BEST HOTEL IN DOWNTOWN TORONTO

Srivaishnavi Korukanti

June 28, 2020

1. **Introduction**
   1. **Background**

Ontario is the most populous province in Canada and Toronto is provincial capital of Ontario. Toronto is the most populous city in Canada and the fourth most populous city in North America. As per 2016, the population of Greater Toronto Area (GTA) is 6,417,516. Toronto is an international center of business, finance, arts, culture, and is recognized as one of the most multicultural and cosmopolitan cities in the world. Toronto has a diverse population as it is an important destination for most immigrants coming into Canada. People belonging to around 200 different ethnic groups reside in Toronto area.

Toronto serves as the financial capital of Canada and hosts high concentration of banks and brokerage firms in the financial district area. The five largest financial institutions in Canada known as Big Five (Royal Bank of Canada (RBC), Toronto-Dominion Bank (TD), Bank of Nova Scotia (Scotiabank), Bank of Montreal(BMO), Canadian Imperial Bank of Commerce(CIBC)) have national offices in Toronto. Toronto serves as headquarters for many companies such as Bell Media, Rogers Communications and Torstar. Toronto is also home to software companies such as Ecobee, Shopify, Amazon, Paytm Labs etc. There are many universities in Toronto such as University of Toronto in downtown area and there are three other universities present in the same area. The downtown Toronto also hosts many hospitals such as the Sick Kids Hospital and Mount Sinai hospital.

Toronto is also the prominent center for music, theatre, motion picture and television production. It is a popular tourist destination attracting lot of people from all over the world for these. The most popular tourist attractions in Toronto are Royal Canadian Museum, CN tower, Toronto Zoo and Hockey hall of fame. There are numerous galleries and museums in Toronto to visit.

Everyday thousands of people come to Toronto for various purposes and it is important for them to know about good hotels to stay in downtown Toronto.

A large body of water with a city in the background

Description automatically generated

* 1. **Problem**

The information about hotels located in downtown Toronto and their ratings can help one decide about where to stay while in Toronto. With lot of companies in downtown Toronto, these hotels would help them stay close to the workplace. Downtown Toronto is busiest part of the city with large number of neighborhoods. People visiting Toronto would love to know about good hotels and their locations in Toronto. Any firm interested in building a new hotel would like to know about the current hotels in the area and their ratings.

A close up of a sign

Description automatically generated

* 1. **Beneficiaries**

The information about good hotels in downtown Toronto would be useful to someone who wants to find answers to the following questions:

1. What are the good hotels to stay in downtown Toronto?
2. Which neighborhoods in downtown Toronto would be ideal to build a new hotel?

**2.Data**

**2.1 Data Source**

I have collected the information about the Toronto neighborhoods from the Wikipedia [page](https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M) using the get requests command. I have used the **Beautiful Soup** package library to transform the data in the table into the required data frame.

Geocoder Python package is used to get the latitude and longitude values of a geographical location. Given that this package is very unreliable, I have used the csv file (<http://cocl.us/Geospatial.data>) to get the latitude and longitude values of the Postal Codes in the Toronto area. I have added the latitude and longitude values to the existing data frame.

I have used the Foursquare API to get the list of Hotels in the downtown Toronto area. I have created a developer account on the Foursquare and used my client ID and client Secret and made regular calls to extract information about hotels in the downtown Toronto area using the Foursquare API. A new DataFrame is created with the list of hotels in the neighborhoods of downtown Toronto.

I have merged both the DataFrames and created a new DataFrame for further data analysis. I have again used the client ID and client Secret and made premium calls using the Hotel ID to get the ratings of the hotels and merged them into the existing DataFrame. This DataFrame is used for further analysis to get the required information on hotels in downtown Toronto.

**2.2 Data Cleaning**

Cleaning the data and changing into the required format is an important part of the data analysis. After downloading the Toronto neighborhood information, I have deleted all the rows with that are not assigned a borough. All the neighborhoods with same postal code are combined into one row. All the boroughs that have an empty neighborhood have been assigned the same name as that of the borough.

The first data frame is created with three rows which are postal code, neighborhood, and borough after making the above changes. I have added the latitude and longitude values to the DataFrame.

I have also cleaned the information I extracted using the Foursquare API by deleting all the unwanted columns from the table. I have also dropped the rows that do not match with the category as ‘Hotel’. I created the second DataFrame with the hotel name, its Id, and its latitude and longitude values. I have merged the two DataFrames on latitude and longitude and created a new DataFrame for further data analysis.

**3.Methtodology**

**3.1 Neighborhoods in Downtown Toronto**

Downtown Toronto is the busiest part of the city and contains large number of neighborhoods. I am interested in finding out if the neighborhood has large number of Hotels as this information gives us an indication if adding new Hotels to the neighborhood or closing some of them (if its overcrowded) is the right action.

A picture containing drawing

Description automatically generated

It is clearly visible from the above figure that the Neighborhoods First Canadian Place, Underground City, Garden District and Ryerson have the highest number of hotels. We can further analyze these hotels by finding the ratings of the hotels. I have used the Foursquare application to get the ratings of the hotels.

**3.2 Ratings of Hotels in Downtown Toronto**

I have obtained the ratings of the hotels by making premium calls using the Hotel Id. I have defined a function to get the ratings of the hotel and used a for loop obtained the ratings of the hotel into a list. I added the ratings list as a column to the DataFrame. If the rating of a hotel if it is not available, I have used the value 0 to indicate it.

A picture containing drawing, fence

Description automatically generated

I was able to get ratings of 12 hotels using the Foursquare API and the ratings range from 8.4 to 5.4 out of 10. The hotels are rated considering various factors into account. The most important factor for providing a rating is the “Explicit User Feedback”.

There are three ways to leave a feedback: a user can say they **liked** it, a user can say they **disliked** it, or a user can say they thought it was **okay**. To maintain the accuracy in the ratings, Foursquare developers try to minimize inversions in their database. An inversion is when a user likes a low rated venue and dislikes high rated venue. Foursquare developers realized that the total number of inversions can be lowered by associating okay to dislike. In other words, if a venue receives 10 **okay**s from the users, the effect on the venue’s rating is the same as if it received 9 dislikes and 1 like.

The ratings are also dependent upon the tips received and every tip is analyzed using the NLP (Natural Language Processing) pipeline to extract information about the venue speciality.

**Machine Learning Algorithms**

The NLP pipeline breaks the tip into parts or phrases of 1 to 4 words of length for further analysis. If a user provides a rating and tip then these are used for training purposes for Logistic Regression. This helps in eliminating the phrases that does not contain any useful information and a value 0 (sentiment score) is assigned to it. This model can help us classify the words that are most often used in writing the tips as

Positive (“amazing”, “awesome”, “delicious”)

Neutral (“average”, “ok”)

Negative (“worst”, “disgusting”, “terrible”)

After the model is trained it can be used to score all the phrases in the tips and the aggregate score of the tip is converted into one of the three of “like”, “dislike” and “okay”. Then all the tips for a venue are scored and classified and a rating is provided for the venue.

Cultural bias is also taken into consideration and denormalized to provide accurate ratings. Foot traffic is also considered while giving the ratings to successfully detect and eliminate scam. Foot traffic signal is normalized based one the location of the venue, its neighborhood and category. Foursquare system can also detect spammers who leave biased tips at places they never visited. The application also takes in to account various features such as if a person is a local or a visitor, a patron, Repeated visits etc.

The ratings are updated everyday to provide accurate and correct information about the venue.

**4. Results**

First Canadian Place and Underground City neighborhoods have large number of hotels with good ratings. That implies that a lot of hotels are located at the Financial District of the city which is a hub for many financial Institutions and tech companies. These hotels are also located close to underground walkways which makes it easy to walk around in the winter. The underground pedestrian walkway network in downtown Toronto spans more than 30 kilometres of restaurants, shopping centers and entertainment centers.

Toronto’s Garden District is famous for finest century-old structures and is named after Allan Gardens, an indoor botanical garden which attracts thousands of visitors and hosts weddings mostly during summer. Garden District and Ryerson areas have number of hotels, but I was not able to get the ratings of most of the hotels. The Chelsea hotel is located at the Garden District of Toronto and it has a rating of 6.4.

The next best hotel is Le Germain hotel and it is located close to the Union Station which is a major railway station in Toronto. Isabella Hotel is the only hotel in and around the area of Church and Wellesley. Gladstone stone hotel located in the West Toronto is not far from the downtown Toronto and has a good rating of 8.2.

**5. Discussion**

The Financial District is the busiest part of the city with many highly rated hotels. If someone visits Toronto on a business visit or for tourism it is the best part to stay as it is close to railway station and underground city. Garden city area is the oldest part of the city with century-old buildings and many hotels, but Foursquare API does not provide ratings of many hotels in this area.

The Harbourfront area is close to Toronto islands and is an ideal place to stay if you want to spend a lot of time near Lake Ontario and take a trip to Toronto islands. Ryerson University is in Garden District and anyone on an academic trip to the university can stay in the Garden District area.

I have also noticed that there are not many hotels in the area close to the University of Toronto and in the surrounding areas.

**6. Conclusions**

Toronto is a beautiful city attracting lots of visitors from around the world and lot of people visit the city for business trips. The best Hotels to stay in Toronto are located at the Financial District with lot of connectivity to all parts of the city. Downtown Toronto can be reachable from Pearson International Airport. Union Pearson Express runs from Pearson airport to Union Station in Downtown Toronto in just 25 minutes. Underground city is also located in Financial District and has a lot of shopping areas.

The best area to open a hotel in downtown Toronto are close to

1. University of Toronto surroundings as it one of the most reputed universities in the world and lot of people visit for academic purposes
2. Harbourfront area as this is close to Toronto islands and can make choice of many tourists and can provide views of lake Ontario