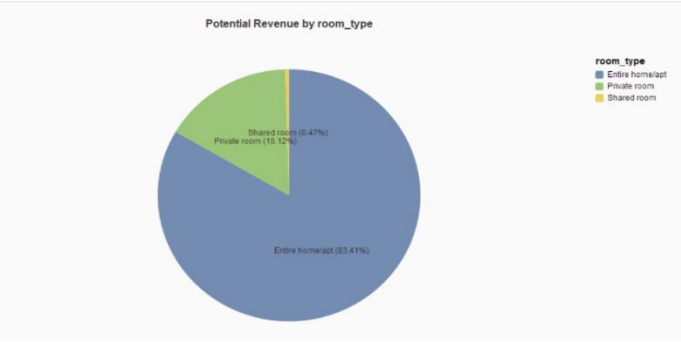
Based on the selected features with an effective correlation to price the regression model plotted the given chart.



The bar chart for top 5 potential revenue by subregion is used to identify the suburbs in NSW that has the potential to generate the highest revenue. Based on the analysis, these top 5 regions are Sydney, Waverley, Randwick, Pittwater and Manly.

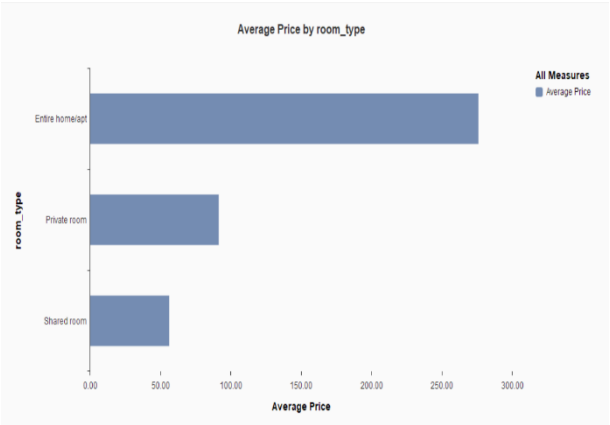
However, the bar chart of the top 5 average prices by subregion identifies those suburbs with the highest average prices for their listed accommodations in Airbnb. Based on the report, despite Waverley with double the revenue-generating capability as compared to Pittwater, the average rent in Pittwater is significantly higher than that of Waverley.



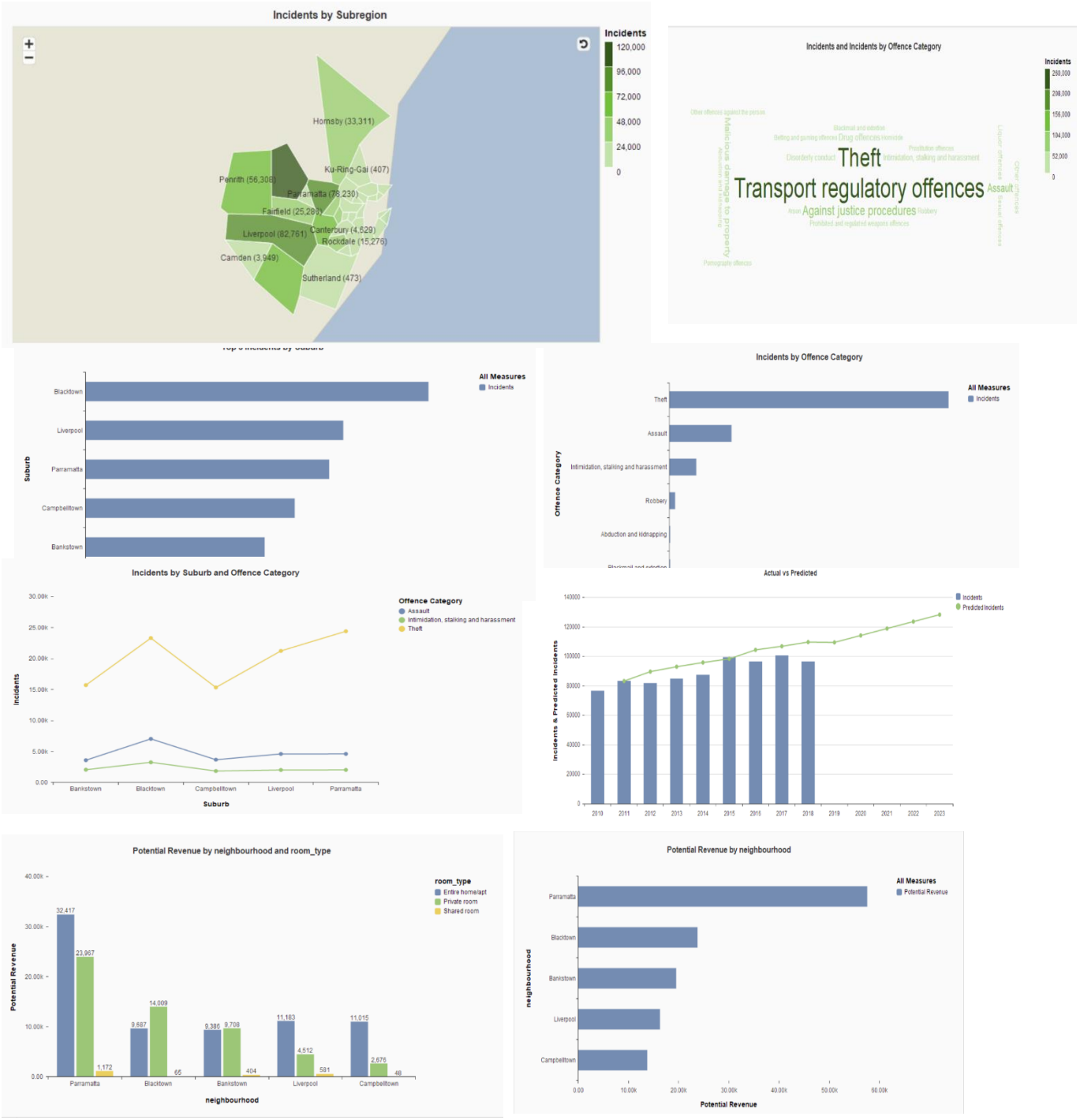


Furthermore, most of the Airbnb hosts want to rent out their entire property (83.41%) while a fair share of hosts (16.12%) can accommodate guests in their private room. While only 0.47% of Airbnb hosts are comfortable to share their room with guests.

The bar chart for an average price by room type depicts the difference in the average price among each of these room types (Entire home/apt, Private room, Shared room). A private room is rented out at almost double the rate of a shared room while entire home/apt are rented out at almost three times the rent of a private room in average.

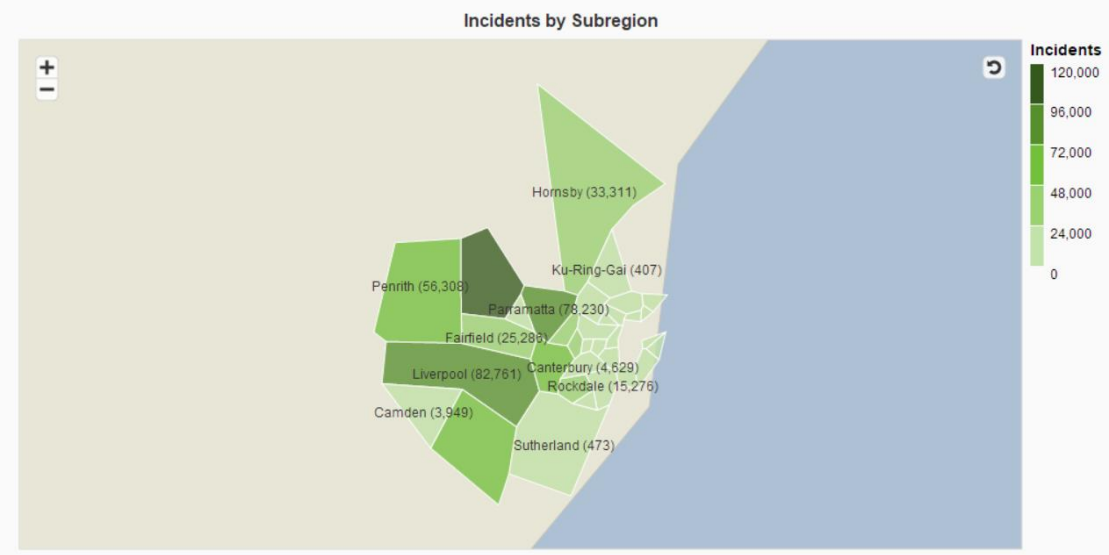


Crime Dashboard

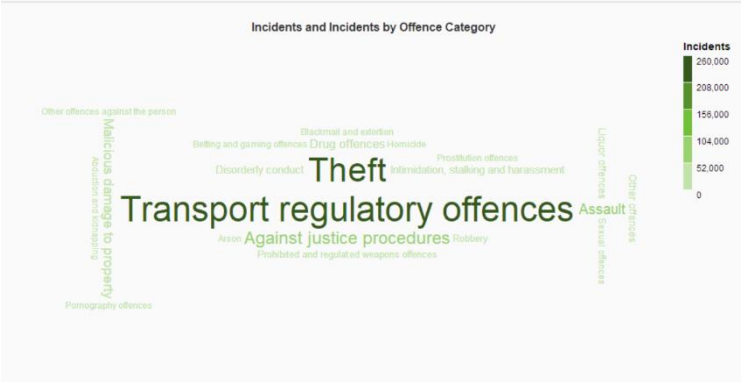


As per the objective of the analysis report to increase the guest experience of Airbnb by reducing the chances of experiencing crime during their short stays, the dashboard aims to notify the CEO of Airbnb regarding the crime category and their rate in various suburbs of New South Wales. Furthermore, it aims to identify certain crimes like theft, robbery, harassment and assault rate in the suburbs with listed Airbnb accommodation. Furthermore, it will predict the crime rate through time series analysis for the next 5 years and calculates the loss of potential revenue if these suburbs are restricted from the Airbnb accommodation services.

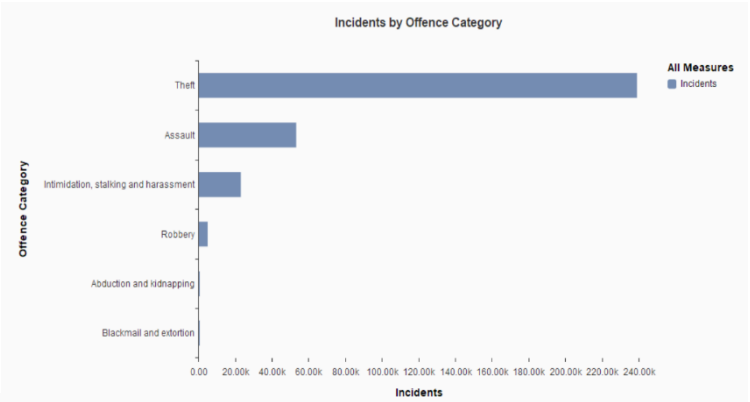
The following geo choropleth graph of the number of incidents by suburb shows the crime rate across the suburbs of New South Wales.

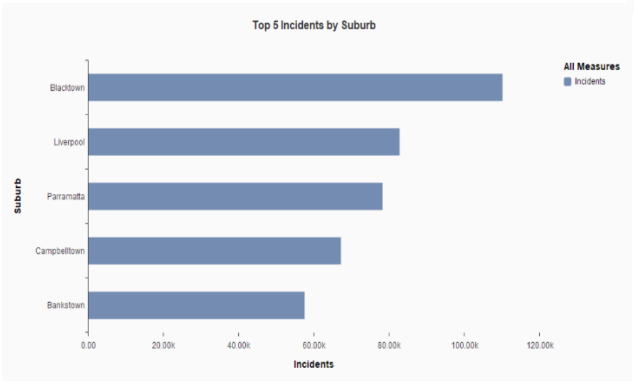


Based on the incidents, the tag cloud is used to identify offence categories that are mostly committed in the New South Wales region. The major offence is transport regulatory offence, which in our case, has mostly no effect on the staying experience of guests.

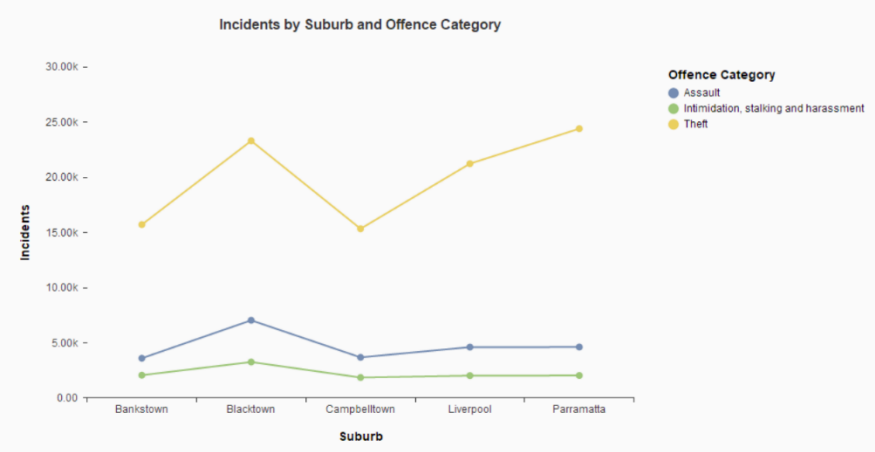


Therefore, crimes such as Theft, Assault, Intimidation, Stalling and harassment, Robbery, Abduction and kidnapping, and blackmail and extortion are most likely to ruin the guest stay in Airbnb accommodation. The bar chart displays the magnitude of each of these crimes committed in New South Wales.



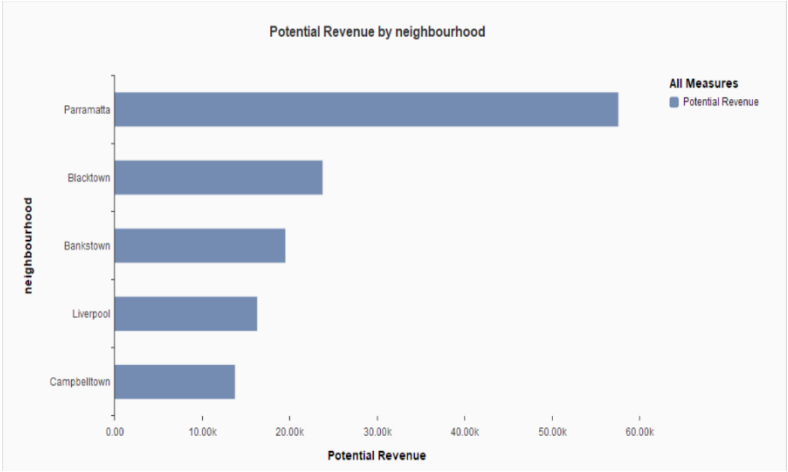


The bar chart identifies the top 5 suburbs that have high incidents rate and that are also listed in the Airbnb accommodation service.

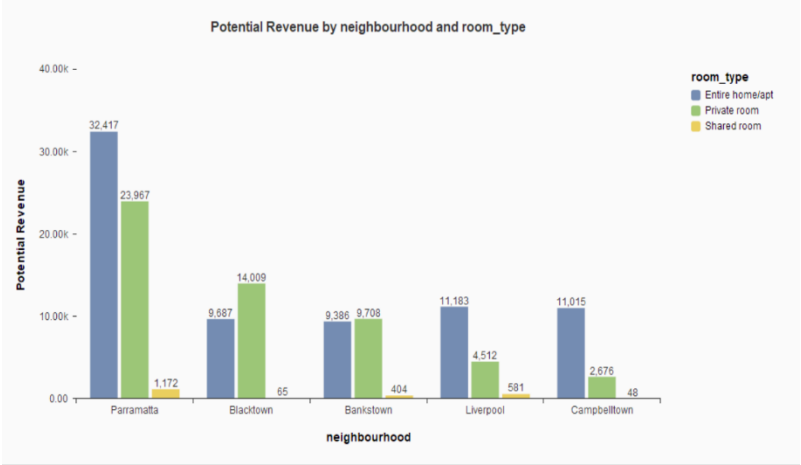


The line chart for incidents by suburb and offence category provides the rate of incidence of Assault, Theft and harassment in the previously identified top 5 crime committed suburb of New South Wales.

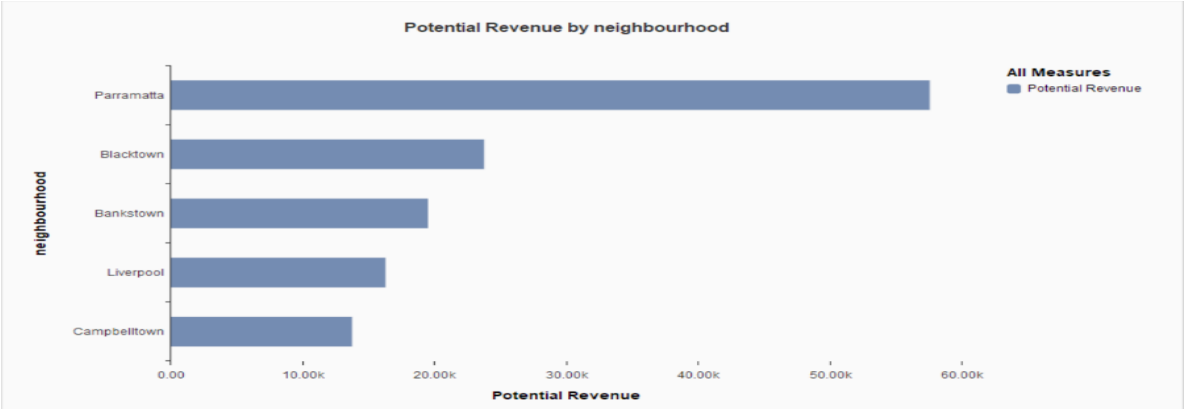
The provided bar chart for potential revenue by neighbourhood provides the contribution of the top 5 crime committed suburbs paramatta, Blacktown, Bankstown, Liverpool and Campbelltown to the potential revenue of the Airbnb.

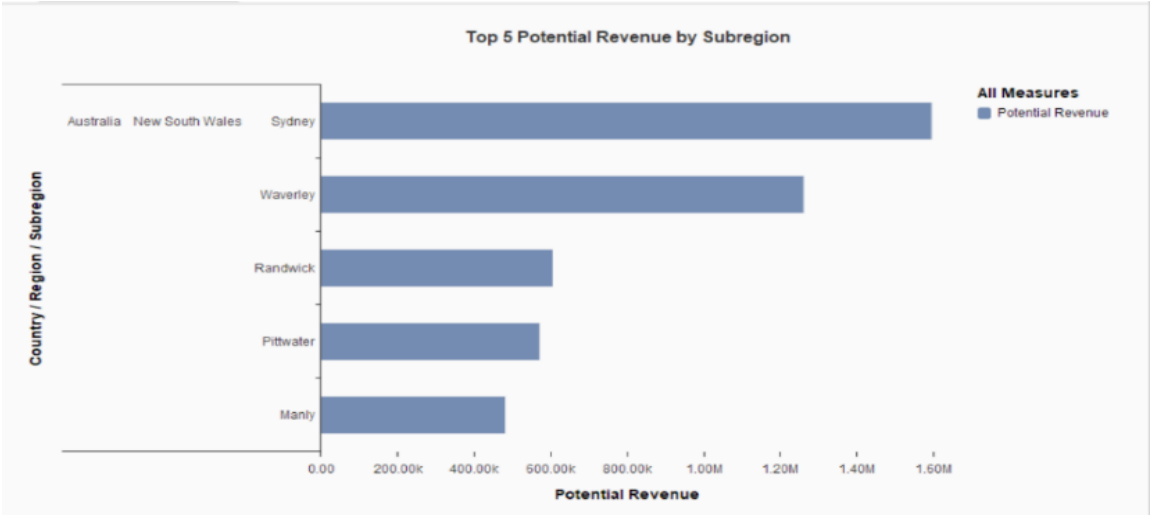


The bar chart for potential revenue by neighbourhood and room type is used to provide the contribution of each of the room type to the potential revenue of each of these suburbs for Airbnb.



The aim of providing the bar chart of potential revenue of top 5 crime committed suburbs and top 5 potential revenue-generating suburb is not to directly compare but to point to an idea of taking some hit on the meagre potential revenue loss to maximize the customer satisfaction through their safety.

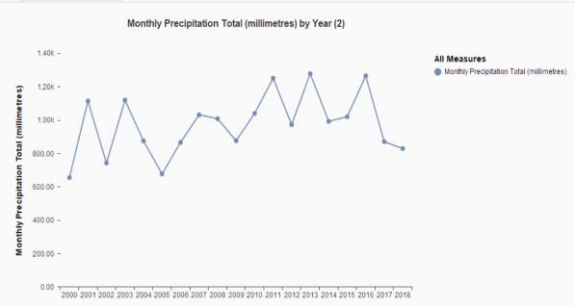


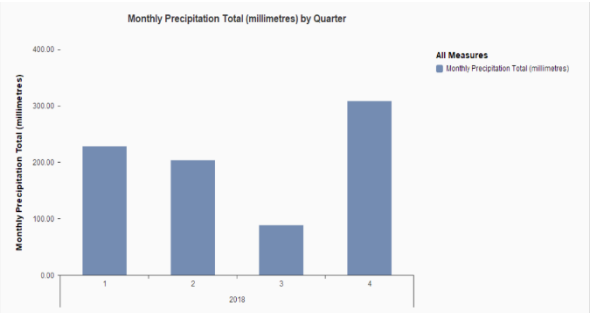


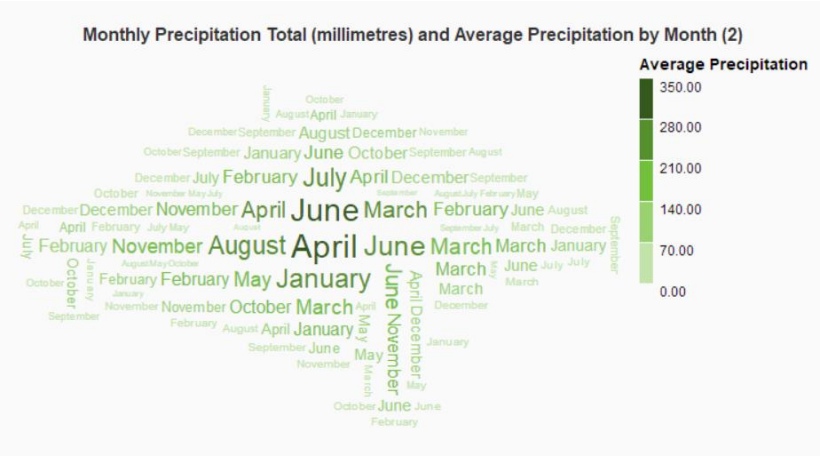
The highest potential contribution to the Airbnb revenue from the higher crime rate suburbs is just under 60K however, other safe suburbs can potentially generate far more revenue than all the combined five crime listed suburbs.

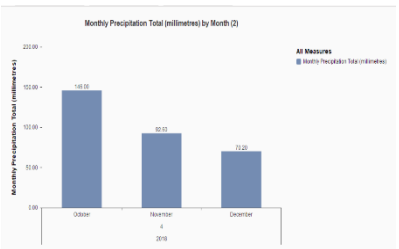
Rainfall and Wind dashboard

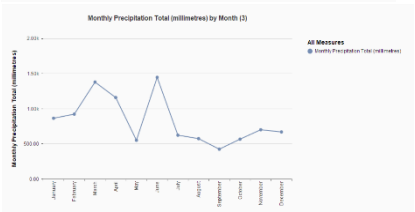
The objective of the dashboard is to inform the rainfall and storm pattern in the Sydney Airport area to determine the month with the massive possibility of flight cancellation due to heavy rainfall and storm. By analysing those data, Airbnb can provide incentives for the hosts near Sydney airport to list their apartments and invest on targeted ads for cosy accommodations to desperate commuters stuck in the airport to enhance customer experience and ramp up the revenue.

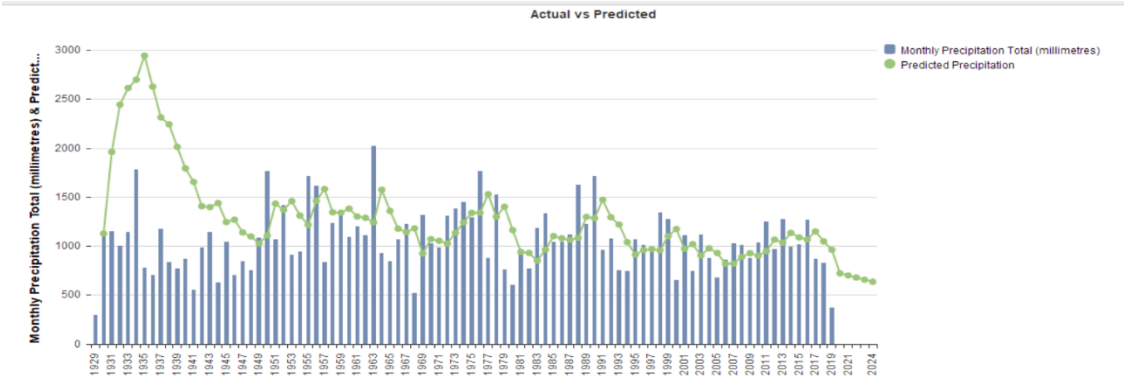


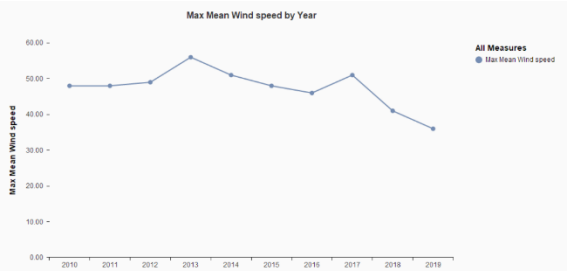


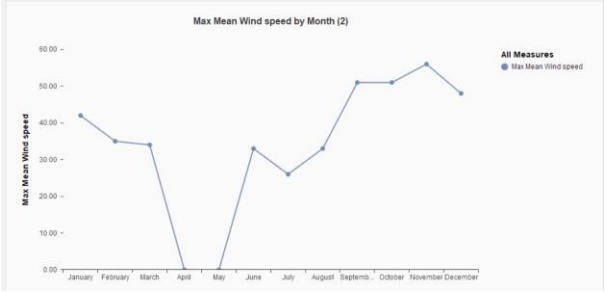


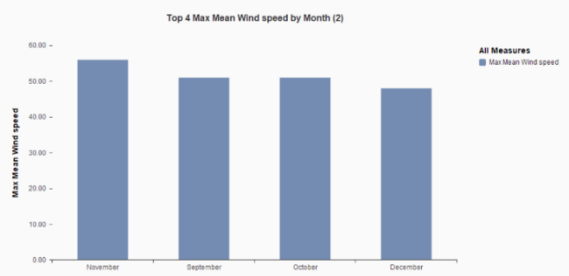


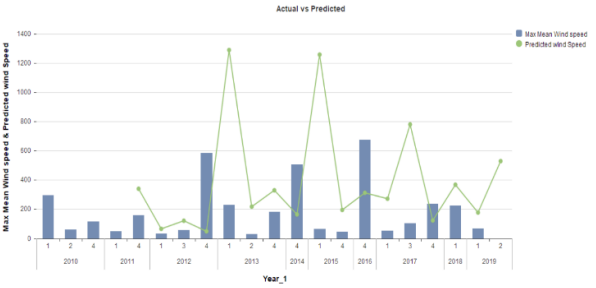


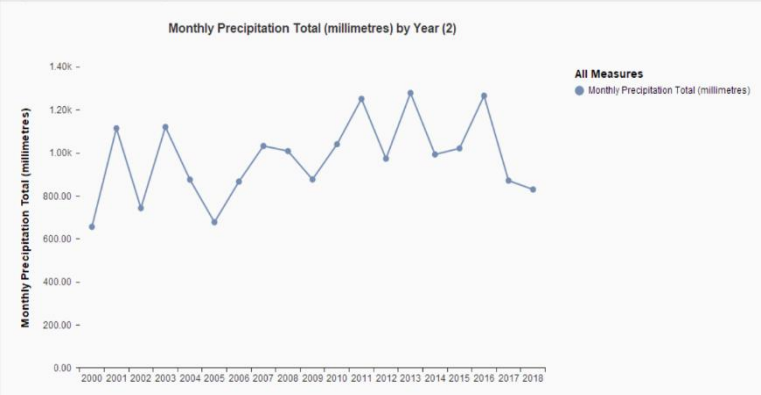




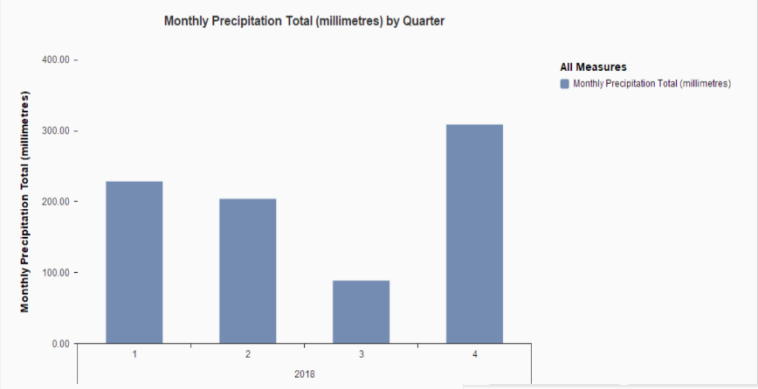






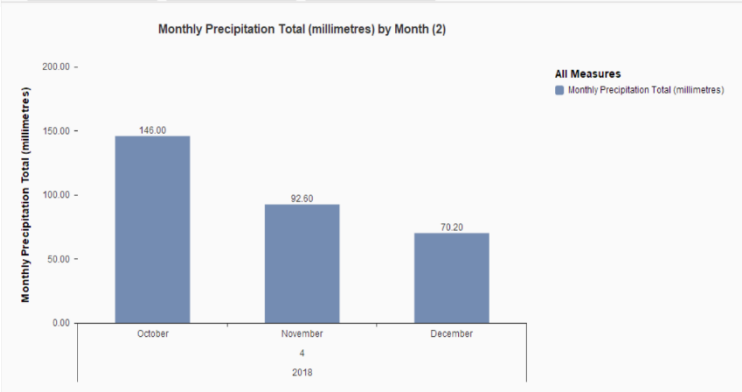


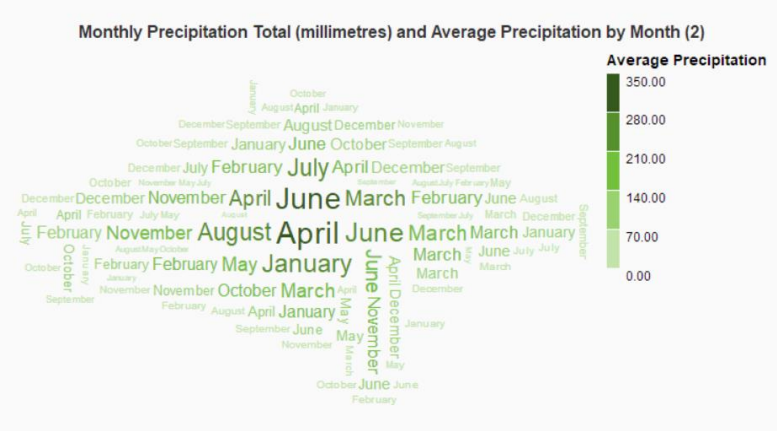
The line chart for precipitation by year provides the precipitation trend of Sydney airport area over the year 2000 to 2018. Based on the graph, the rainfall amount has steadily declined between the year 2016 and 2017.



According to the bar chart for monthly precipitation by a quarter in the year 2018, Sydney airport had high precipitation in the fourth quarter of the year.

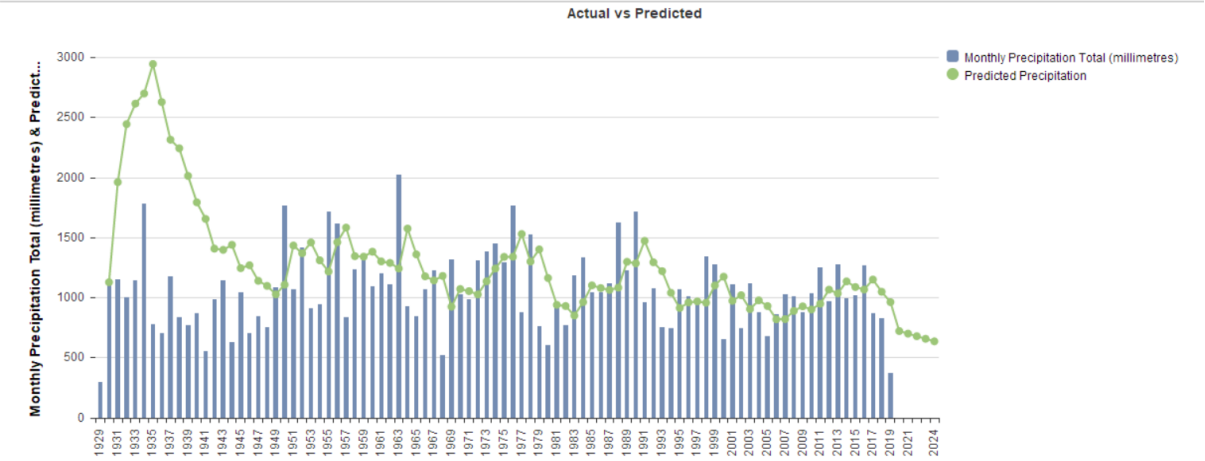
In further drilling down on the fourth quarter of 2018, October has the highest precipitation total in comparison to November and December.



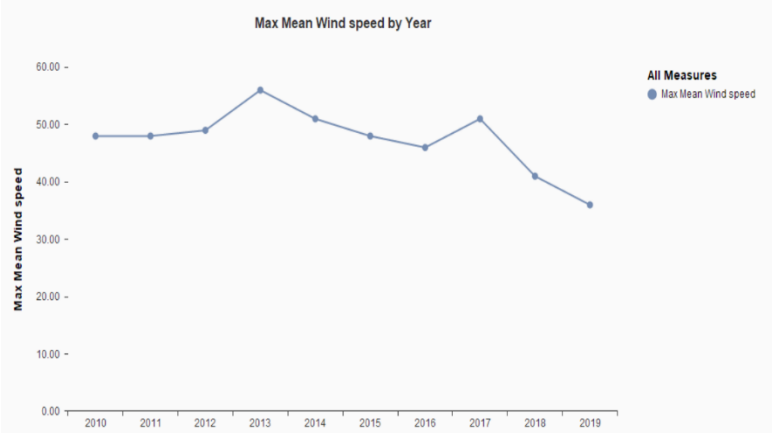


However, based on the past data captured by Station 066037 since 1929, the tag cloud shows that the high precipitation in the Sydney Airport area has been on June, April, August and so on.

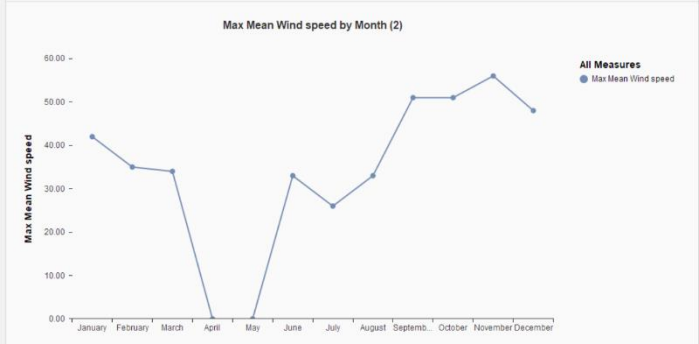
Even though time series algorithm forecasted decline of precipitation total on Sydney airport in the next 5 years, the pattern for the month of heavy rainfall is least likely to change.



Apart from the heavy rainfall, the strong wind can also lead to flight cancellation. Therefore, the pattern of strong wind on the Sydney airport, along with the pattern of heavy rainfall, can be used to identify the months that are most likely to have flight cancellations.

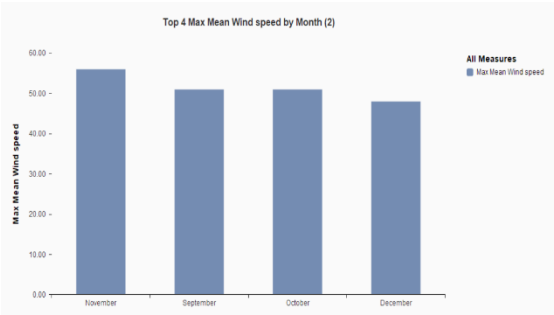


The line chart of Maximum wind speed by the year is used to give the idea of wind speed over Sydney airport from the year 2010 to 2019.

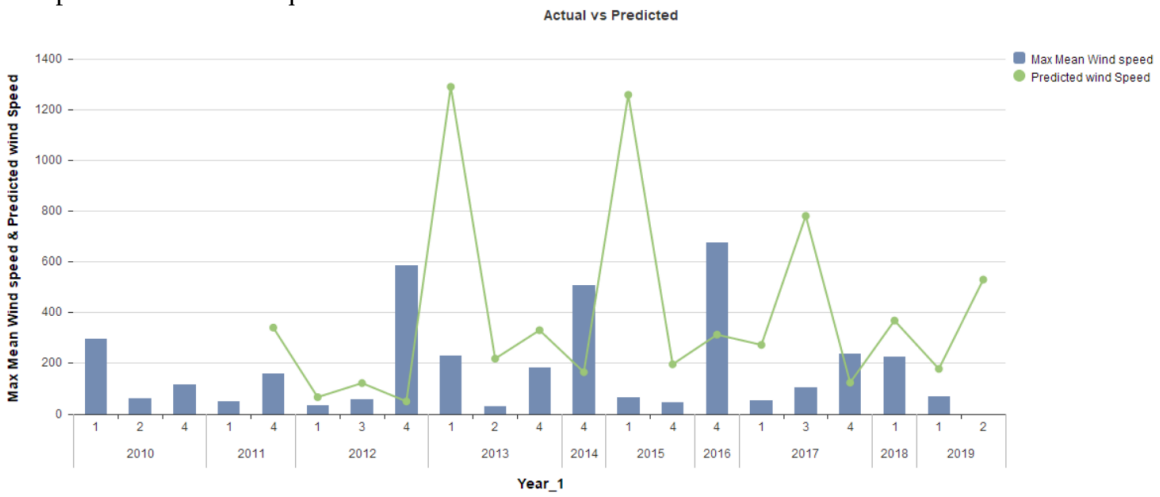


According to the line chart, the final four months of the year are highly susceptible to strong wind in the Sydney airport area.

Upon further drilling down on the data, the strong wind speed of more than 55 km blows over Sydney airport in September, October, November and December.



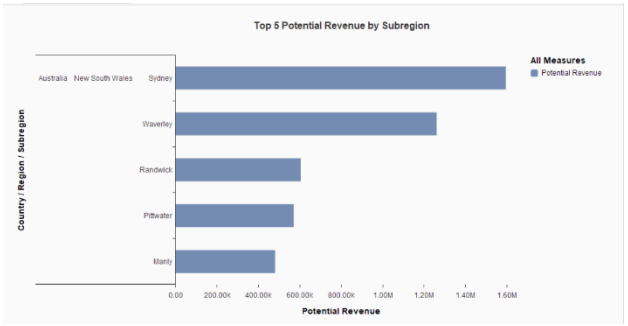
Based on the forecasting done using time series algorithm, it is predicted that there would be a rise in wind speed in the second quarter of 2019.

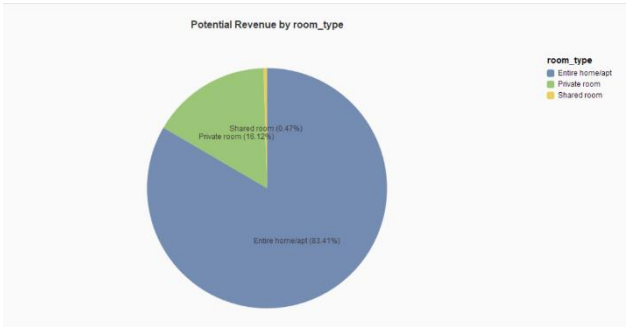


Based on the dashboard, even though historical rainfall data points to the higher precipitation in June in Sydney Airport, the recent pattern of heavy rainfall on the final quarter of the year (October, November and December) as well as the possibility of strong wind in September, October, November and December encourage Airbnb to provide incentives to hosts near Sydney airport and to invest on the targeted ads during the months of heavy rainfall and Strong wind i.e. October, November and December.

Recommendation

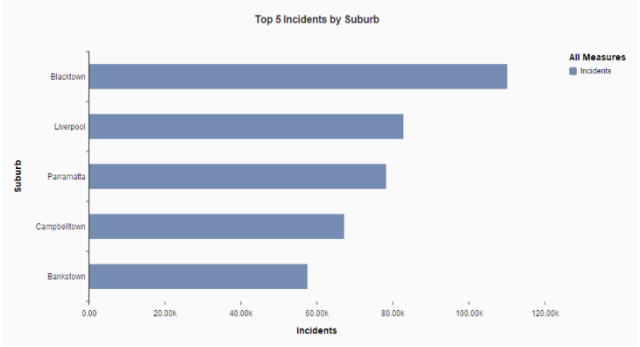
Based on the findings from the data analysis results generated from the data of Airbnb listings, Crime dataset, Rainfall and wind dataset, this report would like to recommend the restructuring of listing operations of Airbnb as well as integrating a new business process to enhance the guest experience and improve the potential revenue of Airbnb NSW division. According to Keiningham et al. (2005), customer satisfaction improve share-of-spending which in turn lead to higher revenue and profitability. Therefore, the following recommendation will allow Airbnb to continue their sustainable operation through enhanced guest satisfaction.

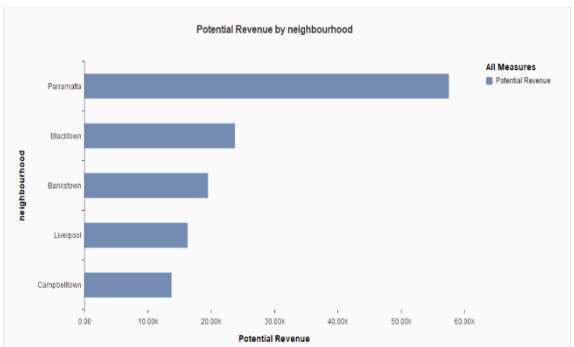




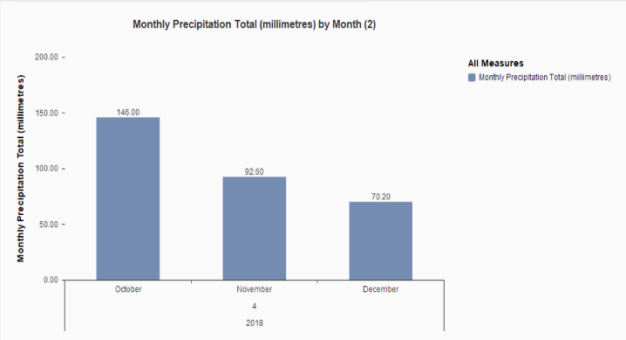
Firstly, based on the revenue dashboard, the highest potential revenue generation is from Sydney, Waverley, Randwick, Pittwater, Manly subregions of New South Wales. Furthermore, based in the room type, the host that lists their entire home or apartment contributes highest, almost triple than that of hosts listing their private room, to potential revenue of Airbnb. Therefore, Airbnb is recommended to encourage hosts to list their entire home/apartments in the high revenue-generating subregions. Thereby, resulting in the improvement of Airbnb revenue from NSW.

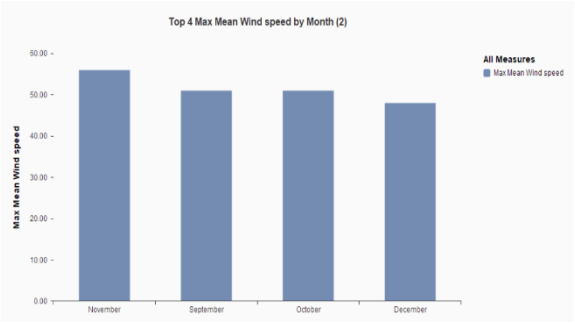
Secondly, from the crime dashboard, the identification of subregions with the highest number of crime incidence can be used to monitor or restrict the property listing from these regions by Airbnb. Ringle, Sarstedt, and Zimmermann (2011) concluded that perceived safety has a significant impact on overall customer satisfaction. Therefore, Airbnb should strive to take "prevention is better than cure" approach. According to crime dataset, the top 5 suburbs of NSW with high crime (Assault, Theft, Robbery, Harassment) incidence are Blacktown, Liverpool, Parramatta, Campbelltown, and Bankstown. Based on the property listings on Airbnb of the year 2019, the potential revenue generation of these subregions is well below other relatively safe subregions. Therefore, the report recommends the Airbnb to filter out these subregions to enhance the guest safety thereby resulting in an improved guest experience of Airbnb.

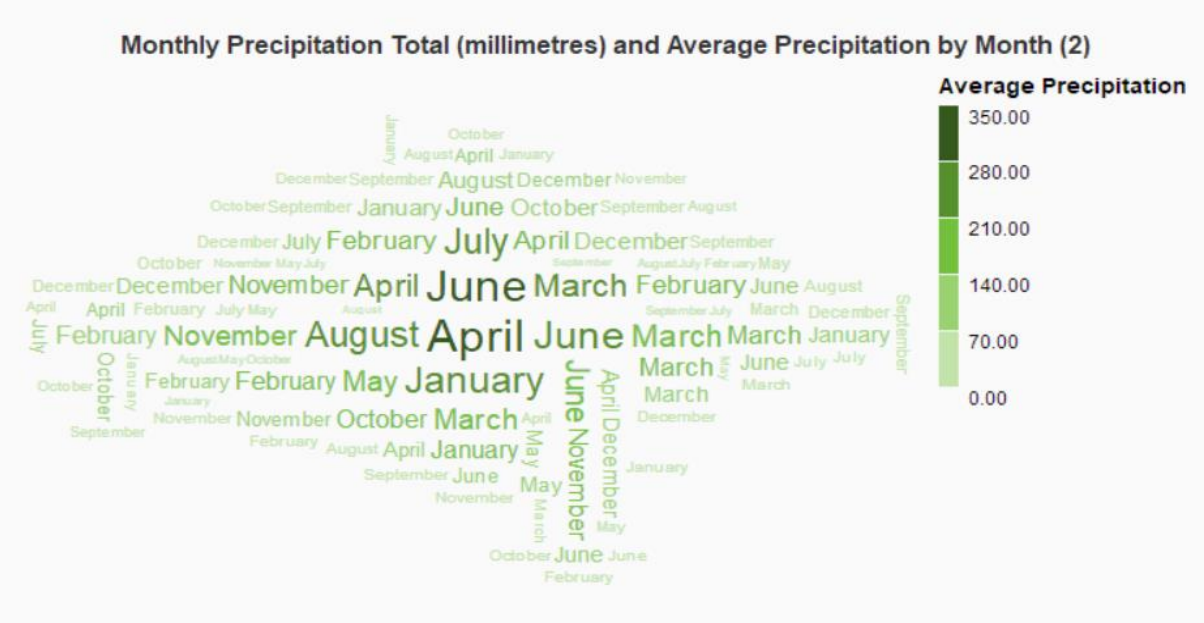




Thirdly, the precipitation and storm dashboard provides the potential heavy rainfall and strong wind over the Sydney airport that can strand the flyers. The report, based on recent pattern, identifies the months of October, November and December as the period with high chances of flight cancellation due to heavy storm and rainfall. However, based on the rainfall pattern of Sydney from 1928 to 2019, the report found the highest precipitation in June. Hence, the report recommends Airbnb to provide incentives to the hosts near Sydney airport for listing their properties in Airbnb and to invest on targeted ads for a comfy stay to the flyers that are stranded in the airport during those periods (June, October, November, December).







To sum up, the report proposes the restructuring of Airbnb listing operations and integration of new business model through restricting the suburbs with high crime incidence for the safety of the guests and through seasonal investment on targeted ads for stranded flyers to enhance the guest experience as well as increasing the potential revenue for Airbnb. Furthermore, encouraging the hosts with listed entire home and apartments from the high potential revenue-generating and safe suburbs can increase the revenue of Airbnb.

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