Monday, July 20, 2020

Recognizing the Top Starbucks in St. Louis

A Coursera Capstone Proposed Project - Applied Data Science Capstone

My vision for applying Foursquare data to a real business need …..

Starbucks and Foursquare have teamed up in major metropolitan areas to recognize the Top Starbucks stores by customer ratings.

Description of the problem:

- CFO Patrick Grismer said COVID-19's estimated impact on Starbucks' revenue to date, due to temporary closures, restricted sales channels, shortened operating hours, and "severely reduced customer traffic," has been about $915 million.

Background

- Well on its way in reopening stores and working to recover its business, Starbucks today introduced a summer-inspired menu and began a multi-faceted advertising campaign designed to help customers find a store near them, check store hours, order ahead and use contactless payment. May 21, 2020

- **Foursquare is ideally situated to assist Starbucks in bringing customers & stores together. While Starbucks has a very capable app of its own to allow loyal customers to order ahead and prepay at their favorite locations, Foursquare can bring in new customers by making valuable recommendations.**
- In a clever and very visible first step down this marketing path, designed to build support of store employees, Foursquare will identify the Top 12 Starbucks in large metropolitan areas. They will be using their Places API - Search Recommendations and Venue Details endpoint. Representatives of both companies will go to the top stores (aided by the Foursquare app's map of course) and present an award plaque to be prominently displayed. Recognize the valuable Baristas and Managers that make satisfied customers and reinforce the message to all employees at all stores that they are the ones responsible for making the loyal Starbucks customers who take time to give a 'Liked' feedback on Foursquare.
- According to Foursquare - "Dozens of signals go into our venue ratings, but the most important ones are generated by our users. Our strongest signals include explicit feedback, quick tips, and verified check-ins. We also use passive location data generated by our flagship apps, Foursquare City Guide and Foursquare Swarm, as well as through our partner data, which rely on our proprietary Pilgrim technology…..The Foursquare City Guide app encourages users to rate the places they visit. There are three ways to leave feedback: a user can say they "liked" it, a user can say they "disliked" like it, or a user can say they thought it was "okay." To date, Foursquare has collected 175 million of these explicit ratings.

Our Proposal:

Tap into this valuable data using Foursquare's Developer Resources:

"The Places API offers real-time access to Foursquare's global database of rich venue data and user content …"

- The Beta test for this project will be in the St. Louis MO metropolitan area. I am familiar with most of the locations and can validate the results.

- The next test will be the huge Toronto CA market to see if the methods used here will scale to a city the size of Toronto.
- **There will also be a friendly competition between cities to see which has the larger percentage of stores in the recommended list of all coffee venues and which has the highest customer rating for those top locations.**

Specifics on data usage:

The Foursquare Developer API Endpoints: venues/search, search/recommendations & Premium Endpoint venues/details will used to search for all coffee venues based on latitude and longitude GPS coordinates, get recommendations for coffee venues also using latitude and longitude and then looking at a specific location's customer ratings using their unique Foursquare ID.

Since this is a proposal without a budget for higher tier services, we will be using multiple search/recommendations to cover an entire metropolitan area, filtering out the top group of those recommendations and then running the Premium Endpoint venues/details to find the highest customer rated stores.

How looking at the data solves a problem:

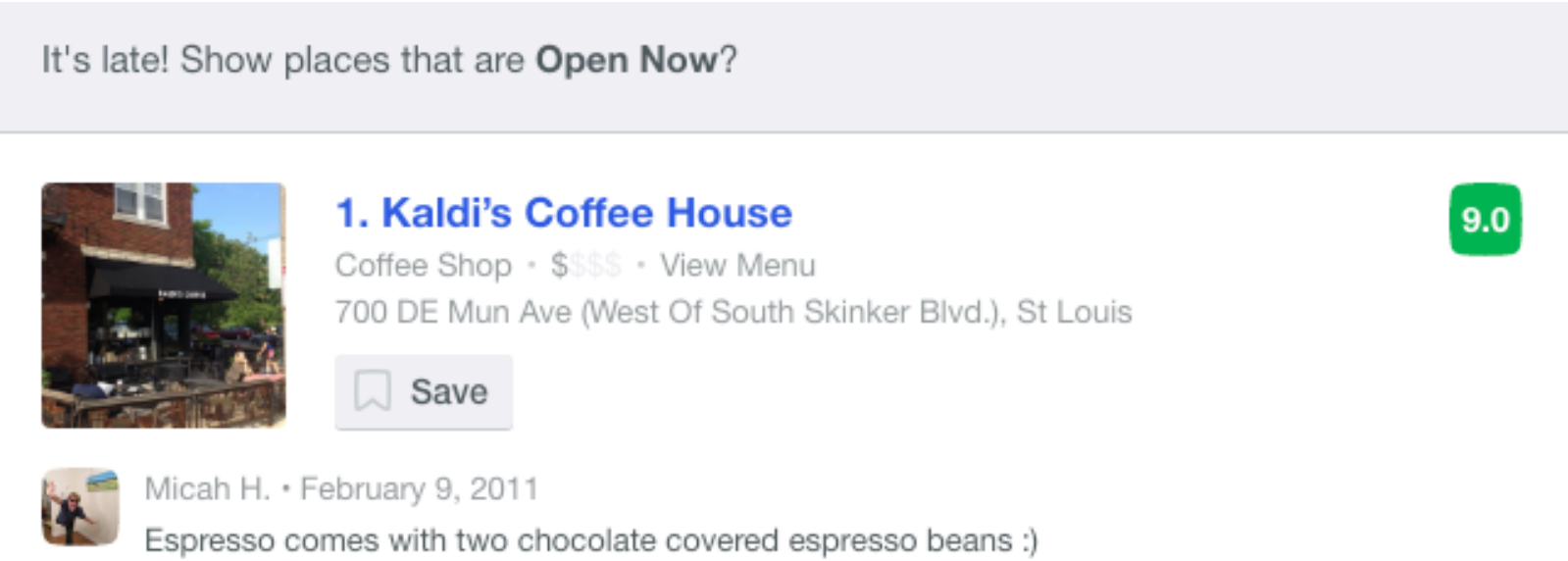
Foursquare data on Customer Ratings can validate the actions by individual store management and baristas to achieve higher customer satisfaction. Their efforts are noticed, rewarded and become visible to all levels of management and then become best practices for neighboring stores and regions, building better ratings. Higher Customer Ratings for more stores makes those Starbucks stores appear in the Foursquare City Guide App recommendations when a new customer is searching for a coffee venue. A new customer "likes" their Starbucks choice and the loyal customer base grows.

Methodology

Initially I experimented with using Foursquare's ***venues/explore*** endpoint with ***section*** parameter set to '***topPicks***'. I found that ***topPicks*** results depend on time of day and if the venue is still open. This can be useful when searching for a venue in real time and you actually intend to visit it. It proved more of a problem though when arriving home late from work and then attempting to complete homework using data that would change as you worked.

To see what kind of ratings data was possible I visited their site" https://foursquare.com/city-guide

There is a rating displayed for each venue and they are listed in rating order. Here the number one venue has a customer rating of 9.0, which when hovering over the green rating icon a tool tip appears explaining this is 9 likes out of 10.



FOURSQUARE CITY GUIDE | I'm looking for... | Current Map View | Mark

Suggestions for **Coffee** near **The Hill, St Louis**

Filters: Specials | Haven't Been | Following | Price | Open Now | Saved | Liked

It's late! Show places that are **Open Now**?

9.0/10 - People like this place

1. Kaldi's Coffee House 9.0

Coffee Shop · $$$ · View Menu

700 DE Mun Ave (West Of South Skinker Blvd.), St Louis

Save

Micah H. • February 9, 2011

Espresso comes with two chocolate covered espresso beans :)

2. SweetArt 8.7

Café · $$$

2203 S 39th St (Flad Avenue), St Louis

Save

★ Most people that write tips here are raving about the **cupcakes**, **vegan food**, and **quiches**

3. Rise Coffeehouse 8.6

Coffee Shop · $$$ · View Menu

4180 Manchester Ave, St Louis

Save

Robin A. • May 6, 2019

Iced Mocha and blueberry scone were delicious.

4. Fiddlehead Fern Cafe 8.5

Draw

Kaldi's Coffee House
700 DE Mun Ave (West Of South Skinker Blvd.)

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My next step to gather ratings data with the API was using Foursquare's new ***search/recommendations*** endpoint. Using the ***intent*** parameter, One of: food, breakfast, brunch, lunch, ***coffee***, dinner, dessert, drinks, shopping, fun, sights is specified the top-level "intent" for a search.

I noticed that what was the number one venue on City Guide is now number 14 in my ***search/recommendations*** with ***intent.***

```
recommended_coffee_StL.head(20)
```

	id	name	categories	address	lat	lng
0	528d4d9a498e2afb49371f35	Park Avenue Coffee	Coffee Shop	5105 Columbia Ave	38.610811	-90.272584
1	4b53639af964a520539a27e3	World's Fair Donuts	Donut Shop	1904 S Vandeventer Ave	38.616782	-90.261832
2	59fddb1cee712077f2be7035	Fiddlehead Fern Cafe	Café	NaN	38.614390	-90.250742
3	523db9ae11d26840aed119ac	Rise Coffeehouse	Coffee Shop	4180 Manchester Ave	38.627378	-90.253390
4	5148a464e4b06d5da8c492c6	Russell's on Macklind	Café	5400 Murdoch Ave	38.586823	-90.284382
5	4acbc3faf964a520dac520e3	SweetArt	Café	2203 S 39th St	38.611688	-90.245939
6	4adbfa8bf964a520372b21e3	The London Tea Room	Tea Room	3128 Morganford Rd	38.603617	-90.261169
7	502ea937d63ec9ac23368b4a	Comet Coffee	Coffee Shop	5708 Oakland Ave	38.630144	-90.281997
8	55a51b9a498e2b2b986ac5c2	Starbucks	Coffee Shop	2350 South Grand Ave	38.608347	-90.240794
9	4ae473a3f964a520a99a21e3	Hartford Coffee Company	Coffee Shop	3974 Hartford St	38.602613	-90.252517
10	4ad9f235f964a5202a1c21e3	Shaw's Coffee	Coffee Shop	5147 Shaw Ave	38.618005	-90.272383
11	542031bf498e7ac7044b33a5	Kitchen House Coffee	Coffee Shop	3149 Shenandoah Ave	38.609067	-90.233717
12	4afc3c9bf964a520c32022e3	The Crave Coffee House	Coffee Shop	3500 Caroline St	38.621967	-90.235257
13	518691bf498ef45e67b24a80	Cafe Flora	Café	4344 Shaw Blvd. (inside Missouri Botanical Gar...	38.613924	-90.257314
14	4acbc3faf964a520f9c520e3	Kaldi's Coffee House	Coffee Shop	700 DE Mun Ave	38.638702	-90.307715
15	4afabad8f964a5206d1822e3	Donut Drive-In	Donut Shop	6525 Chippewa St	38.592158	-90.302796
16	4ad8c938f964a5209f1421e3	Northwest Coffee Roasting Company	Coffee Shop	4251 Laclede Ave	38.638428	-90.250794
17	4c8bf8e25e048cfa3892c8cd	Cafe Nova	Café	5611 S Kingshighway Blvd	38.579301	-90.281502
18	4ae49b3cf964a520429c21e3	Starbucks	Coffee Shop	4656 Maryland Ave	38.644480	-90.261246
19	4ade4c12f964a520c47421e3	Foundation Grounds	Coffee Shop	7298 Manchester Rd	38.613286	-90.316944

Since I am familiar with the locations, I recognized that the first 13 results were all close to the coordinates I supplied to the search even though I specified a search radius of 15 km (9.3 miles).

Looking closer at the request/response results context key gave more clues to the venue rankings:

```
'context': {'searchLocationNearYou': True,
   'searchLocationMapBounds': False,
   'searchLocationType': ‘NearYou',
```

I ran a new ***/search/recommendations*** using the latitude & longitude for my favorite Starbucks at 7333 Lindbergh, latitude = 38.506838 longitude = -90.326656, which is 10 miles south of my first search. My Starbucks is now number one in the results and Kaldi’s on De Mun has moved down to the 22 spot.

	id	name	categories	address	lat	lng
0	5362b1ef498ecbc46d106438	Starbucks	Coffee Shop	7333 Lindbergh	38.506776	-90.326607
1	4ae21ecbf964a520eb8a21e3	Krispy Kreme Doughnuts	Donut Shop	6935 S Lindbergh Blvd	38.510409	-90.332878
2	4af45b95f964a520a5f121e3	Starbucks	Coffee Shop	12460 Tesson Ferry Rd	38.508217	-90.375396
3	4c07ad9db4aa0f4701f06562	Donut Stop	Donut Shop	1101 Lemay Ferry Rd	38.533978	-90.286946
4	5148a464e4b06d5da8c492c6	Russell's on Macklind	Café	5400 Murdoch Ave	38.586823	-90.284382
5	4dbaf4fb4b222080d36b8903	Miss Sheri's Cafeteria	Café	5406 Southfield Ctr	38.526487	-90.360352
6	529cdedc11d27ffeb9efd34e	Starbucks	Coffee Shop	4250 Rusty Rd	38.508043	-90.338967
7	4c8bf8e25e048cfa3892c8cd	Cafe Nova	Café	5611 S Kingshighway Blvd	38.579301	-90.281502
8	4b2426f1f964a5204a6224e3	Starbucks	Coffee Shop	53K S County Center Way	38.506681	-90.331441
9	4afabad8f964a5206d1822e3	Donut Drive-In	Donut Shop	6525 Chippewa St	38.592158	-90.302796
10	4ef9f1ff93ad7cf2ec969baa	Sump Coffee	Coffee Shop	3700 S Jefferson Ave	38.587852	-90.226506
11	4afda37af964a520612922e3	Russell's Cafe & Bakery	Café	952 Brookwood Ctr	38.522560	-90.472566
12	4ade4c12f964a520c47421e3	Foundation Grounds	Coffee Shop	7298 Manchester Rd	38.613286	-90.316944
13	4ae35291f964a5206a9321e3	Kaldi's Coffee House	Coffee Shop	120 S Kirkwood Rd	38.580241	-90.406025
14	4acbc3faf964a520d7c520e3	The Mud House	Coffee Shop	2101 Cherokee St	38.592977	-90.222131
15	528d4d9a498e2afb49371f35	Park Avenue Coffee	Coffee Shop	5105 Columbia Ave	38.610811	-90.272584
16	4adbfa8bf964a520372b21e3	The London Tea Room	Tea Room	3128 Morganford Rd	38.603617	-90.261169
17	542031bf498e7ac7044b33a5	Kitchen House Coffee	Coffee Shop	3149 Shenandoah Ave	38.609067	-90.233717
18	4ae473a3f964a520a99a21e3	Hartford Coffee Company	Coffee Shop	3974 Hartford St	38.602613	-90.252517
19	4acbc3faf964a520dac520e3	SweetArt	Café	2203 S 39th St	38.611688	-90.245939
20	4d61935eb6b9a1cd54e98851	Shameless Grounds	Café	1901 Withnell Ave	38.595297	-90.218172
21	50e998107ab49c2823fb8867	Strange Donuts	Donut Shop	2709 Sutton Blvd	38.612153	-90.319870
22	4acbc3faf964a520f9c520e3	Kaldi's Coffee House	Coffee Shop	700 DE Mun Ave	38.638702	-90.307715
23	4b53639af964a520539a27e3	World's Fair Donuts	Donut Shop	1904 S Vandeventer Ave	38.616782	-90.261832

Distance is clearly a major factor in the results order and '***venue.location.distance'*** is specified in the results.

But, customer rating is still a key component of the results algorithm. Here you can see #22 Kaldi's is higher in the results than #26 Gelateria Del Leone which is actually 2 km closer to our search coordinates.

	displayType	id	venue.id	venue.name	venue.location.address	venue.location.crossStreet	venue.location.lat	venue.location.lng	venue.location.labeledLatLngs	venue.location.distance	...
0	venue	5f1118d514ca69310cb98dd1	5362b1ef498ecbc46d106438	Starbucks	7333 Lindbergh	Lemay Ferry	38.506776	-90.326607	[{'label': 'display', 'lat': 38.50677618798911...	8	...
20	venue	5f1118d514ca69310cb98de5	4d61935eb6b9a1cd54e98851	Shameless Grounds	1901 Withnell Ave	at Lemp	38.595297	-90.218172	[{'label': 'display', 'lat': 38.59529716198955...	13644	...
21	venue	5f1118d514ca69310cb98de6	50e998107ab49c2823fb8867	Strange Donuts	2709 Sutton Blvd	Manchester & Sutton	38.612153	-90.319870	[{'label': 'display', 'lat': 38.61215285309789...	11738	...
22	venue	5f1118d514ca69310cb98de7	4acbc3faf964a520f9c520e3	Kaldi's Coffee House	700 DE Mun Ave	West Of South Skinker Blvd.	38.638702	-90.307715	[{'label': 'display', 'lat': 38.63870184380965...	14771	...
23	venue	5f1118d514ca69310cb98de8	4b53639af964a520539a27e3	World's Fair Donuts	1904 S Vandeventer Ave	at Castleman Ave	38.616782	-90.261832	[{'label': 'display', 'lat': 38.61678217870263...	13476	...
24	venue	5f1118d514ca69310cb98de9	5890e30cf68d8d72685f6938	Teatopia	2606 Cherokee St	Texas	38.593170	-90.225891	[{'label': 'display', 'lat': 38.59317016601562...	13012	...
25	venue	5f1118d514ca69310cb98dea	59fddb1cee712077f2be7035	Fiddlehead Fern Cafe	NaN	NaN	38.614390	-90.250742	[{'label': 'display', 'lat': 38.61439002147868...	13675	...
26	venue	5f1118d514ca69310cb98deb	4ada6d30f964a5207f2221e3	Gelateria Del Leone	3197 S Grand Blvd	at Wyoming St.	38.599378	-90.242850	[{'label': 'display', 'lat': 38.59937803794692...	12623	...

The ***search/recommendations*** endpoint will be my primary tool to get a list of highly rated Starbucks stores but I will have to do this in multiple searches instead of one big radius search.

The ***search/recommendations*** endpoint also has customer tips if you wish to dive into the results.

```
results = requests.get(url).json()

results[‘response']['group']['results'][3]['snippets']
```


```
{'count': 1,
 'items': [{'detail': {'type': 'tip',
    'object': {'id': '5d320402429bfc0025aa5772',
     'createdAt': 1563558914,
     'text': 'This store has quite a bit of seating available! The staff is really friendly as well. I ordered a cold brew with sweet cream and it was delicious 😋',
     'type': 'user',
     'canonicalUrl': 'https://foursquare.com/item/5d320402429bfc0025aa5772',
     'logView': True,
     'agreeCount': 0,
     'disagreeCount': 0,
     'todo': {'count': 0},
     'user': {'id': '429045119',
      'firstName': 'Michael',
      'lastName': 'M',
      'photo': {'prefix': 'https://fastly.4sqi.net/img/user/',
```

The final tool to get accurate customer ratings will be the ***venues/details*** endpoint. The request look like this ….

GET https://api.foursquare.com/v2/venues/VENUE_ID

This is a Premium endpoint. Restrictions apply based on your account type. We will reserve this for ranking the best of the recommended list of Starbucks locations.

An example request:

Starbucks at Lindbergh & Lemay Ferry has a Foursquare unique ***venue.id*** of **5362b1ef498ecbc46d106438**.

url = 'https://api.foursquare.com/v2/venues/**5362b1ef498ecbc46d106438**?&client_id={}&client_secret={}&v={}'.format(

CLIENT_ID,

CLIENT_SECRET,

VERSION)

url # display URL

… and the response showing a very high rating of 8.8:

```
'likes': {'count': 59,
    'groups': [{'type': 'others', 'count': 59, 'items': []}],
    'summary': '59 Likes'},
   'dislike': False,
    'ok': False,
   'rating': 8.8,
```

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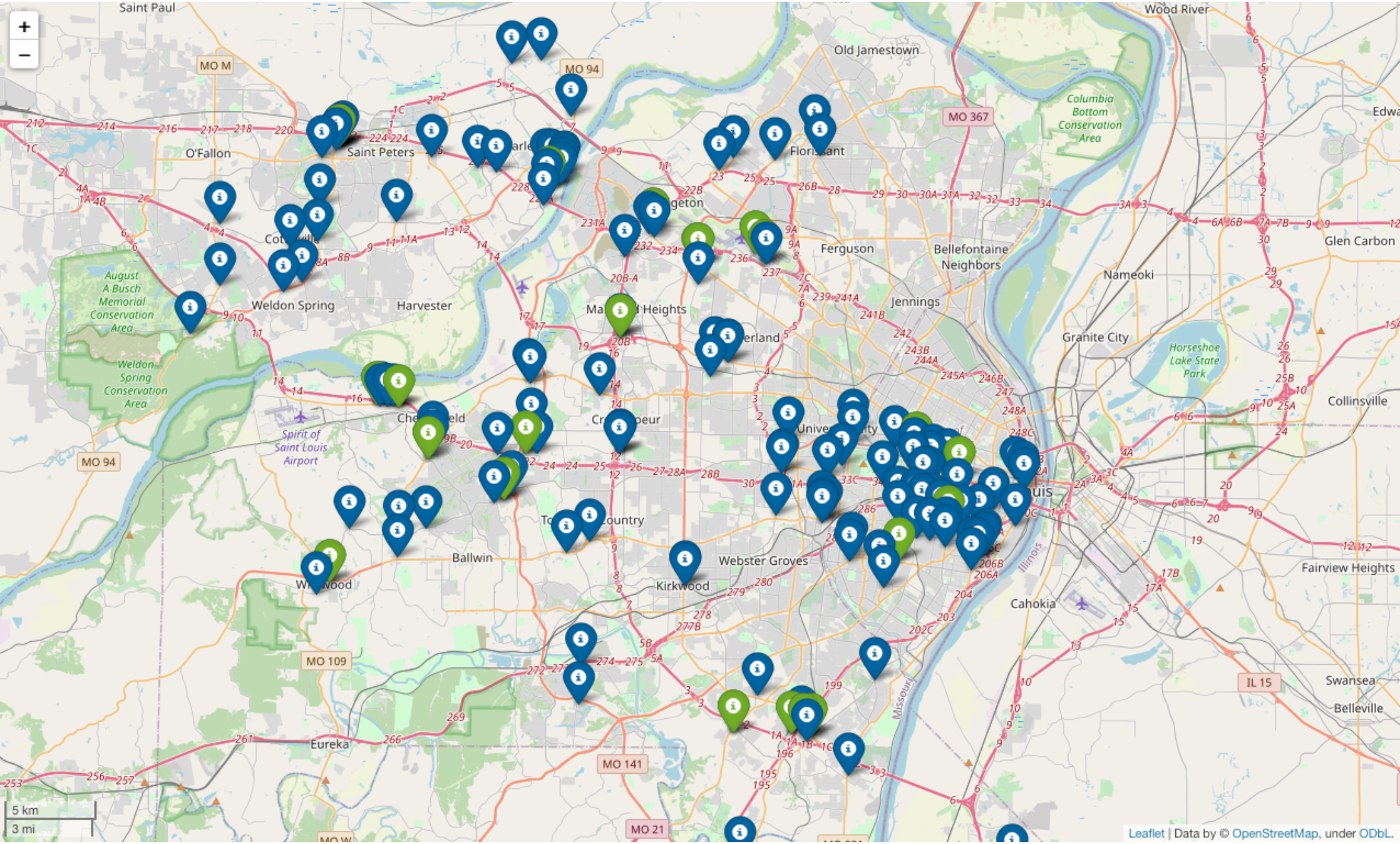

After running ***search/recommendations*** with ***intent = 'coffee'*** for 4 coordinates around the St. Louis metropolitan area and then dropping duplicates here are the results on a map with the Starbucks locations in Green.

There are 22 Starbucks stores that are recommended out of all 153 recommended coffee venues which is 14%

Find All Starbucks around St Louis MO

It is useful to find all of the Starbucks in a city.

The ***venues/search*** endpoint can be used with parameter ***query = 'Starbucks'*** and ***limit = 50*** at 4 different coordinates around the city to gather all of the Starbucks locations into a dataframe.

The df.drop_duplicates(subset='id', ignore_index=True) method is run to remove duplicates due to the radius overlapping in the 4 searches.

I found that there are 111 Starbucks locations.

Find Starbucks that are not only recommended, but highly rated.

The ***search/recommendations*** endpoint in my function:

starbucks_rating, recommended_starbucks = getRecommended(latitudes=centers[:, 0], longitudes=centers[:, 1])

…will initially KEEP only rows that are duplicated, meaning recommended Starbucks appearing farther away, near edges of one search radius, so it is appearing lower in that one search results list, will appear higher in results when the search is repeated at coordinates that it is closer to.

A store that after multiple search coordinates, only made it on one recommended list, made it because it was very close to that one set of search coordinates but didn't have high enough customer ratings for it to appear in a search with coordinates more distant.

After single entries (low ratings) are removed, we are left with a list of the most highly rated stores, but may also have 2 or 3 entries due to the 4 searches. The last step is to remove the duplicates of these top rated stores. We will be left with a unique list of the highly rated stores.

For each of the highly rated Starbucks, get venues/details which includes the actual number rating

Add a ‘rating’ column to our Starbucks data frame and store the actual rating for each of the top 28 locations.

Sort the data frame by highest rating.

Store the Top12 in a new data frame.

	id	name	categories	address	lat	lng	rating
7	4b566e45f964a520151028e3	Starbucks	Coffee Shop	922 South Meramec Station Rd.,	38.536537	-90.496540	8.9
11	55a51b9a498e2b2b986ac5c2	Starbucks	Coffee Shop	2350 South Grand Ave	38.608347	-90.240794	8.8
20	5362b1ef498ecbc46d106438	Starbucks	Coffee Shop	7333 Lindbergh	38.506776	-90.326607	8.8
10	4af713c1f964a5208d0522e3	Starbucks	Coffee Shop	9590 Watson Rd	38.556990	-90.381181	8.5
2	54bc2971498e3e13bd3946b5	Starbucks	Coffee Shop	7036 Clayton Ave	38.633045	-90.306122	8.5
5	4af82696f964a520290b22e3	Starbucks	Coffee Shop	343 S Kirkwood Rd	38.577435	-90.406850	8.5
8	4ae49b3cf964a520429c21e3	Starbucks	Coffee Shop	4656 Maryland Ave	38.644480	-90.261246	8.4
14	4af2ca77f964a52084e821e3	Starbucks	Coffee Shop	14128 Manchester Rd	38.593239	-90.497492	8.4
4	4be1809b8e2962b520589b0a	Starbucks	Coffee Shop	9616 Manchester Road	38.608397	-90.367306	8.3
12	4adb6c88f964a5204f2721e3	Starbucks	Coffee Shop	14900 Manchester Rd	38.592656	-90.543162	8.3
17	4adf0db3f964a5204a7721e3	Starbucks	Coffee Shop	1030 S 5th St	38.773824	-90.490665	8.3
19	4ae9809ef964a520f2b421e3	Starbucks	Coffee Shop	699 Gravois Bluffs Blvd	38.507950	-90.442790	8.3
6	4adb70f4f964a520822721e3	Starbucks	Coffee Shop	2300 S Brentwood Blvd	38.619538	-90.348211	8.2
22	55e1c55b498e967647b98c27	Starbucks	Coffee Shop	10015 Gravois Road	38.551113	-90.333694	8.2
21	4af45b95f964a520a5f121e3	Starbucks	Coffee Shop	12460 Tesson Ferry Rd	38.508217	-90.375396	8.2
24	4afeb7c4f964a5200a3022e3	Starbucks	Coffee Shop	3700 S Kingshighway Blvd	38.592558	-90.272176	8.1
13	4b2d109ef964a52076cd24e3	Starbucks	Coffee Shop	6187 Mid Rivers Mall Dr	38.742573	-90.634930	8.1
1	4bb79a3cb35776b041dbc701	Starbucks	Coffee Shop	11464 Olive Blvd	38.671368	-90.435840	8.1
15	4b3a3b5ff964a520a96225e3	Starbucks	Coffee Shop	4581 Highway K	38.719202	-90.702113	8.1
23	4af9f1a7f964a520771522e3	Starbucks	Coffee Shop	1042 Loughborough Ave Ste A	38.557545	-90.262024	8
0	584ff98a0aac75044472aaad	Starbucks	Coffee Shop	11538 Page Service Dr	38.699668	-90.421316	8
18	4b2d23a3f964a52048cf24e3	Starbucks	Coffee Shop	7098 Mexico Rd	38.788819	-90.625550	8
16	4ae05ce0f964a520d57e21e3	Starbucks	Coffee Shop	13448 Clayton Rd	38.626513	-90.481608	8
3	4ae632a9f964a52084a521e3	Starbucks	Coffee Shop	1500 S Lindbergh Blvd	38.632549	-90.404777	8
9	4af207d0f964a52052e521e3	Starbucks	Coffee Shop	2 N Central Ave	38.650432	-90.338015	7.9
25	4afd6d11f964a520bd2722e3	Starbucks	Coffee Shop	6622 Chippewa St	38.590708	-90.305082	7.9
27	4b313eb2f964a5200e0325e3	Starbucks	Coffee Shop	80 W County Ctr	38.599907	-90.447300	7.9
26	4af9e6fdf964a520211522e3	Starbucks	Coffee Shop	1 S Old Orchard Ave	38.590803	-90.339254	7.7

St. Louis MO Results

Find the Mean Rating for these top 12 Starbucks

	id	name	categories	address	lat	lng	rating
7	4b566e45f964a520151028e3	Starbucks	Coffee Shop	922 South Meramec Station Rd.,	38.536537	-90.496540	8.9
11	55a51b9a498e2b2b986ac5c2	Starbucks	Coffee Shop	2350 South Grand Ave	38.608347	-90.240794	8.8
20	5362b1ef498ecbc46d106438	Starbucks	Coffee Shop	7333 Lindbergh	38.506776	-90.326607	8.8
10	4af713c1f964a5208d0522e3	Starbucks	Coffee Shop	9590 Watson Rd	38.556990	-90.381181	8.5
2	54bc2971498e3e13bd3946b5	Starbucks	Coffee Shop	7036 Clayton Ave	38.633045	-90.306122	8.5
5	4af82696f964a520290b22e3	Starbucks	Coffee Shop	343 S Kirkwood Rd	38.577435	-90.406850	8.5
8	4ae49b3cf964a520429c21e3	Starbucks	Coffee Shop	4656 Maryland Ave	38.644480	-90.261246	8.4
14	4af2ca77f964a52084e821e3	Starbucks	Coffee Shop	14128 Manchester Rd	38.593239	-90.497492	8.4
4	4be1809b8e2962b520589b0a	Starbucks	Coffee Shop	9616 Manchester Road	38.608397	-90.367306	8.3
12	4adb6c88f964a5204f2721e3	Starbucks	Coffee Shop	14900 Manchester Rd	38.592656	-90.543162	8.3
17	4adf0db3f964a5204a7721e3	Starbucks	Coffee Shop	1030 S 5th St	38.773824	-90.490665	8.3
19	4ae9809ef964a520f2b421e3	Starbucks	Coffee Shop	699 Gravois Bluffs Blvd	38.507950	-90.442790	8.3

```
starbucks_Top_12_ratings.rating.mean()
```

8.499999999999998

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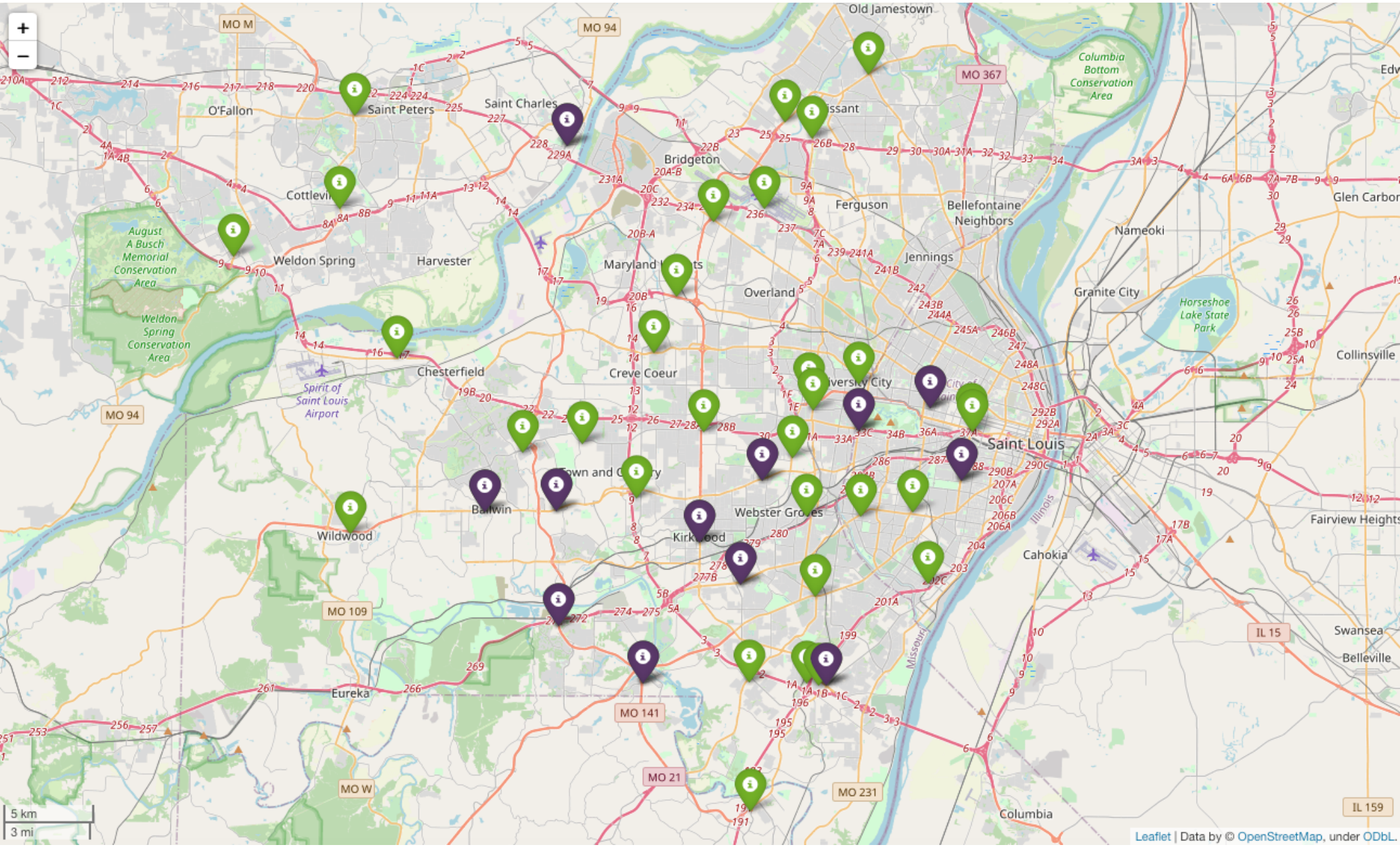

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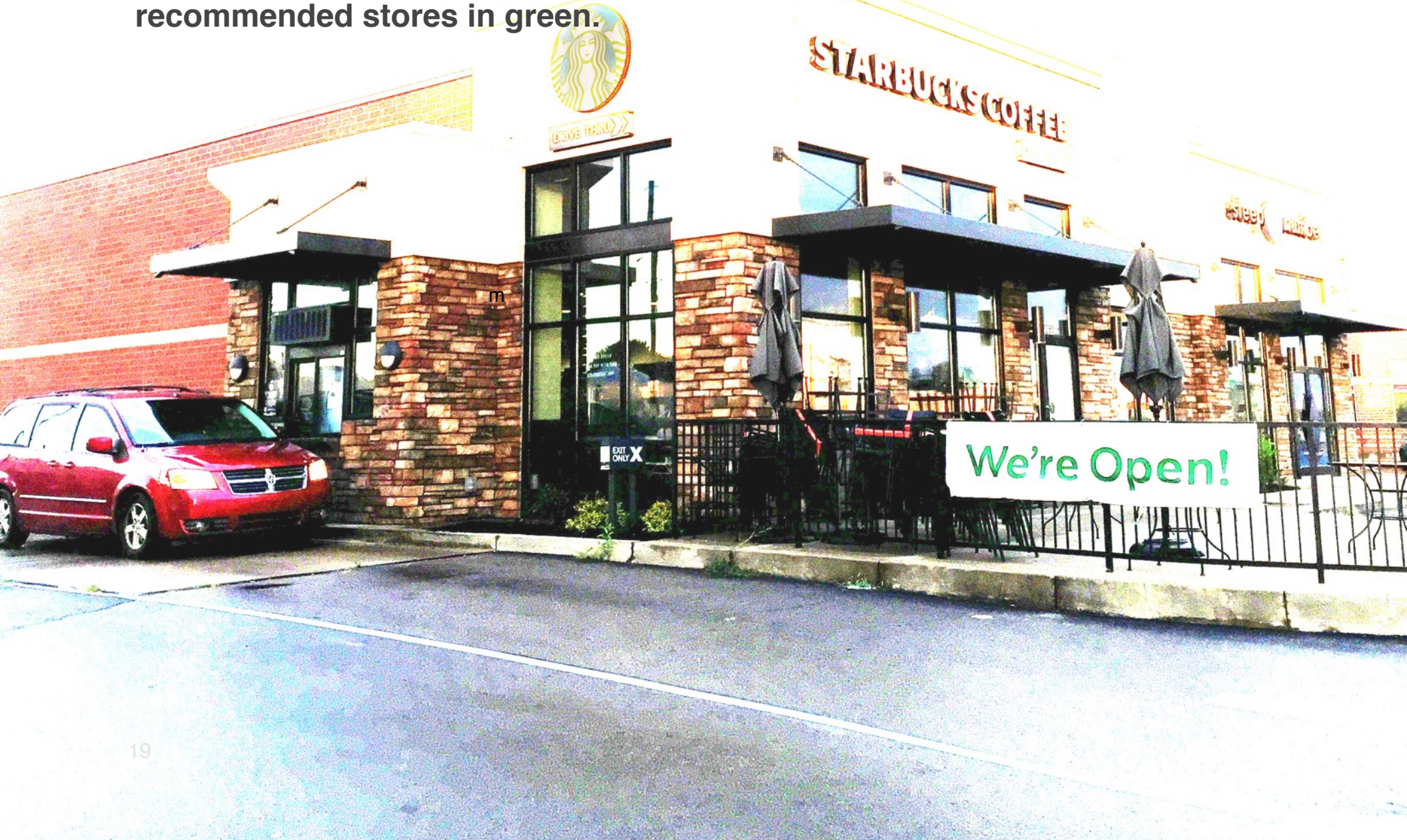
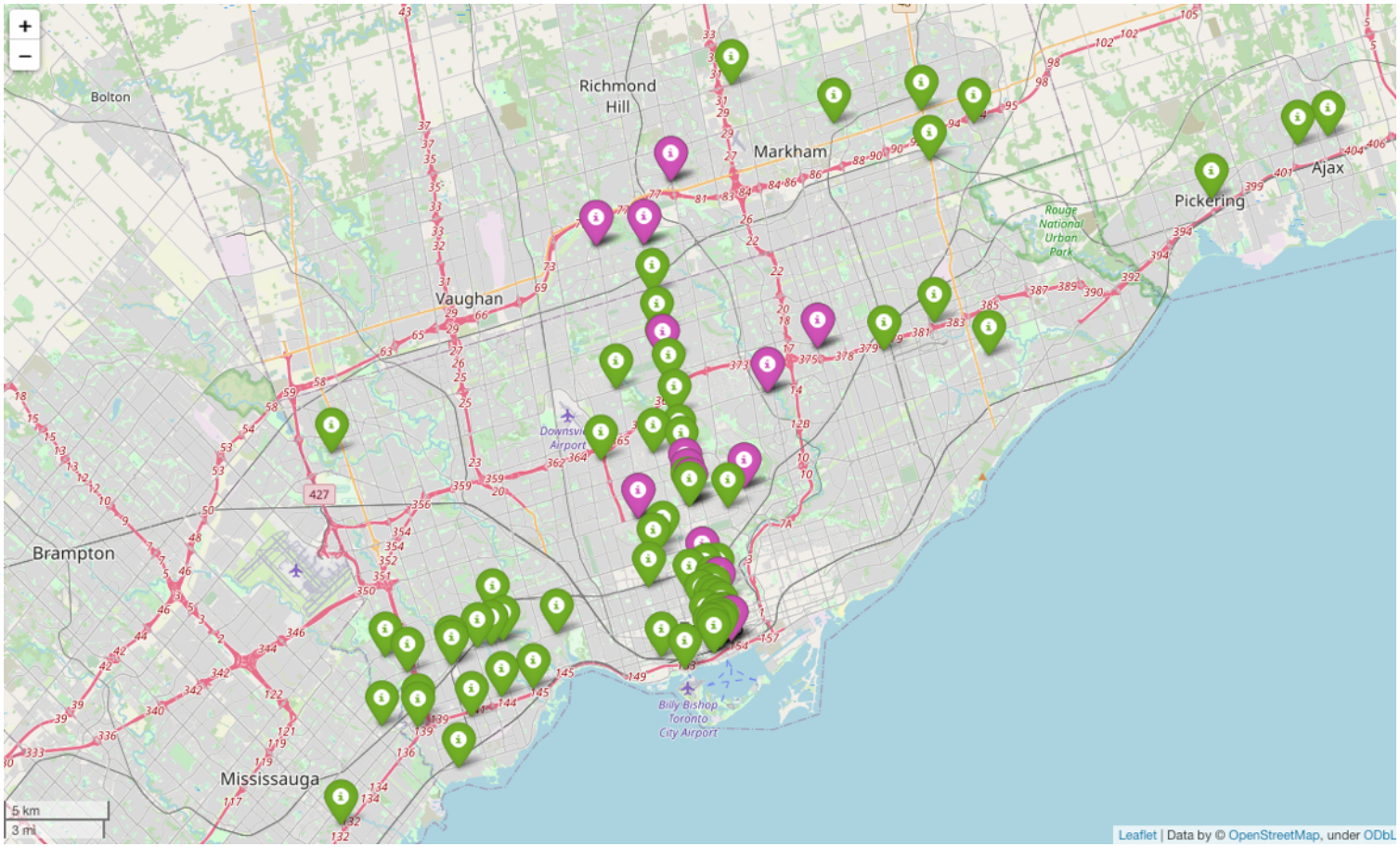
Map the Top 12 Highest Rated Starbucks Stores in the St. Louis MO Metropolitan Area shown in purple with the remainder of the recommended stores in green.



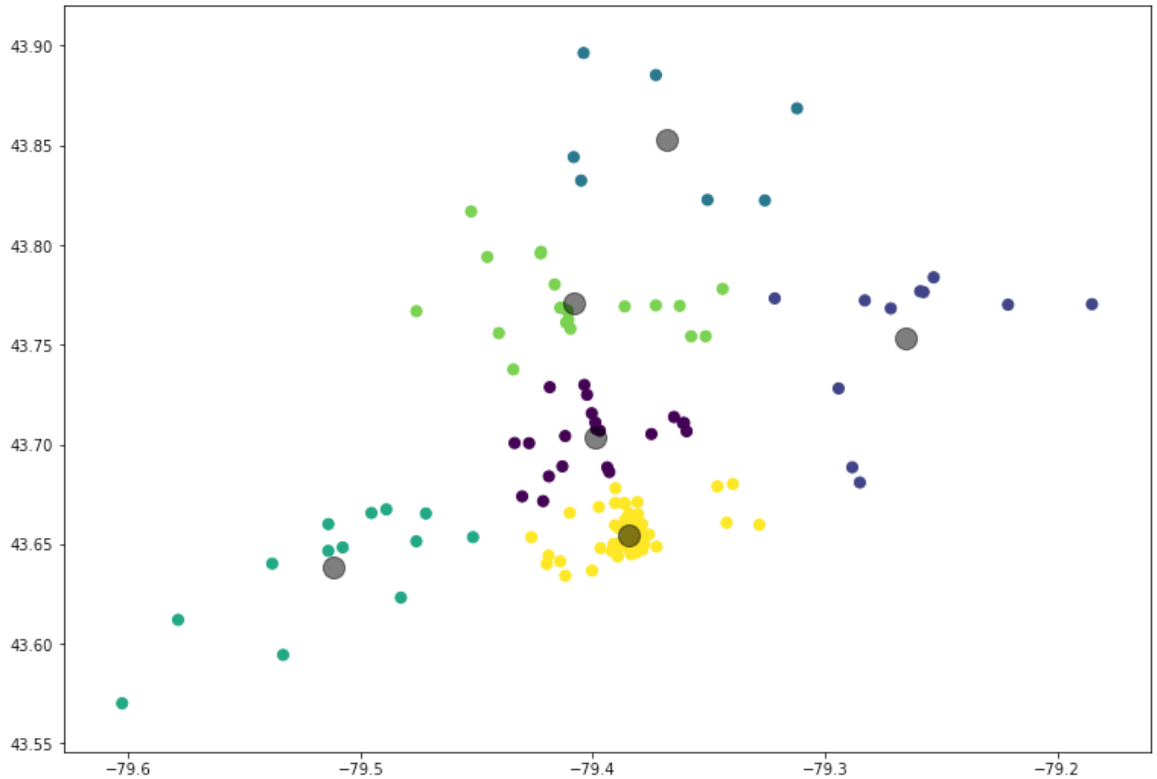
Find the Top Rated Starbucks in Toronto

When the St. Louis method of using 4 large radius circles was used for the ***search/recommendations*** *in the Toronto metropolitan area, missed were the highest rated Starbucks locations in less dense areas, outside of the downtown area.*

When the Foursquare search finds plenty of recommendations close to the search coordinates it will not go out to the edges of the radius to look at locations with higher customer ratings.



Toronto has clusters of venues so I decided a better approach for finding the best recommendations would be to run the K-Means algorithm to cluster the Starbucks stores by their geographic coordinates. The cluster centers could then be used as the search coordinates for Foursquare. The radius would only be large enough to allow the clusters to provide complete coverage of the Toronto metropolitan area. There will now be minimal overlap but the few duplicates will have to be deleted from the final data frame.



Use K-Means Cluster Centers as new coordinates for Starbucks recommended locations search.

For the Toronto function to get recommended Starbucks I changed the search radius from 35km to 15km; Limit changed from 25 to 7 results for a coordinate and increase search coordinates to 6.

This keeps the distance from search coordinates a major factor in results found and limits results to the few very best matches for a coordinate.¶

Increase coordinates (Cluster Centers) to improve coverage. The Toronto area is rectangular so there needs to be plenty of smaller circular search areas to provide complete coverage without extending much beyond the actual toronto area. Duplicates from overlapping search circles are removed.

The new function:

```
def getRecommendedK(latitudes, longitudes, radius = 15000, query = 'Starbucks', LIMIT =
7):


# K-Means Cluster Centers

print(centers)
[[ 43.7033298  -79.39925157]
 [ 43.75347165 -79.26539844]
 [ 43.85302029 -79.36836471]
 [ 43.63831453 -79.51188786]
 [ 43.77103916 -79.40794771]
 [ 43.65442317 -79.38426413]]
```

Call getRecommendedK with the K-Means cluster centers as search coordinates :

```
toronto_recommended = getRecommendedK(latitudes=centers[:, 0], longitudes=centers[:, 1])
```

Toronto's 34 Recommended Starbucks using 6 search coordinates

Toronto Results

For each Starbucks id listed, get Venue / Details which includes rating.

This is a Premium endpoint. Restrictions apply based on your account type. The Foursquare API has a limit of 950 Regular API Calls per day and 50 Premium API Calls per day.

	id	name	categories	address	lat	lng	rating
18	55fd4770498e7a8fbc9082fe	Starbucks	Coffee Shop	829 The Queensway	43.624654	-79.508217	8.9
26	4e85e67d9a523c072086c589	Starbucks	Coffee Shop	170 Rimrock Road, Unit 3	43.758597	-79.466252	8.5
8	5a8743ed1543c734d2840194	Starbucks Reserve Bar	Coffee Shop	1090 Don Mills Rd	43.735764	-79.344156	8.5
12	567f320d498e414f8a8a40ac	Starbucks	Coffee Shop	6355 Yonge St	43.796409	-79.419653	8.5
0	4aec6b7df964a520e0c621e3	Starbucks	Coffee Shop	2451 Yonge St N	43.711039	-79.398924	8.4
19	551486ff498ee91ac6d40f43	Starbucks	Coffee Shop	150 Park Lawn Rd, Unit A	43.627931	-79.489286	8.4
21	4fe0a850e4b0c602e5be4414	Starbucks	Coffee Shop	25 The West Mall, 1606	43.611693	-79.557183	8.2
11	4be499ba8a8cb713cd4cc4a0	Starbucks	Coffee Shop	201 Main Street	43.868473	-79.312043	8.1
23	52abc3b011d279cc571a9e77	Starbucks	Coffee Shop	3559 Lake Shore Blvd W	43.594427	-79.533384	8.1
4	4ad8888ff964a520141221e3	Starbucks	Coffee Shop	485 Church St	43.664980	-79.380510	8.1
1	4ad9c161f964a520a11a21e3	Starbucks	Coffee Shop	39 Eglinton Ave E	43.706859	-79.396950	8
17	4c3c7eba86ce328f2ccbab2d	Starbucks	Coffee Shop	8010 Bathurst St, Building C, Unit 6	43.816777	-79.452391	8
20	505b5b7be4b0b951796f99f7	Starbucks	Coffee Shop	5251 Dundas St W	43.638135	-79.537814	7.9
25	4aedfeadf964a52005d121e3	Starbucks	Coffee Shop	5140 Yonge St	43.768353	-79.413046	7.9
2	4ae52541f964a5206aa021e3	Starbucks	Coffee Shop	1088 Yonge St	43.678020	-79.390240	7.9

Sort the 34 ratings results and save the top 12.

toronto_top12.rating.mean() 8.308

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Toronto's Top 12 Highest Rated Starbucks in Purple with the remainder of the 34 highest recommended in Green

Get all recommended coffee venues

```
intent = 'coffee'
recommended_coffee_t = getRecommendedIntent(intent, latitudes=centers[:, 0],
longitudes=centers[:, 1])
```

172 Recommended Coffee Venues found, 16 of these are Starbucks.

172 Recommended Coffee Venues in Toronto / 16 Starbucks = 9%

Combined Results comparing both cities

Which City gets the Highest Average Rating for its Top 12 Starbucks Locations?

StLouis_Starbucks_Top_12.rating.mean()	**8.499**
toronto_top12.rating.mean()	8.308

Which City has more stores on the Recommended list for all coffee venues?

```
Percentage of Starbucks in St. Louis on the Recommended list:  14.379
Percentage of Starbucks in Toronto on the Recommended list:  9.302
```

STARBUCKS COFFEE
DRIVE THRU
7333

LINDBERGH COMMONS
sleep number
WEST
50
PENN STATION

STARBUCKS COFFEE
DRIVE THRU

NOW
OPEN

STARBUCKS COFFEE
DRIVE THRU
We're Open!

Discussion

If budget for Premium use is not an issue, the ***venues/details*** endpoint could be used on a list of all Starbucks in a city. This would reduce or eliminate the need for multiple ***search/recommendations*** endpoint use. I found it very useful though to learn the use and limitations of the various endpoints with this experimentation.

It was shown that ratings can be determined for venues of a large city while being efficient and not wasting Foursquare network resources.

Conclusion

St Louis Starbucks Wins with 14 % of their locations on the recommended list of all coffee venues !

And, St. Louis wins for having a store average rating of 8.5 for its top 12 locations !

My personal favorite Starbucks at 7333 Lindbergh is tied for number 2 spot in St. Louis and I believe it is a great example for delivering excellent customer service to bring in more customers.

	id	name	categories	address	lat	lng	rating
7	4b566e45f964a520151028e3	Starbucks	Coffee Shop	922 South Meramec Station Rd.,	38.536537	-90.496540	8.9
11	55a51b9a498e2b2b986ac5c2	Starbucks	Coffee Shop	2350 South Grand Ave	38.608347	-90.240794	8.8
20	5362b1ef498ecbc46d106438	Starbucks	Coffee Shop	7333 Lindbergh	38.506776	-90.326607	8.8
10	4af713c1f964a5208d0522e3	Starbucks	Coffee Shop	9590 Watson Rd	38.556990	-90.381181	8.5
2	54bc2971498e3e13bd3946b5	Starbucks	Coffee Shop	7036 Clayton Ave	38.633045	-90.306122	8.5
5	4af82696f964a520290b22e3	Starbucks	Coffee Shop	343 S Kirkwood Rd	38.577435	-90.406850	8.5
8	4ae49b3cf964a520429c21e3	Starbucks	Coffee Shop	4656 Maryland Ave	38.644480	-90.261246	8.4
14	4af2ca77f964a52084e821e3	Starbucks	Coffee Shop	14128 Manchester Rd	38.593239	-90.497492	8.4
4	4be1809b8e2962b520589b0a	Starbucks	Coffee Shop	9616 Manchester Road	38.608397	-90.367306	8.3
12	4adb6c88f964a5204f2721e3	Starbucks	Coffee Shop	14900 Manchester Rd	38.592656	-90.543162	8.3
17	4adf0db3f964a5204a7721e3	Starbucks	Coffee Shop	1030 S 5th St	38.773824	-90.490665	8.3
19	4ae9809ef964a520f2b421e3	Starbucks	Coffee Shop	699 Gravois Bluffs Blvd	38.507950	-90.442790	8.3