

# Capstone Project - The Battle of the Neighborhoods, Building Live Music Venues in Toronto

Chi-Ta Yang

## 1. Introduction: Business Problem

Music has played a substantial role in human's life. It is tightly connected to the course of human history; a man sings a love song to his lover, mother hums melody to comfort her baby, and the history of a race can be passed down through music. From the creative music blog, it is stated that music makes us creative, makes us express our emotion, and makes learning more pleasant. As the most populous city in Canada and the fourth most populous city in North America, the establishment of more live music venues can further decorate and upgrade the historical and diverse city of Toronto. This can provide valuable information to the Toronto officials and investors.

To achieve the goal, we use data science techniques to suggest the potential borough and the type of live music venues to build in Toronto. Based on the analysis of nearby venues of the best live music venues via exploratory data Analysis and clustering, we investigate the kinds of venues (feature venues) that sustain their continual success. The cluster analysis will then be used to reveal the areas of Toronto that shares comparable surrounding feature venues of the model live music venues. Upon looking into the clusters, boroughs of Toronto that have potential to sustain a successful live music venue can be revealed.

In summary, to make Toronto an even popular city via the establishment of live music venues, the questions below will be answered through data science techniques:

1. What are the kinds of venues surrounding the best live music venues?
2. What are area in Toronto should the live music venues be invested upon?

## 2. Data Source

Based on definition of our problem, the following data are needed.

1. The Best Live Music Venues are needed for analysis. This piece of information are obtained from the ROLLING STONE magazine and musicgateway website. The latitudes and longitudes for each best live music venue can be obtained from latitude website.

- ROLLING STONE:10 Best Live Music Venues in America  
<https://www.rollingstone.com/music/music-lists/10-best-live-music-venues-in-america-767070/ottobar-baltimore-767244/>
- musicgateway: The 10 Best Live Music Venues In The US – NYC To San Francisco & More  
<https://www.musicgateway.com/blog/how-to/best-live-music-venues-in-the-us>

- latitude  
<https://latitude.to/articles-by-country/us/united-states/>

2. The borough information of Toronto is scrape off the following Wikipedia page using BeautifulSoup, and the corresponding Coordinate data is obtained link listed below.

- borough information  
[https://en.wikipedia.org/wiki/List\\_of\\_postal\\_codes\\_of\\_Canada:\\_M](https://en.wikipedia.org/wiki/List_of_postal_codes_of_Canada:_M)
- Coordinate data  
[http://cocl.us/Geospatial\\_data](http://cocl.us/Geospatial_data)

3. The venues data associated with a geographic coordinate is obtained from Foursquare API, in which Venue's name, latitude, longitude, and Category will be given within a specified radius (meter) from the given coordinates.

### 3. Method

A total of 13 best Live Music Venues suggested by the Rolling Stone and musicgateway are analyzed. As can be seen in the notebook file, these Music Venues are scattered across the USA, so the diversity factor is included. The corresponding neighborhood venues were collected with a radius of 2000 meter along with the default number (100) of venues. The bar chart and scatter plot were studied. In addition, the scatter plot are plotted with the coordinate referenced to the input coordinate (ex: Live music venues). The one hot coding were used to transform the venue information. The K mean clustering were used for cluster analysis, and the number of clusters were determined via elbow method.

## 4. Result and Discussion

### 4.1 Study Feature Venues Surrounding Famous Live Music Venues

After we have the venue information nearby the best Live Music Venues, we then go on to analyze the main kinds of venues (feature venue) in the neighborhood. This is to know the types of venues that are keys to the success of a music venue. To achieve it, we first use one hot coding to list the nearby venues of the Best Live Music venue, followed by using the mean of surrounding venues as the representative venues associated with each Best Live Music venues. We then use the bar chart to show the Top 10 venue category. From the cluster analysis, it can be seen that some Live Music venues are located in urban and some in suburban areas; therefore, feature venues are investigated further for each case using bar chart and scatter plot.

As shown in Figure 1, the types of venues that are keys to the success of a music venue lies in the category of Lodge (Hotel), Drinks(Coffee, beer), Relaxation (Park), and Food (Restaurant). It can be understood that the concert usually last till midnight; therefore, people need place to spend overnight. Coffee shop also has high weights. This indicates that Coffee is the first choice to most Americans over other beverage, and this is related to the food culture. Park may be a place before

the music event start, so it is also has heavy weighting. It can be inferred that a live music event is likely some sort of vocation to some people.

In cluster analysis, clustering the best live music venues into 4 group gives a better clustering as shown in the code. 4 clusters can be understood by that some music venues are in the rural area while some are in the urban area. This can be revealed by the average distance of the surrounding venues from the best music venues (D). The D values of cluster 2 & 1 tend to be larger than cluster 0 & 3 as shown in Figure 1(b).

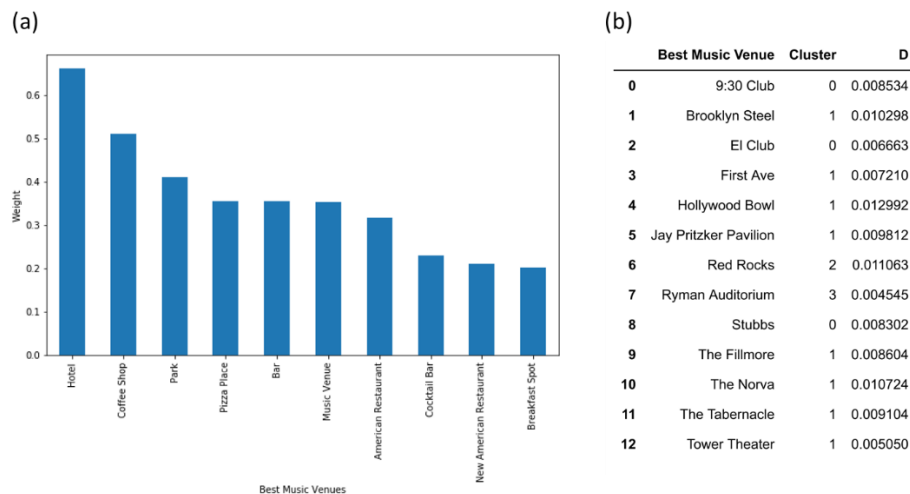
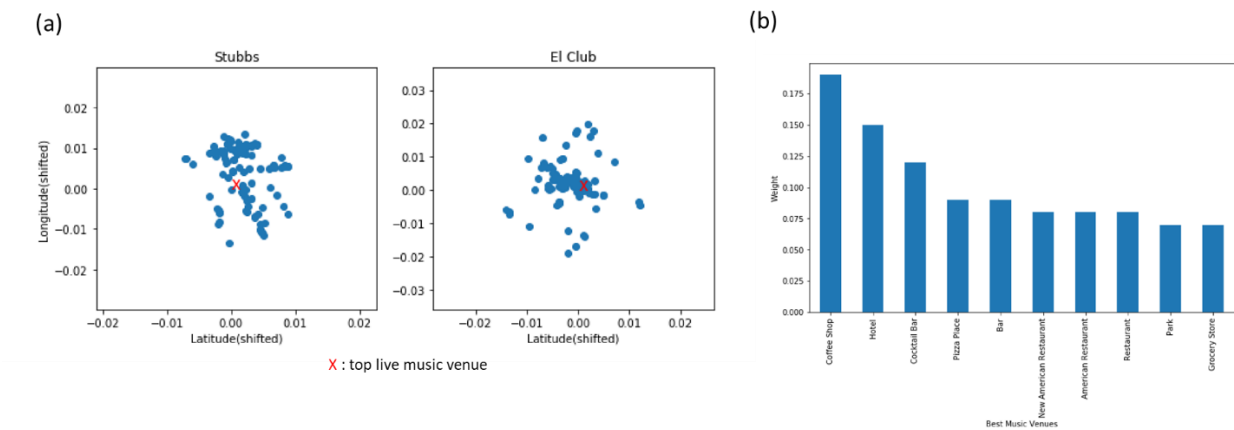


Figure 1. (a) Overall top ten feature venue in the neighborhood of and (b) cluster analysis of the best live music venues.

In cluster 0 as shown in Figure 2, selected scatter plots show the best live music venues in the cluster are urban style as the surrounding venues are very close to the live music venues. The coffee shop is highly needed as well as bar. In this kind of environment, people may enjoy a cup of coffee before the concert and have a beer after the concert.



(b)

Figure 2. (a) Selected scatter plots and (b) top ten feature venue in the neighborhood of best live music venues in cluster 0 as shown in Figure 1 b.

As shown in Figure 3a, the best live music venues in the cluster 3 is quite similar to the cluster 0 (urban style), and the venues are even more closely packed. This is likely to be the downtown style, as bars are densely surrounding this kind of live music venue. There are other music venues in the area. The collection of such venues suggests this area be known for music, likely, an area that host main music events in that city or state.

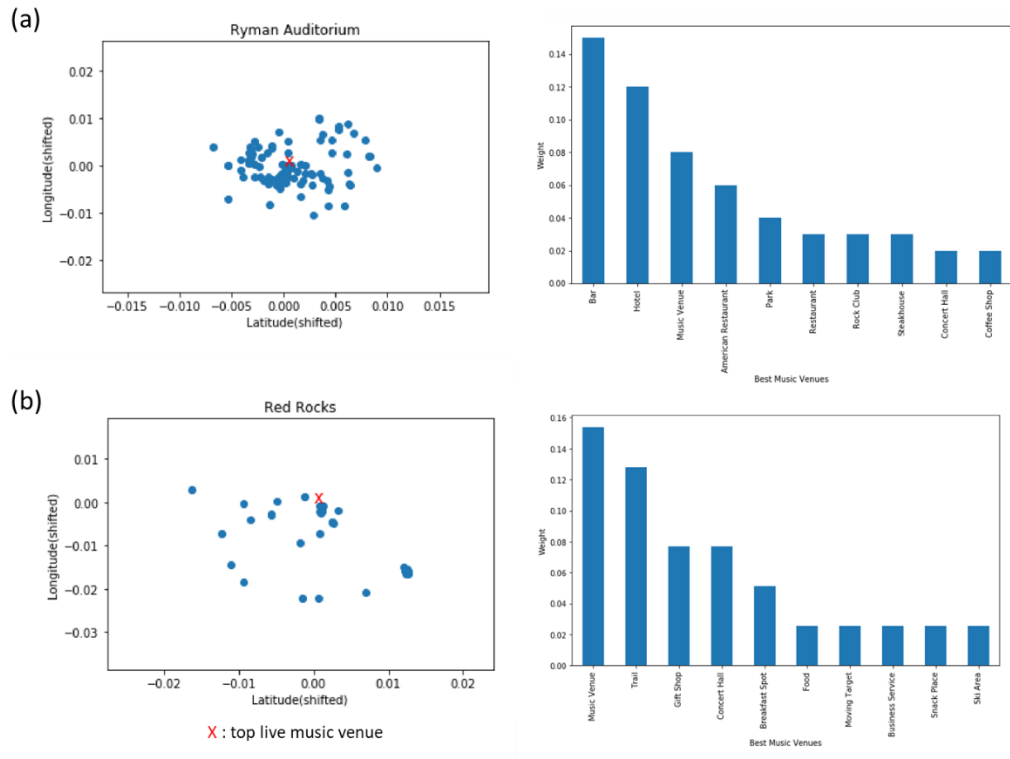


Figure 3. Selected scatter plots and top ten feature venue in the neighborhood of best live music venues in (a) cluster 3 and (b) cluster 2 as shown in Figure 1b.

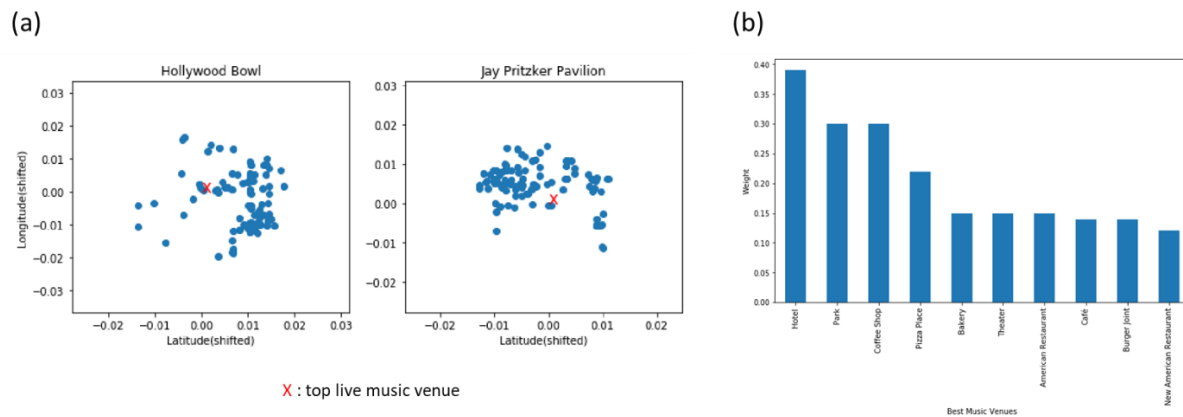


Figure 4. (a) Selected scatter plots and (b) top ten feature venue in the neighborhood of best live music venues in cluster 1 as shown in Figure 1 b.

The live music venue in this cluster is in urban style as shown in Figure 3b, since the surrounding venues are sparse, and the trail is a top feature venue. Gift shop is also dense, so it indicates that this kind of live music venue is likely located in or near a touring site or itself is a touring site. A collection of music venues is another characteristic. We can depict this kind of live music venue to be a place for people to enjoy music as well as the natural view. Surprisingly, the hotel is not a top feature venue nearby. It indicates people may come here mainly for the event or the area is not suitable for lodge.

From Figure 4, the top live music venues in cluster 1 are in-between rural and urban style, as the scatter plot show fairly dense as well as spare venues in portions of the area. A wider kind of venues in the surrounding area can be seen such as hotel, café, restaurant, park, bakery and theater, which is likely near a rural mall.

#### 4.2 Suggest Potential Borough and the Type of Live Music Venues to build in Toronto

Now, we put together the venue information surrounding the top live music venues and the Borough of Toronto. After the cluster analysis, the area with the same venue kinds (feature venues) in the area should be grouped together. This can suggest where in Toronto and what kind of live music venue to develop.

As shown in Figure 5, it turns out all Old Toronto, East York, Etobicoke, North York, Scarborough, and York are all suitable for live music venue, and the style inbetween rural and urban should be considered, where coffee shop, hotel, park, and restaurant are presence. The stakeholder and the officers can refer to 9:30 Club or Brooklyn Steel in order to transform the area into a more attractive place. The city officers can also consider to develop the live music venue near the historical or touring sites to turn the area into a place similar to Red Rocks to attract more people for touring.

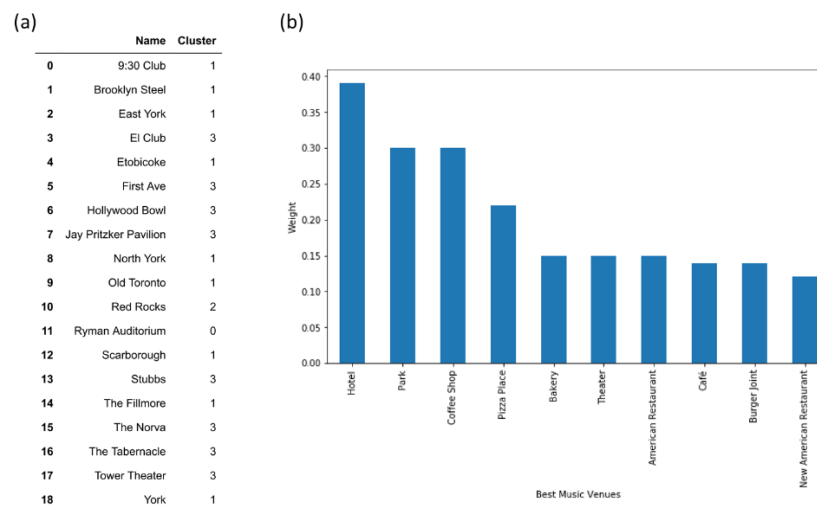


Figure 5. (a) Cluster analysis of the best live music venues and areas of Toronto. (b) Top ten feature venue in the neighborhood of cluster 1 reported in (a).

## **5. Conclusion**

From analyzing the venues surrounding the world-class live music venues, the types of surrounding venues that are keys to the success of a live music venue is concluded to be Lodge (Hotel), Drinks(Coffee, beer), Relaxation (Park), and Food (Restaurant). Two main styles of live music venues are identified: Urban and Rural styles; the surrounding feature venues in the former category mainly contain coffee shop, hotel, bar, restaurant, while park and theater are additional features in the latter category. All Old Toronto, East York, Etobicoke, North York, Scarborough, and York are suitable to build the live music venue, and style in-between rural and urban should be considered. 9:30 Club and Brooklyn Steel can be the models for the stakeholder and the officers for a successful development.