

DS8007: Advanced Data Visualization

Project: EDA of Toronto Airbnb listings in 2021

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Introduction

Background

Since 2008, Airbnb has been a popular method to look for traveling possibilities. As of end of 2021, it has six-millions of active listings worldwide, more than one-hundred-thousands of cities and towns with active Airbnb listings [Dgomonov, 2019], one-hundred-fifty billions were earned by hosts [Airbnb Newsroom, 2022].

Purpose

The purpose of this project is to provide insights for both customers and hosts. Mainly for hosts, will have a better business insight. Business insights such as, which neighbourhood have most listings? When is the period of busy of off season? What does name and description for popular listings looks like? What is most frequently used words? etc. For customers, price related questions will be answered. Such as how does price change during the year? Will price be higher when it comes to weekends? etc.

Methodology

The tools used were Jupyter notebook and python, and data visualizations will be implemented by matplotlib and seaborn python packages. The data comes from the Airbnb public data, <http://insideairbnb.com/get-the-data/>. Data files used in this project were listings and calendar. The raw listings is a csv file and contains 74 attributes and 15084 observations, however for this project, listings will be referenced to a data frame with only 11 columns and 15084. Since other attributes were irrelevant to the project, they were dropped during the data preprocessing. The 11 attributes from listings were: id, accommodates, description, host_name, neighbourhood_cleansed, latitude, longitude, room_type, price, number_of_reviews, reviews_per_month. The 8 attributes are listing_id, date, available, price, adjusted_price, minimum_nights, maximum_nights, weekday.

Listings Dataframe

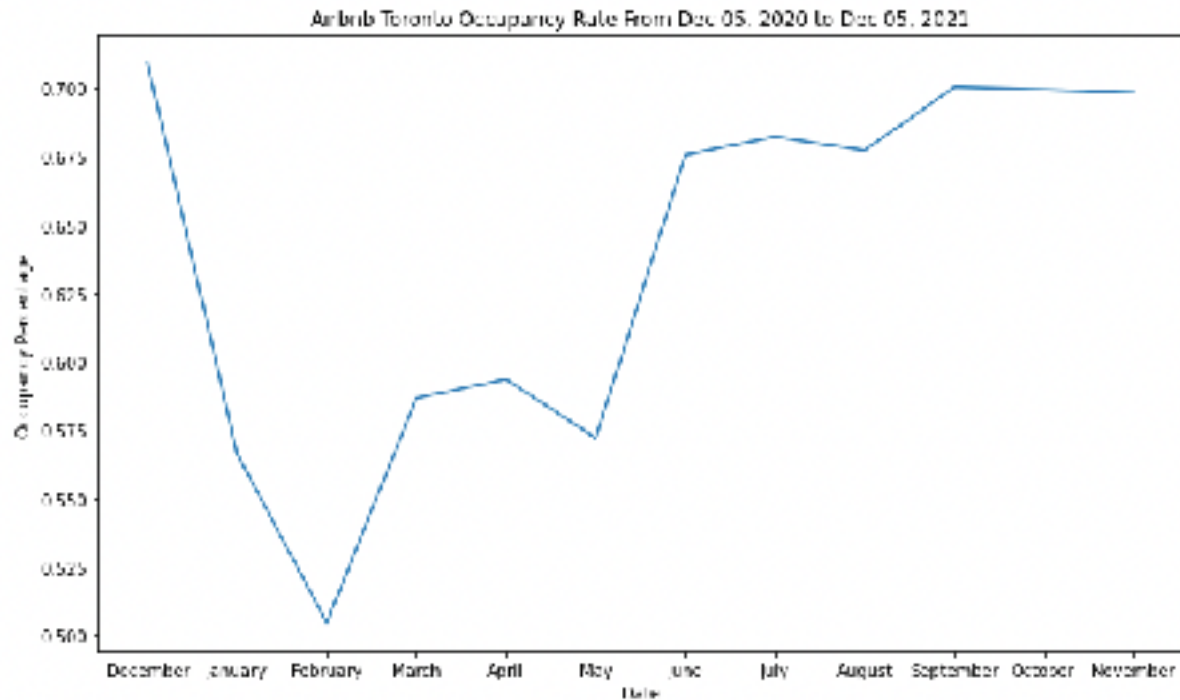
	id	accommodates	description	host_name	neighbourhood_cleansed	latitude	longitude	room_type	price	number_of_reviews	reviews_per_month
0	1419	10	This large, family home is located in one of T...	Alexandra	Little Portugal	-43.64617	-79.42451	Entire home/apt	469.8	7	0.09
1	4077	2	Guest room in a luxury condo with access to all...	Kathie & Larry	Waterfront Communities-The Island	-43.64100	-79.37628	Private room	94.8	109	1.50

Calendar Dataframe

	listing_id	date	available	price	adjusted_price	minimum_nights	maximum_nights	weekday
0	557915	2021-12-08	f	85.0	\$85.00	30.0	730.0	Monday
1	40468	2021-12-08	f	100.0	\$100.00	75.0	1125.0	Monday

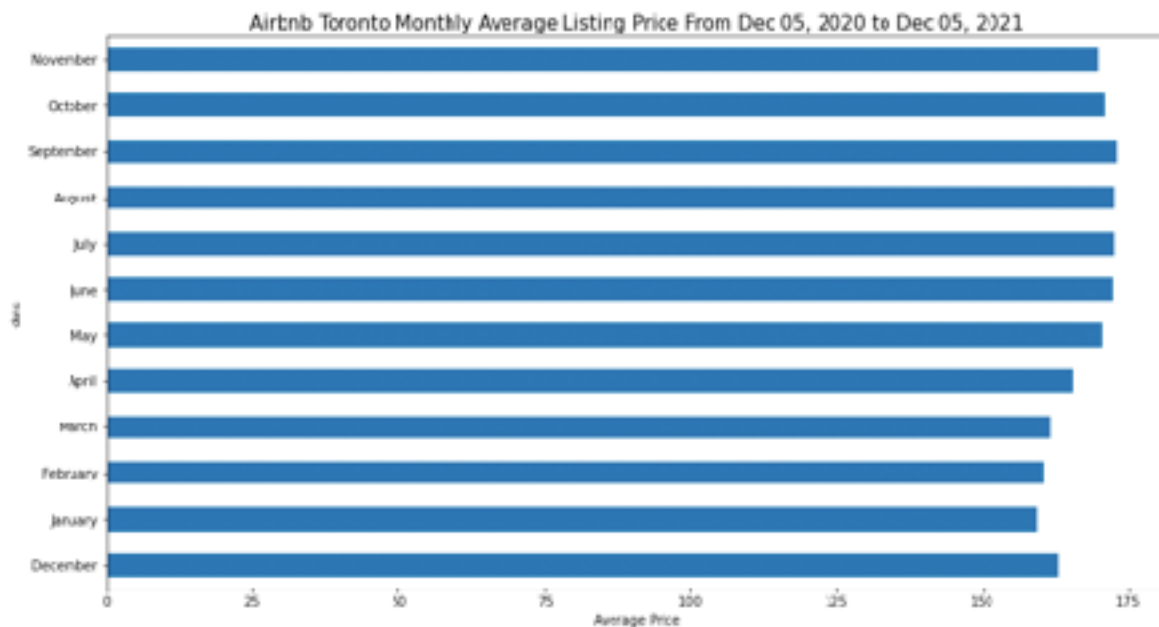
Insights from dates

How does occupancy rate change during the year?



The occupancy percentage was high in the month of December, and it became low during January to May. And it bounced back starting from June. The busier month was in holidays such as December, and warmer month such as starting from June to November.

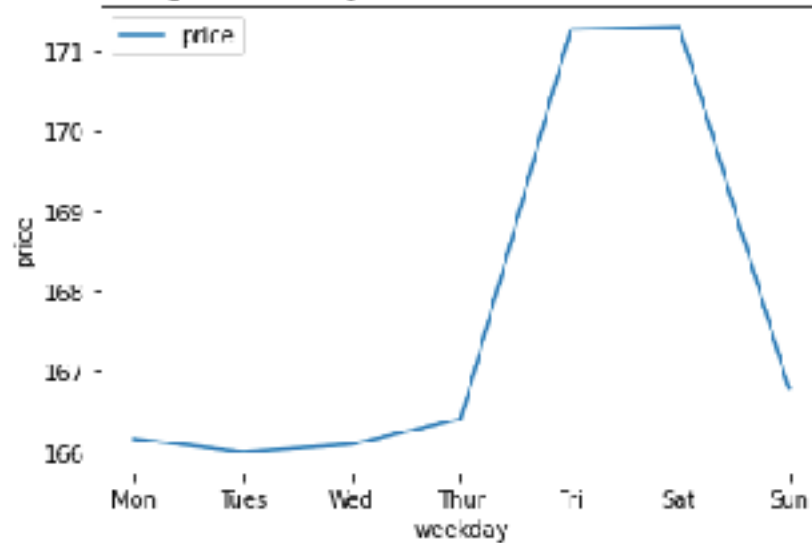
How does price change during the year?



The average price of listings were relatively low from January to April, which supports our conclusion for previous chart, the off season seems to be from January to April, therefore the price will be lower.

How does price change during days of week?

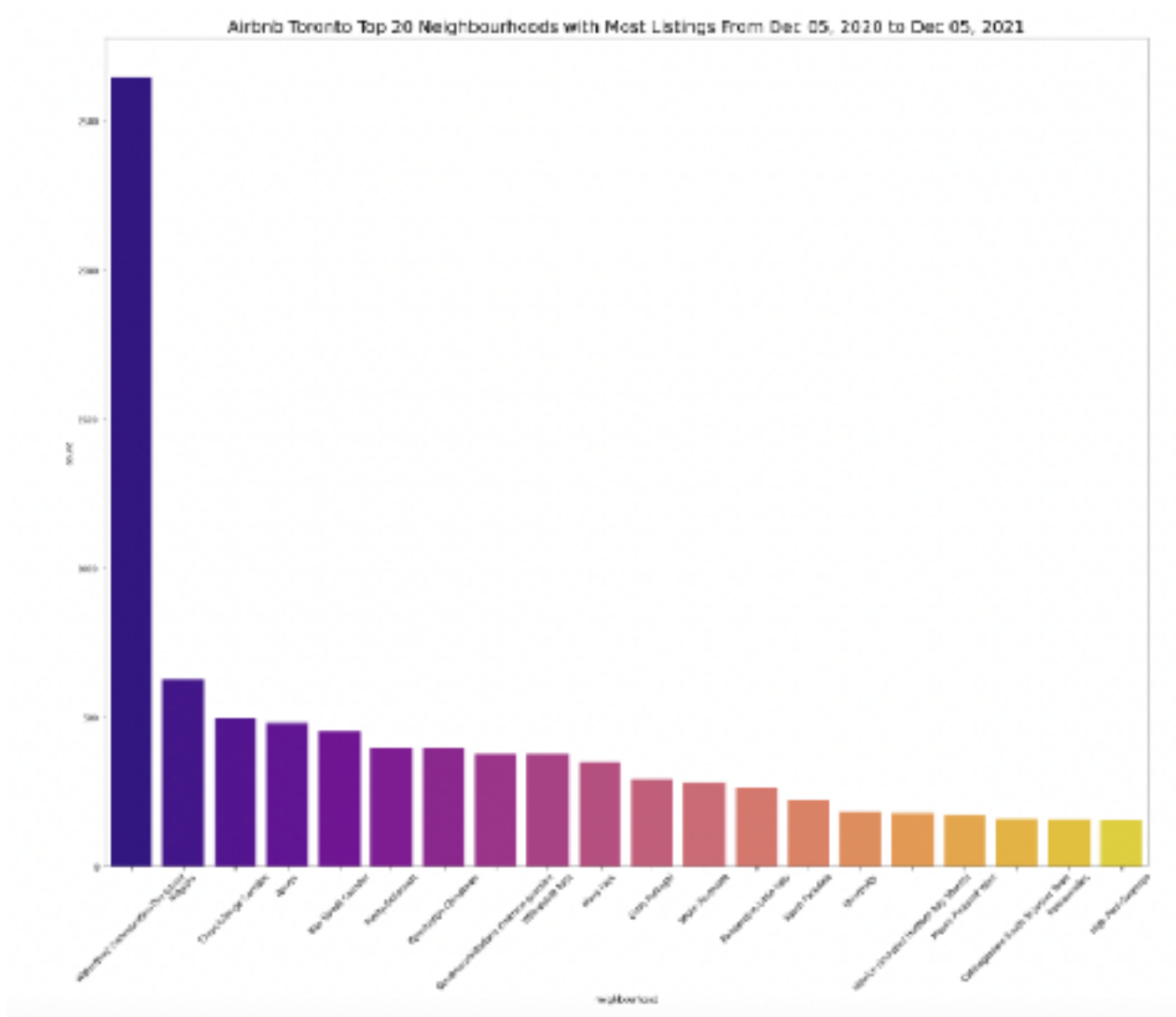
Airbnb Toronto Average Price in Days of Week Rate From Dec 05, 2020 to Dec 05, 2021



The average price of listings became higher by around 6 dollars in Friday and Saturday. The price was higher when it came to weekends.

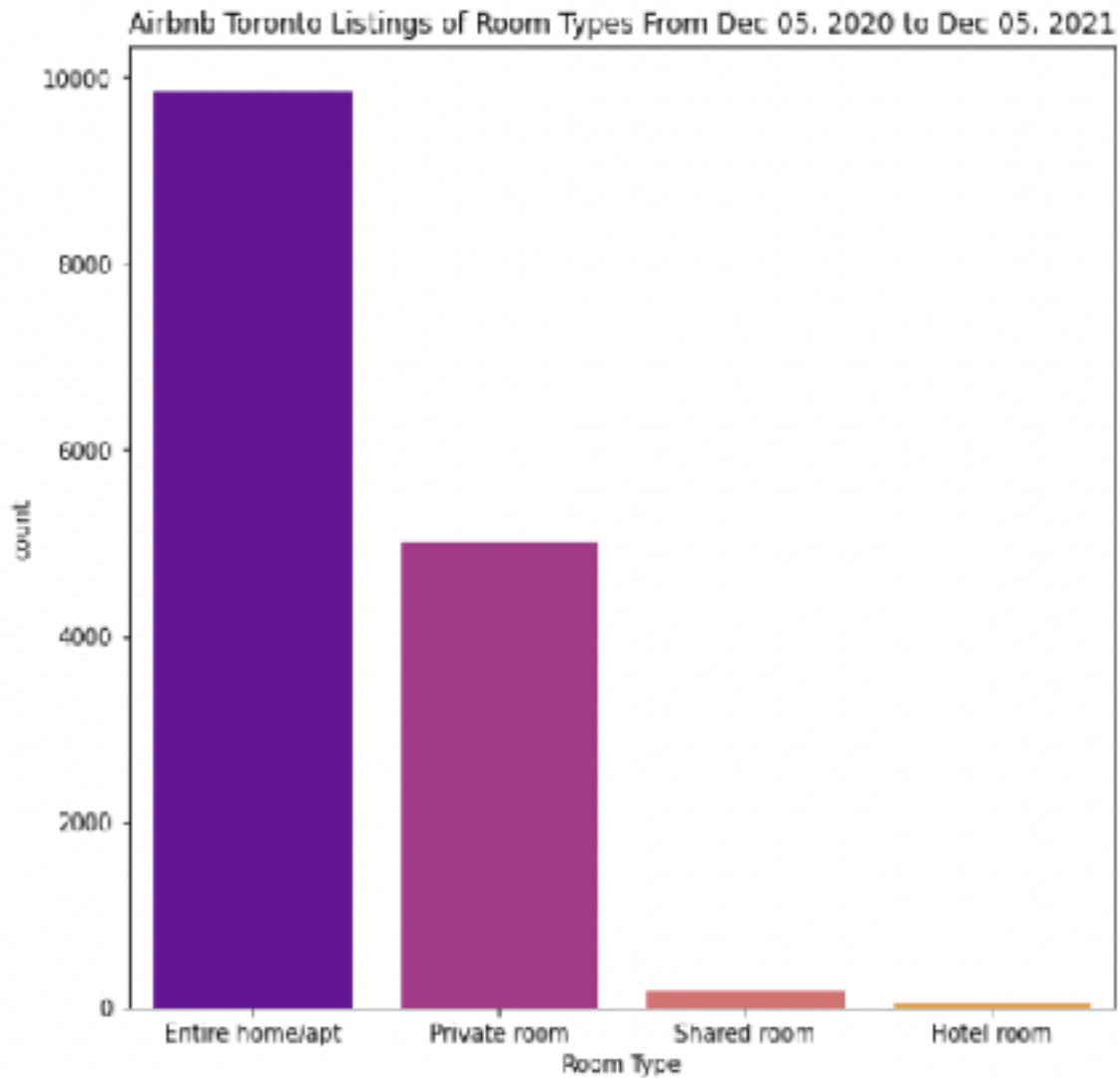
Listings analysis

What are the neighbourhoods with most listings?



The bar chart show the top 20 neighbourhoods with most listings from December 05, 2020 to December 05,2021. The neighbourhood with most listings is Waterfront Communities-The Island, and followed by Niagara neighbourhood. Waterfront Communities-The Island had about 2700 listings, and Niagara had about 700 listings.

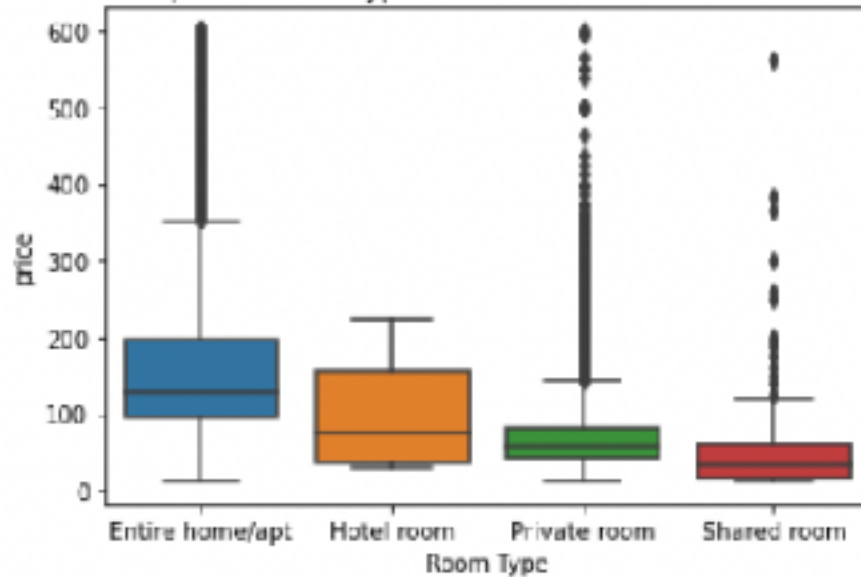
Different types of rooms



The bar chart shows the Airbnb Toronto listings of different room types from Dec 05, 2020 to Dec 05, 2021. There are four different types of rooms: entire home/apartment, private room, shared room and hotel room. The entire home/apartment room type had most listings around 10000 listings, and followed by private room around 5000 listings.

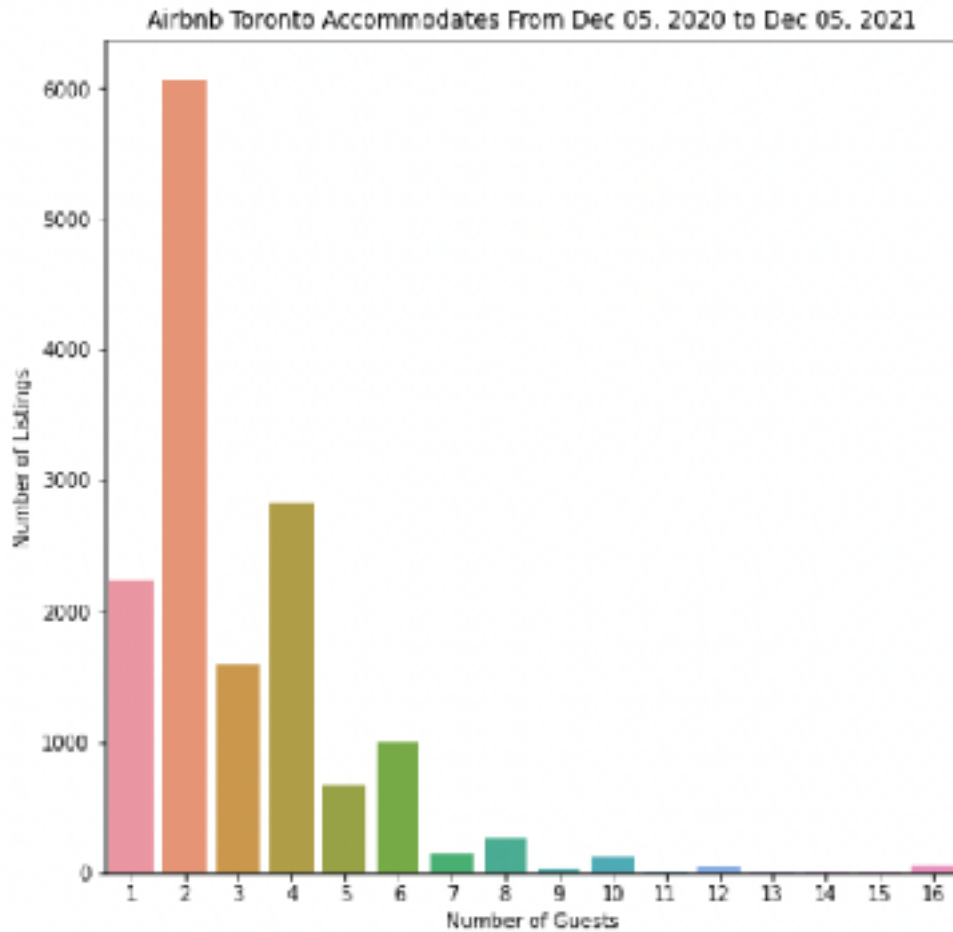
How does room types effect price?

Airbnb Toronto Boxplot of Room Types and Price From Dec 05, 2020 to Dec 05, 2021



From the box plot of price with different room types, we could see that the room type entire home/apartment tend to be more expensive, and shared room is the cheapest.

What is the most popular accommodates listed?

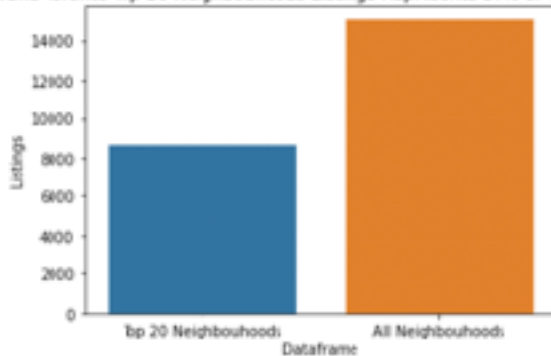


The bar chart shows number of listings by different number of guests. The most popular listings is for 2 guests, around 6000 listings. The reason behind this result could be that the targeted customers were couple for these listings.

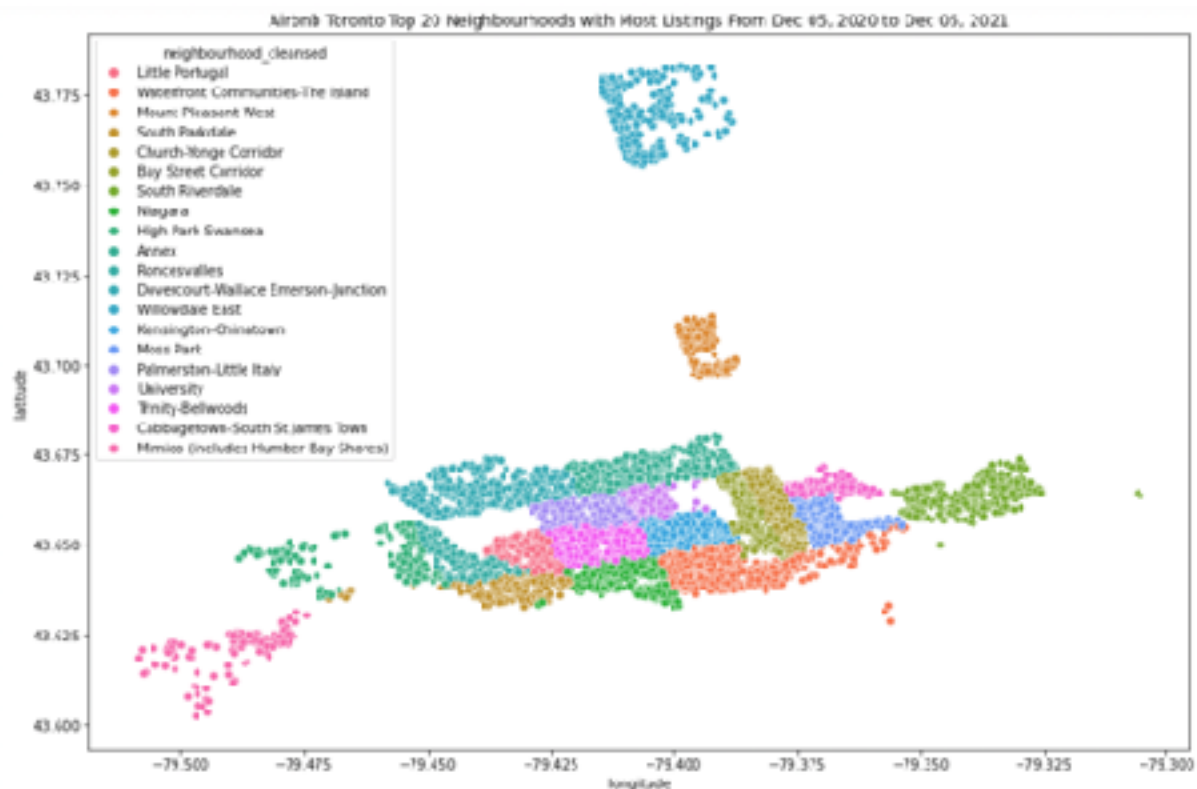
Popular neighbourhood

Listings Map of Neighbourhoods

Airbnb Toronto Top 20 Neighbourhoods Listings Represents 57% of Total Listings



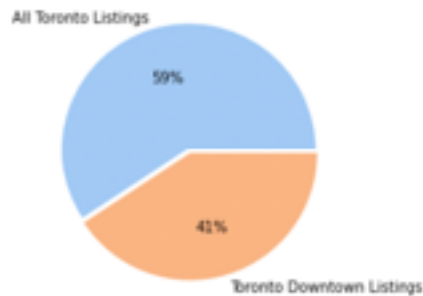
There are 140 different neighbourhoods in the dataset, however listings from the top 20 neighbourhoods is about 57% of total number of listings.



The map of top 20 neighbourhoods shows that most of the listings is located along the Lake Ontario and Downtown area. The two neighbourhoods that were outside of the downtown area were Willowdale East and Church-Yonge Corridor. Willowdale East is the neighbourhood around Yonge Street and Finch Avenue intersection, the area is known for authentic and fusion Asian restaurants and a plethora of nightspots, also it is close to the Yorkdale shopping mall [Cooper, 2017].

Downtown Toronto

Airbnb Toronto Downtown Listings Represents 41% of Toronto Listings From Dec 05, 2020 to Dec 05, 2021

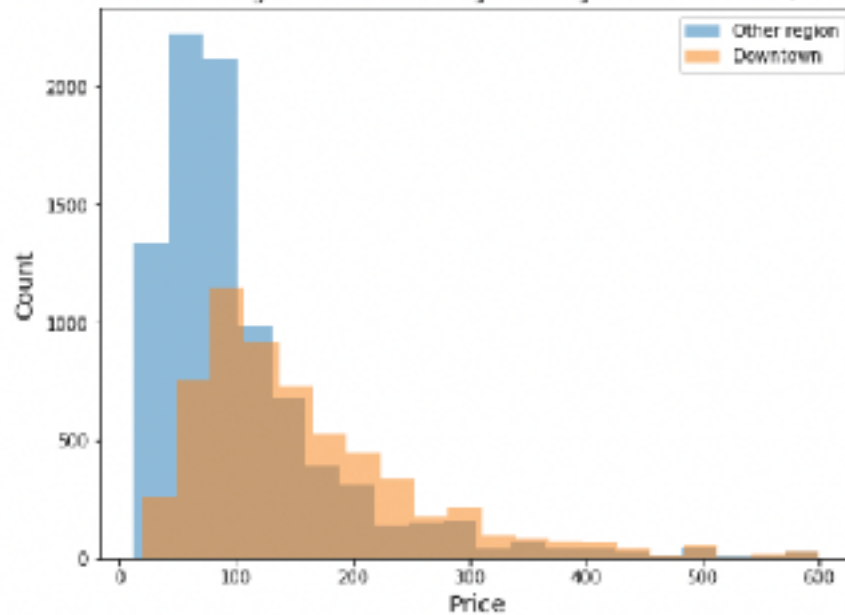


The listings from Downtown Toronto is about 41% of total Toronto listings from Dec 05, 2020 to Dec 05, 2021. Downtown Toronto is a popular area for Airbnb listings.



The map shows all the listings that came from Downtown Toronto from Dec 05, 2020 to Dec 05, 2021. Area from the map is a little bit wider than the area of Downtown Toronto by definition. More strictly the map shows all the listings from Downtown and near Downtown Toronto.

Airbnb Toronto Downtown Listings Price and Other Region Listings Price From Dec 05, 2020 to Dec 05, 2021

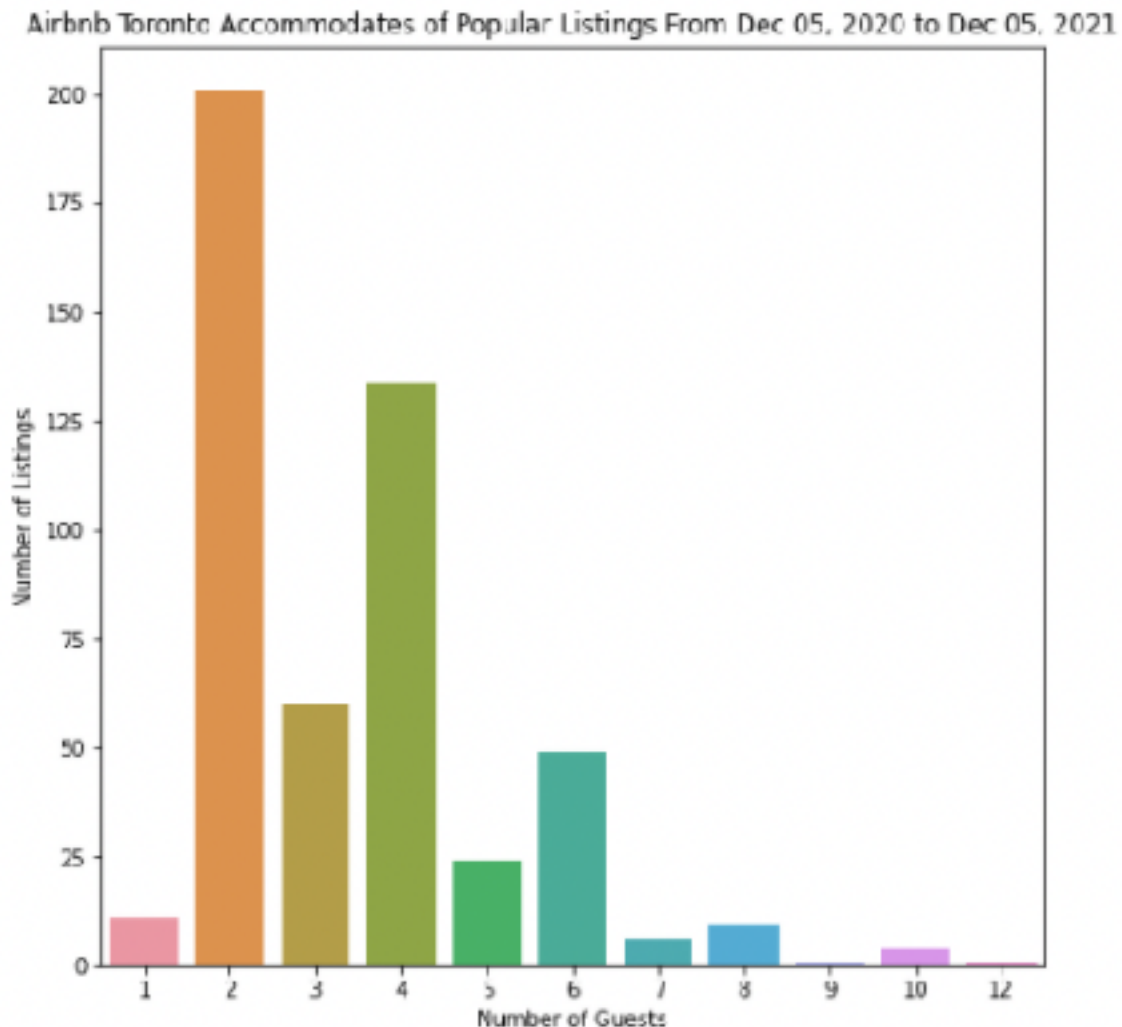


The overlapped histogram shows the distributions of listings price for Downtown Toronto and other regions in Toronto. From the histogram, we can see that price is denser around 100 dollars for regions not in Downtown. For Downtown listings, there were more listing prices that are higher than 100 dollars than other regions. For Downtown listings, there were more luxury and vacation listings.

Popular Listings

The popular listings is defined by top 500 listings with most reviews per month.

Most popular accommodates listed



The bar chart shows number of listings by different number of guests for top 500 listings with most reviews per month. The most popular listings is for 2 guests, around 200 listings. The bar chart looks similar to bar chart for every listings, however the bar for only 1 guest is very low. The reason could be that the popular listings does not tend to list for only 1 guest, it also could be the case that the customer choose listing for only 1 guest does not tend to write a review.

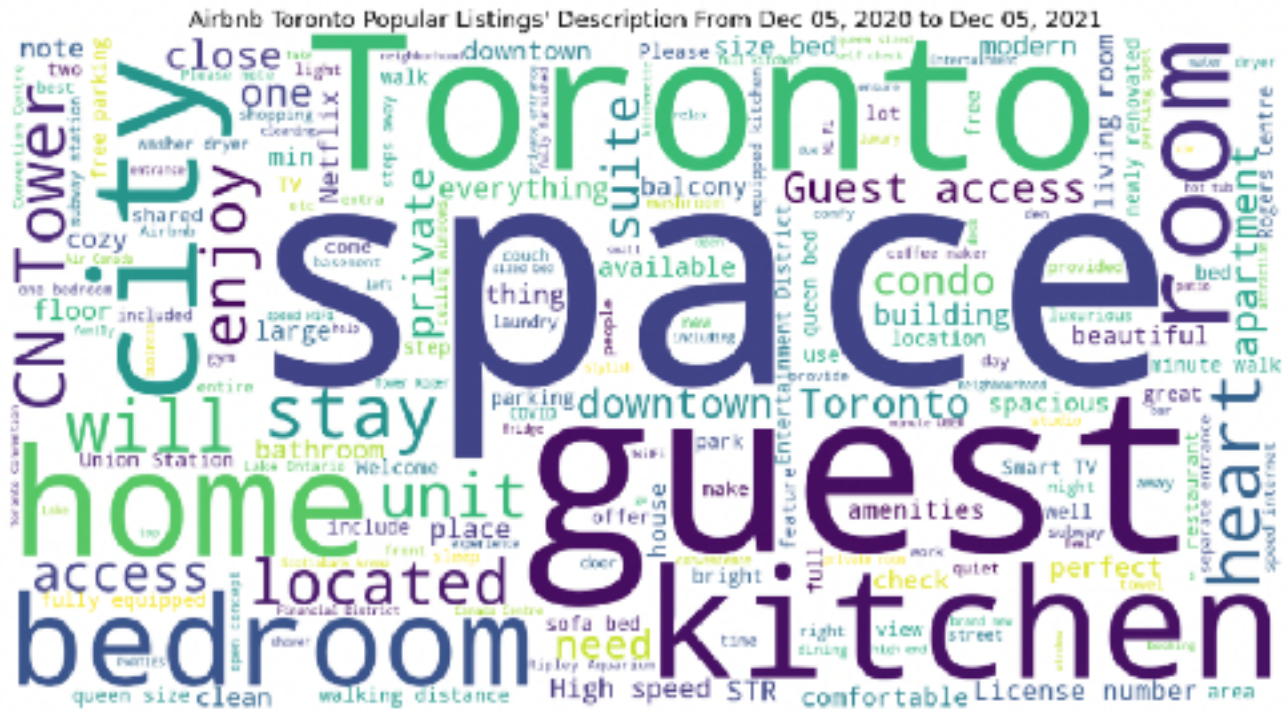
What makes popular listings popular?

Title name of listings



The word cloud shows the popular words used by the popular listings title name. From the word cloud, we could location words such as “Downtown” and “CN Tower” were frequently used, also living conditions words such as “Condo”, “Bedroom”, “View” and “Cozy” were frequently used. Therefore, the locations and living conditions could be the important factors for popular listings. Also, the word cloud tells us what should be included in the title name, and most importantly how to make an eye-catching title name.

Description of listings



The word cloud shows the popular words used by the popular listings description. The word cloud tells us what should be included in the description, such as locations, number of bedrooms, number of guests, kitchen description, and type of room, etc.

Reference

About us. Airbnb Newsroom. (2022, February 24). Retrieved March 9, 2022, from <https://news.airbnb.com/about-us/>

Cooper, C. (2017, April 25). Neighbourhood profile: Central willowdale (Yonge & Finch). GTA Real Estate News | Presented by Living Realty. Retrieved April 13, 2022, from <https://news.livingrealty.com/neighbourhood-profile-central-willowdale/#:~:text=The%20stretch%20of%20Yonge%20between,all%20within%20steps%20of%20home.>

Get the Data. Inside Airbnb. (n.d.). Retrieved April 13, 2022, from <http://insideairbnb.com/get-the-data/>