Understanding Hong Kong Property Market: An Analysis of Customer Preference and Market Trend

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Abstract: Housing shortage has been a significant issue in Hong Kong since 1997. For years, the government has put great effort in addressing this problem. This report describes a project aiming at identifying the key factors influencing customer preferences within the Hong Kong property market, so as to better understand the market needs and provide insights for land planning. Social media and property agency websites are main data sources. Web Crawler and a taxonomy database were developed to extract and map the information from social media into property market discussion. Visualizations and text mining have been used to perform analysis. We concluded that the housing preference in Hong Kong is concentrated in the New Territories and identified a negative relationship between average housing price and online social discussion frequency for top mentioned locations.

Keywords: Customer preference; Text mining; Hong Kong Property Market

1. Introduction

Housing crisis has been one of the key issues that Hong Kong is facing. Home to 7.5 million people, the city has suffered from the lack of land supply for housing for decades. The whole society has been widely beset by housing shortage and soaring property prices. According to the CBRE Global Living Report 2020, Hong Kong has again reached the top in the global list of most expensive property markets, for 11 consecutive years[1-3]. The average property price in Hong Kong has now reached to 1,254,442 USD, with an annual growth of 4.7% from 2019 (Rating and Valuation Department, 2021) [4]. In the meantime, the average waiting time for subsidized housing has also increased to 5.8 years, as reported by Hong Kong Housing Authority in June 2021.

The housing crisis has always been the top concern of the city. For decades, the Hong Kong government has spent great effort in addressing the land issue to improve the housing supply and affordability. This project aims to investigate the key factors, (e.g., locations, property sizes, etc.) and analyze the relationship between them and the property transaction volume. With this study, finally, the group will provide insights and recommendations to different stakeholders, including the Hong Kong government, property managers, and investors. The study period of this project is from 2011 to 2021.

2. Literature review

Today, artificial intelligence has made an evident impact in people's lives. Besides, companies have devoted themselves towards customer engagement. According to (Zulaikha et al., 2020), AI refers to the creating the ability for digital machines or computers to do what was previously done by humans. AI has been integrated with algorithmic functions that respond to dataset and future data processing. In Hong Kong, the AI is being used to handle the growing data volume (Zulaikha et al., 2020) [5]. To succeed in the property market in Hong Kong, businesses have to understand their customers and their preferences first (Popescu, 2018). Once they understand their customer preferences, they can easily identify the strengths which are later amplified or pinpoint weaknesses. Therefore, customers' feedback is the most important part of information in the property market.

According to (Popescu, 2018) [8], AI, known as "Machine Learning", has been used in the Hong Kong property market to extract key aspects of customer experiences/preferences from unstructured data. The unstructured data are obtained from online reviews, surveys, and customer communications, among

others. Many institutions make use of the mechanical AI to automate data collection about the market (Huang and Rust, 2021) [6]. In terms of customer preferences, AI is used in the property types and market in Hong Kong to collect information about the customers' opinions and attitudes. Moreso, the AI works best in the creation of customer understanding. Huang and Rust (2021) argues that AI assists institutions in Hong Kong to understand the existing and potential customers' needs and wants. The information is then later used to determine the customer's preferences.

Customer preferences are understood by a company the moment an opinion is given. According to (Păvăloaia et al., 2019) [7], the development of the social network platforms has created networks for handling all the big data collected via the Artificial Intelligence (AI). By understanding the data, then these companies enjoy sustainable businesses. Instagram, Facebook, and Twitter are some of these social networks. The property firms in Hong Kong are making use of social media to build trust and gain knowledge about their customers (Păvăloaia et al., 2019). Besides, these are the same platforms where these companies build customer loyalty while developing the customer retention strategies. The social media and environmental data collected via the AI is used by these platforms to introduce new products to their customers. All these products are done as per the customer preferences.

3. Methodology

3.1. Data Source

For the social media source, the information structure of Facebook is more in line with the data we need. Considering the public group that contains the posts of property information [1], we can find the 'Topic' module which gives some hot topics discussed in the group and shows the frequency. The subject can be determined as the word frequency on the website in accordance with this idea. Thus, the word frequency can be used to characterize the popularity of a region. The target data will be crawled from the Facebook website.

3.2. Text mining

After looking for some social platforms where property news may appear, we found that there are many public groups on Facebook showing sales and rental information which were published by many intermediaries or landlords. We believe that it is possible to obtain investor and market sentiments on real estate here, which is shown below. Relative popular properties transaction locations could also help to contact previous government historical data. Hence, we decided to use Facebook as our social media platform for text mining. In order to avoid advertisements and the lack of feature words, we selected 10 public groups with more than 2,000 people to crawl posts. Compared with inactive groups with few members, where a lot of content has been reposted and shared, these active groups contain more original posts. These original posts can give more valuable information, which we can base on to determine the keyword for text mining.

Due to the potential anti-crawler mechanism of Facebook, it is probably difficult to crawl out of the data by requests and facebook-scraper. After many attempts, we decided to use Selenium to simulate the login of the Facebook account. Based on BeautifulSoup, we look for several indexes to determine the location of each post. After using find_all to get the entire page, we locate the tag for each post of each group. We also use Selenium to simulate interface sliding to help us better demonstrate posts. All the crawlers worked under a large while loop and several small for loop. Finally, we got 7262 public group posts.Subjectively, regions in the New Territories appear more frequently. Only in the pictures we showed above, 'Tuen Mun' is mentioned the most, 'Tseung Kwan O' and 'Yuen Long' are located in the New Territories as well. As mentioned before, the text mining analysis focused on the investigation of location keyword frequencies in the dataset. The Buy/Sell and Rent market were studied separately first.

[1]The posts of property information are like 'Hong Kong second-hand property rental and sale trading platform' (https://www.facebook.com/groups/319834981518051/)

Table 1: Buy/Sell Market: Top 5 mentioned locations

Location	Frequency
Yuen Long	92
Tuen Mun	85
Sha Tin	43
Tsuen Wan	26
Tai Po	23

Table 2: Rent Market: Top 5 mentioned locations

Location	Frequency
Tuen Mun	171
Yuen Long	148
Tsuen Wan	108
Mong Kok	82
Hung Hom	79

We also plotted the histograms to visualize the frequency distribution of all locations in the final list:
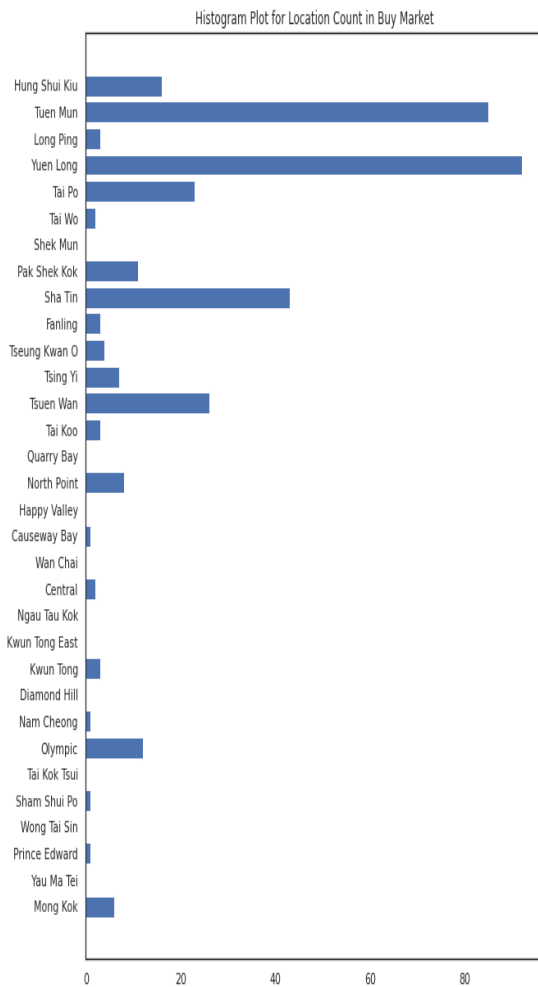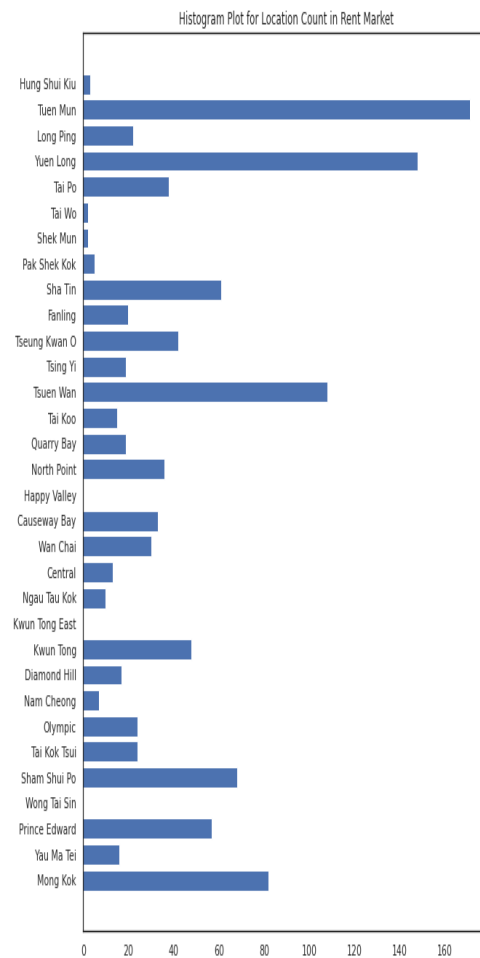

Figure 1: Histogram of Buy/Sell Market

Figure 2: Histogram of Rent Market

Figure 3: Word Cloud of Buy/Sell Market

Figure 4: Word Cloud of Rent Market

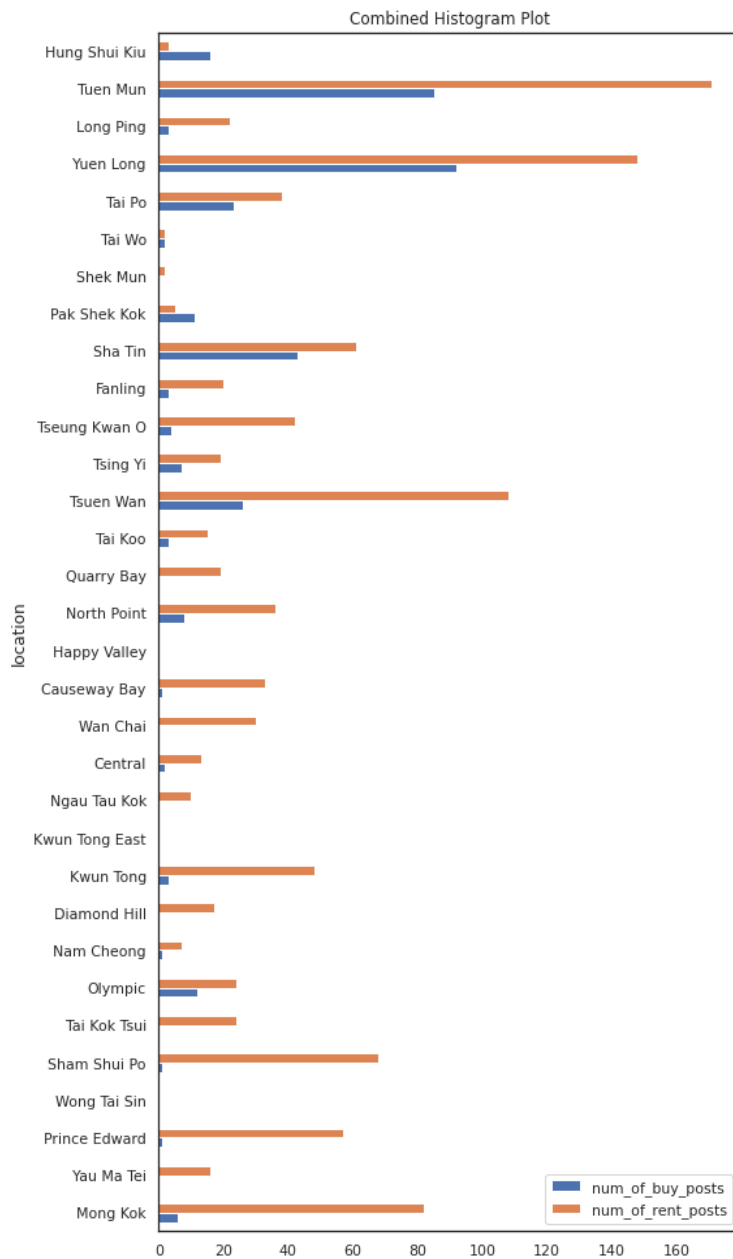Finally, we combine the two histograms into one to make some comparisons:

Figure 5: Combined Histogram

To sum up, according to the frequency count of different locations in the 7262 public posts, we observed an obvious concentration of housing preference in New Territories, especially in the Buy/Sell

market. In the Buy/Sell market, all top 5 mentioned locations are located in New Territories. In the Rent market, the top 3 mentioned locations are all located in New Territories ((Tuen Mun, Yuen Long and Tsuen Wan), and the 4th and 5th mentioned locations, Mong Kok and Hung Hom, are located in Kowloon. Overall, the public preference in buying or renting properties is distinctively high in New Territories, followed by Kowloon. Hong Kong Island, on the other hand, is the least preferred location, especially when people consider buying property.

4. Discussion

4.1. Insights from text mining

As far as we are concerned, the level of preference in location for the property market may be partially explained by the average housing price in the location. Therefore, we conducted a regression analysis, as discussed in section 4.2, to investigate the potential relationship between these two factors.

Furthermore, despite some similarities such as some common top mentioned locations (Yuen Long, Tuen Mun and Tsuen Wan), we also noticed some differences in people's preference in the Buy/Sell market and Rent market, especially in Hong Kong Island. For example, Wan Chai, Causeway Bay, Quarry Bay have seldom or never been mentioned in the Buy/Sell posts, but have material counts in the Rent posts. These are the places where many offices and companies are located and have high prices on the property websites. For example, the average transaction price of property in Causeway Bay is $14,132/sq. ft. However, due to its convenience, some people who work in Causeway Bay or nearby areas, are likely to rent a property in that location. The factors that affect buy preference are different from the factors that affect rent preference, as people have different considerations for living and working. The age distribution and average income level of customers are also different in these two markets. In order to better design the land plan for each location, the government needs to consider the customers' needs in both markets. Ignoring any of them may lead to flawed planning.

The text mining results show people's housing preference in Hong Kong is concentrated in the New Territories. The utilization rate of land in the New Territories is significantly lower than that in Hong Kong Island, and there is more space for development and utilization. Therefore, the living condition in the New Territories is relatively the best. Relatively cheap housing price and the relatively large living space satisfy at the same time.

4.2. Insights from text mining

Here we can give some critical discussion on our results. The first is the data crawling and the data value. We only have the recent data in each Facebook group because of some anti-crawler techniques of the webpage. Our crawler program didn't handle the automatic page extension. The original data contains more than 7000 records in total, but the remaining useful information is not that sufficient after processing. The sheer volume of data in need took lots of time and effort. In addition, facebook group cannot cover all the property discussion in hk. And we cannot make sure that all the people would consider Facebook groups as their information source. Even if it has a generally correct feature, keyword like Tseung Kwan O which should have a popular discussion don't show a high frequency.

The second is the objective data source. The data we extract from some government websites is more authoritative. Instead, data from property agency websites and others may not be that accurate to some extent. Housing price data and median income we used come from a property website which provides the statistical information limited in its own transaction coverage. If this agency's services vary from region to region, the sample in some regions may not be universal. When our target is Hong Kong, more general data brings a more accurate model.

5. Conclusion

There are poor housing conditions for the last century till to date in many districts of Hong Kong due to high need of accommodation. The current settlement is a result of how the government of Hong Kong put efforts to provide homes for its people for a long time (Cheng, M.2019). Increasing prices is one of the main issues facing the government and the people of Hong Kong. The cause of it is the effects of the pandemic on the efforts of building back the economy (Li, K. 2020). A measuring index on increasing house prices indicates that the prices rose with a percentage of 0.6 to 0.8 per cent from 2019. Another

reason for increasing housing prices in Hong Kong is as a result of supply restrictions and the capitalization of high rent expectations. Our result shows that the increasing property price is accompanied with the decreasing transaction in the past 6 years. Based on the texting mining results, people in Hong Kong prefer to concentrate in the New Territories now. In general, according to the research we conclude that the government should focus on developing the property market in the New Territories.

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