

Proyecto Capstone - La Batalla de los Vecindarios semana 4

Introducción

En este proyecto vamos a abordar geográficamente cada uno de los barrios de la ciudad de Medellín - Colombia, con el fin de determinar la mejor opción para establecer una discoteca. Utilizaremos una base de datos proporcionada por la alcaldía de Medellín, además otra herramienta es la API de Foursquare, que nos ayudara para analizar a detalle cada uno de los barrios, al realizar este análisis nos daremos cuenta de aquellos lugares cercanos y comunes a nuestra área de interés. Además, nuestro público objetivo es todo aquel interesado en emprender crenado un negocio para el comercio nocturno de la ciudad de Medellín

Problema Comercial

Este problema surge ya que uno de los efectos de la pandemia del año 2020 es la desaparición del entreteniendo nocturno en la ciudad de Medellín, por lo tanto, se busca el barrio más adecuado para emprender en este segmento del mercado. Con base en lo anterior, utilizaremos Ciencia de Datos para generar Clústeres y así saber en cual barrio de Medellín es más factible entablar una discoteca.

Datos

Para este proyecto nos basamos en la fuente de datos Barrios Medellín la cual la encontramos en la página web Geo Medellín, sitio web administrado por la Alcaldía de Medellín. En esta fuente de datos, encontraremos cada uno de los barrios de la ciudad de Medellín, juntos con otros atributos tales como tamaño del área, nombre de la comuna a la que pertenece, Id, entre otros. Posteriormente haremos limpieza de datos para dejar solo nuestros campos de interés. Como segundo recurso utilizamos la librería geopy para encontrar los valores de latitud y longitud para cada uno de los barrios. Una vez tengamos el DataFrame de los barrios de Medellín con sus respectivas coordenadas, procederemos a usar la API de Foursquare para analizar cada uno de los barrios. Con nuestro DataFrame completo con el nombre del barrio y sus respectivas coordenadas, procedemos a conectarnos con Foursquare, el cual nos ayudará a analizar cuáles son las categorías de negocios más comunes en cada uno de los barrios de la ciudad de Medellín.

Proceso

Importar Librerías

```
In [1]: import numpy as np # librería para manejar datos vectorizados

import pandas as pd # librería para análisis de datos
pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)

import json # librería para manejar archivos JSON

!conda install -c conda-forge geopy --yes # retirar el comentario de esta línea si no ha completado el laboratorio
from geopy.geocoders import Nominatim # convertir una dirección en valores de latitud y longitud

import requests # librería para manejar solicitudes
from pandas.io.json import json_normalize # librería para convertir un archivo json en un dataframe pandas

# Matplotlib y módulos asociados para graficar
import matplotlib.cm as cm
import matplotlib.colors as colors

# importar k-means desde la fase de agrupación
from sklearn.cluster import KMeans

#!conda install -c conda-forge folium=0.5.0 --yes # retirar el comentario de esta línea si no ha completado el laboratorio
import folium # librería para graficar mapas

print('Libraries imported.')
```

```
usage: conda-script.py [-h] [-V] command ...
conda-script.py: error: unrecognized arguments: # retirar el comentario de esta línea si no ha completado el laboratorio de la API de FourSquare
```

Libraries imported.

```
In [2]: #Cargar set de datos barrios de Medellín
```

```
df = pd.read_csv(r'C:\Users\jaimea.munoz\Documents\DATA SCIENCE\Curso 9 Final\BarriosMedellin.csv')
df.head()
```

```
Out[2]:
```

	OBJECTID	CODIGO	NOMBRE	SUBTIPO_BARRIOVEREDA	NOMBRE_COMUNA_CORREGIMIENTO	SHAPEAREA	SHAPELEN
0	1112	0510	Tricentenario	1	Castilla	420637.970349	2897.304229
1	1113	0208	Villa Niza	1	Santa Cruz	143215.327504	1697.303318
2	1114	1108	Laureles	1	Laureles Estadio	707014.821267	3847.112683
3	1115	1303	Santa Rosa de Lima	1	San Javier	139970.996369	2158.954261
4	1116	1206	Santa Lucía	1	La América	275913.740234	3048.703385

```
In [3]: #Borrar columnas
df = df.drop('OBJECTID',1).drop('SUBTIPO_BARRIOVEREDA',1).drop('NOMBRE_COMUNA_CORREGIMIENTO',1).drop('SHAPEAREA',1)
```

```
In [4]: df.head()
```

```
Out[4]:
```

	CODIGO	NOMBRE
0	0510	Tricentenario
1	0208	Villa Niza
2	1108	Laureles
3	1303	Santa Rosa de Lima
4	1206	Santa Lucía

```
In [5]: #Mostrar tamaño del DataFrame
df.shape
```

```
Out[5]: (332, 2)
```

Determinar coordenadas de la ciudad de Medellín

```
In [6]: for i, row in df.iterrows():
        try:
            adress = row['NOMBRE']
            geolocator = Nominatim(user_agent='Md_explorer')
            location = geolocator.geocode(adress)
            latitude = location.latitude
            longitude = location.longitude
            df.loc[i, 0] = latitude
            df.loc[i, 1] = longitude
            #print('las coordenadas de {} son {}, {}'.format(adress, latitude, longitude) )
        except:
            print(adress)

df.rename(columns={0:'Latitude',1:'Longitude'}, inplace=True)
```

Buga Patio Bonito
 Área de Expansión El Noral
 Potrera Miserenga
 Picachito
 Área de Expansión San Cristóbal
 Área de Expansión Altavista
 Área de Expansión Belén Rincón
 Cabecera Urbana Corregimiento San Cristóbal
 Área de Expansión Pajarito
 Área de Expansión San Antonio de Prado

```
In [7]: #Borrar filas con campos nulos
df.dropna(inplace=True)
df.head()
```

```
Out[7]:
```

	CODIGO	NOMBRE	Latitude	Longitude
0	0510	Tricentenario	6.291070	-75.566325
1	0208	Villa Niza	6.295645	-75.563450
2	1108	Laureles	-31.498759	-57.525990
3	1303	Santa Rosa de Lima	14.436619	-90.352043
4	1206	Santa Lucía	13.825049	-60.975036

```
In [8]: # Columna bandera
for i, row in df.iterrows():
    if row['Latitude'] > 6.1 and row['Latitude'] < 6.6:
        bandera = 1
    else:
        bandera = 0

    df.loc[i,0] = bandera
```

```
In [9]: df = df.rename(columns={0:"Bandera"})
```

```
In [10]: df = df[df["Bandera"] == 1]
df
```

Out[10]:

	CODIGO	NOMBRE	Latitude	Longitude	Bandera
0	0510	Tricentenario	6.291070	-75.566325	1.0
1	0208	Villa Niza	6.295645	-75.563450	1.0
8	0725	Nueva Villa de La Iguaná	6.259940	-75.581743	1.0
9	0905	Alejandro Echavarría	6.238770	-75.546348	1.0
11	0105	Moscú No.2	6.289982	-75.549095	1.0
12	0101	Santo Domingo Savio No.1	6.297085	-75.544310	1.0
21	1213	Calasanz Parte Alta	6.266179	-75.601820	1.0
23	0202	Playón de Los Comuneros	6.306853	-75.553086	1.0
24	1004	El Chagualo	6.262212	-75.570487	1.0
27	0916	Asomadera No.3	6.218804	-75.558343	1.0
29	1301	El Pesebre	6.272672	-75.598533	1.0
31	0409	Manrique Central No.1	6.266456	-75.557399	1.0
32	1314	Las Independencias	6.249230	-75.623701	1.0
34	0209	Moscú No.1	6.291817	-75.554244	1.0
35	0707	Bosques de San Pablo	6.278699	-75.584478	1.0
36	0807	Los Mangos	6.250971	-75.544953	1.0
37	0904	Los Cerros El Vergel	6.235076	-75.545375	1.0
42	0314	San José La Cima No.1	6.283946	-75.542636	1.0
51	0313	María Cano-Carambolas	6.282624	-75.540318	1.0
53	0706	La Pilarica	6.274423	-75.584669	1.0
57	0504	Tejelo	6.306682	-75.568986	1.0
65	1115	Cuarta Brigada	6.260868	-75.587590	1.0
68	0713	Aures No.1	6.287559	-75.593846	1.0
71	0112	Carpinelo	6.289086	-75.538924	1.0
74	1101	Carlos E. Restrepo	6.257775	-75.580938	1.0
76	1307	Juan XXIII La Quiebra	6.265648	-75.613643	1.0
79	1310	Veinte de Julio	6.252292	-75.620836	1.0
82	1407	Las Lomas No.2	6.210336	-75.556967	1.0
88	0906	Barrio Caicedo	6.243292	-75.555425	1.0
91	1102	Suramericana	6.254853	-75.583019	1.0
93	0816	Villa Turbay	6.237106	-75.530019	1.0
94	0914	Asomadera No.1	6.229427	-75.563471	1.0
95	0903	Bomboná No.2	6.229171	-75.544996	1.0
100	0611	Progreso No.2	6.307034	-75.583223	1.0
102	1210	Barrio Cristóbal	6.247790	-75.608954	1.0
104	1415	Los Balsos No.2	6.195344	-75.570364	1.0
105	1114	Los Colores	6.265774	-75.593845	1.0
109	0805	Batallón Girardot	6.259893	-75.545604	1.0
110	0813	Villatina	6.236040	-75.539546	1.0
115	0315	San José La Cima No.2	6.278571	-75.543323	1.0
117	0603	Doce de Octubre No.2	6.299772	-75.579844	1.0
118	0104	Granizal	6.292904	-75.546842	1.0

140	AUC2	San Antonio de Prado	6.223485	-75.677735	1.0
155	Inst_13	Batallón Cuarta Brigada	6.263433	-75.591926	1.0
156	1411	Los Balsos No.1	6.189269	-75.561206	1.0
157	1403	Villa Carlota	6.220299	-75.572237	1.0
158	0108	El Compromiso	6.287881	-75.543612	1.0
162	0819	Villa Lilliam	6.235378	-75.533431	1.0
169	0724	Monteclaro	6.287615	-75.600057	1.0
170	0802	La Mansión	6.259034	-75.556068	1.0
172	1607	Diego Echavarría	6.215988	-75.596259	1.0
174	0410	Campo Valdés No.1	6.273120	-75.556057	1.0
181	0307	Manrique Central No.2	6.265049	-75.553665	1.0
185	1202	Calasanz	6.262140	-75.599209	1.0
186	0404	Bermejal-Los Álamos	6.281429	-75.564995	1.0
188	0917	Ocho de Marzo	6.228568	-75.529241	1.0
189	0718	Cucaracho	6.281088	-75.601945	1.0
190	1311	Belencito	6.248218	-75.617165	1.0
191	1621	Cerro Nutibara	6.236220	-75.579527	1.0
193	Inst_11	Universidad de Antioquia	6.267854	-75.569022	1.0
194	1308	San Javier No.2	6.258130	-75.614242	1.0
200	Inst_18	Cerro Nutibara	6.236220	-75.579527	1.0
201	0610	Mirador del Doce	6.303238	-75.583245	1.0
202	1620	El Nogal-Los Almendros	6.237403	-75.597307	1.0
207	0815	Las Estancias	6.232925	-75.533967	1.0
209	Inst_7	Ecoparque Cerro El Volador	6.266502	-75.581239	1.0
210	0309	Versalles No.1	6.264537	-75.540447	1.0
221	0902	Barrios de Jesús	6.229939	-75.537100	1.0
227	1422	La Aguacatala	6.198763	-75.577201	1.0
230	0102	Santo Domingo Savio No.2	6.299473	-75.540104	1.0
233	0513	Francisco Antonio Zea	6.285949	-75.573449	1.0
236	0806	Llanaditas	6.253061	-75.540276	1.0
238	1315	Nuevos Conquistadores	6.250215	-75.628043	1.0
242	Inst_14	U.D. Atanasio Girardot	6.256918	-75.589338	1.0
244	0308	Manrique Oriental	6.264195	-75.549610	1.0
245	0110	La Esperanza No.2	6.291305	-75.541949	1.0
248	0811	Trece de Noviembre	6.246492	-75.541306	1.0
249	0602	Doce de Octubre No.1	6.306256	-75.579758	1.0
250	1611	La Loma de Los Bernal	6.218601	-75.603090	1.0
253	1413	El Diamante No.2	6.183371	-75.572355	1.0
254	1618	Nueva Villa del Aburrá	6.235657	-75.604301	1.0
260	0109	Aldea Pablo VI	6.288287	-75.542067	1.0
262	1406	Las Lomas No.1	6.210831	-75.561405	1.0
266	9003	Piedras Blancas - Matasano	6.287046	-75.508685	1.0
271	6013	Pedregal Alto	6.287903	-75.628436	1.0
284	1005	Estación Villa	6.255959	-75.569419	1.0
287	1201	Ferrini	6.268949	-75.597068	1.0
290	0915	Asomadera No.2	6.221321	-75.563557	1.0
292	0712	Aures No.2	6.291795	-75.590615	1.0
304	0710	López de Mesa	6.283605	-75.581346	1.0
311	1309	San Javier No.1	6.255494	-75.617716	1.0
312	0507	Héctor Abad Gómez	6.301350	-75.559502	1.0
314	1117	Florida Nueva	6.251355	-75.590808	1.0
317	0310	Versalles No.2	6.264537	-75.540447	1.0
318	1015	Bomboná No.1	6.244064	-75.562360	1.0
321	0303	Campo Valdés No.2	6.273794	-75.552507	1.0
325	1613	Altavista	6.227446	-75.635455	1.0

328	5006	La Frisola	6.294787	-75.688188	1.0
329	5005	Volcana Guayabal	6.200089	-75.580003	1.0

```
In [11]: #Mostrar tamaño del DataFrame
df.shape
```

```
Out[11]: (99, 5)
```

Utilice la librería geopy para obtener la latitud y la longitud de la Ciudad de Medellín

```
In [12]: #Renombramos columna "NOMBRE" a "Neighborhood"
df.rename(columns={'NOMBRE': 'Neighborhood'}, inplace=True)
```

```
In [13]: #Obtenemos coordenadas solo para la ciudad de Medellín
address = 'Medellín, CO'

geolocator = Nominatim(user_agent="Md_explorer")
location = geolocator.geocode(address)
latitude = location.latitude
longitude = location.longitude
print('The geograpical coordinate of {} are {}, {}'.format(address, latitude, longitude))
```

The geograpical coordinate of Medellín, CO are 6.2443382, -75.573553.

```
In [14]: #Crear un mapa de Medellin
map_medellin = folium.Map(location=[latitude, longitude], zoom_start=10)

#Añadir marcadores al mapa
for lat, lng, Neighborhood in zip(df['Latitude'], df['Longitude'], df['Neighborhood']):
    label = '{}'.format(Neighborhood)
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=5,
        popup=label,
        color='blue',
        fill=True,
        fill_color='#3186cc',
        fill_opacity=0.7,
        parse_html=False).add_to(map_medellin)

map_medellin
```

```
Out[14]: Make this Notebook Trusted to load map: File -> Trust Notebook
```

Definir la versión y credenciales de FourSquare

```
In [15]: CLIENT_ID = 'N5LPL5YGBPLQ4RHJJWHJYN4RKXNVR0J30TMOC35S00UVPFWL' # su ID de Foursquare
CLIENT_SECRET = '0G2J1Z54UD2ATX3MD4SEYSAI5FCZUJBKDE2POA5ZIJDIC1C' # Secreto de Foursquare
VERSION = '20180605' # versión de la API de Foursquare
LIMIT = 100 # Un valor límite para la API de Foursquare

print('Your credentails:')
print('CLIENT_ID: ' + CLIENT_ID)
print('CLIENT_SECRET:' + CLIENT_SECRET)
```

```
Your credentails:
CLIENT_ID: N5LPL5YGBPLQ4RHJJWHJYN4RKXNVR0J30TMOC35S00UVPFWL
CLIENT_SECRET:0G2J1Z54UD2ATX3MD4SEYSAI5FCZUJBKDE2POA5ZIJDIC1C
```

Explorar el primer barrio del DataFrame

```
In [16]: df.loc[0, 'Neighborhood']
```

```
Out[16]: 'Tricentenario'
```

```
In [17]: # Obtener coordenadas de nuestro primer barrio
neighborhood_latitude = df.loc[0, 'Latitude']
neighborhood_longitude = df.loc[0, 'Longitude']
neighborhood_name = df.loc[0, 'Neighborhood']
```

```
In [18]: print("las coordenadas del barrio {}, son {}, {}".format(neighborhood_name,
                                                                    neighborhood_latitude,
                                                                    neighborhood_longitude
                                                                    ))
```

```
las coordenadas del barrio Tricentenario, son 6.29107, -75.5663252
```

Obtengamos los 100 sitios en Tricentenario en un radio de 500 metros

```
In [19]: radius = 500
limit = 100
url = "https://api.foursquare.com/v2/venues/explore?client_id={}&client_secret={}&v={}&ll={},{}&limit={}&radius={}&".format(neighborhood_name,
                                                                    neighborhood_latitude,
                                                                    neighborhood_longitude,
                                                                    radius, limit)

url
```

```
Out[19]: 'https://api.foursquare.com/v2/venues/explore?client_id=N5LPL5YGBPLQ4RHJJWHJYN4RKXNVR0J30TMOC35S00UVPFWL&client_secret=0G2J1Z54UD2ATX3MD4SEYSAI5FCZUJBKDE2POA5ZIJDIC1C&v=20180605&ll=6.29107,-75.5663252&limit=100&radius=500'
```

```
In [20]: # Enviar la solicitud GET
results = requests.get(url).json()
results
```

```
Out[20]: {'meta': {'code': 200, 'requestId': '61397b6775445b1930cc04ee'},
 'response': {'headerLocation': 'Castilla',
 'headerFullLocation': 'Castilla, Medellín',
 'headerLocationGranularity': 'neighborhood',
 'totalResults': 4,
 'suggestedBounds': {'ne': {'lat': 6.2955700045000045,
 'lng': -75.5618063854314},
 'sw': {'lat': 6.286569995499996, 'lng': -75.57084401456859}},
 'groups': [{'type': 'Recommended Places',
 'name': 'recommended',
 'items': [{'reasons': {'count': 0,
 'items': [{'summary': 'This spot is popular',
 'type': 'general',
 'reasonName': 'globalInteractionReason'}]}],
 'venue': {'id': '4ca53e1b8a65bfb726762b22',
 'name': 'Parque Juanes de la Paz',
 'location': {'address': 'Carrera 65 98 - 50',
 'lat': 6.292662952964911,
```

```
'lng': -75.56867270242827,
'labeledLatLngs': [{'label': 'display',
  'lat': 6.292662952964911,
  'lng': -75.56867270242827}],
'distance': 314,
'cc': 'CO',
'city': 'Medellín',
'state': 'Antioquia',
'country': 'Colombia',
'formattedAddress': ['Carrera 65 98 - 50',
  'Medellín, Antioquia',
  'Colombia']],
'categories': [{'id': '52e81612bcb57f1066b7a26',
  'name': 'Recreation Center',
  'pluralName': 'Recreation Centers',
  'shortName': 'Recreation Center',
  'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/shops/sports_outdoors_',
    'suffix': '.png'},
  'primary': True}],
'photos': {'count': 0, 'groups': []},
'referralId': 'e-0-4ca53e1b8a65bfb726762b22-0'},
{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]},
'venue': {'id': '4c7fce54807576b07006a915',
  'name': 'METRO - Estacion Tricentenario',
  'location': {'address': 'Carrera 63A',
    'crossStreet': 'Calle 97',
    'lat': 6.290542134273335,
    'lng': -75.56473297400169,
    'labeledLatLngs': [{'label': 'display',
      'lat': 6.290542134273335,
      'lng': -75.56473297400169}],
    'distance': 185,
    'cc': 'CO',
    'city': 'Medellín',
    'state': 'Antioquia',
    'country': 'Colombia',
    'formattedAddress': ['Carrera 63A (Calle 97)',
      'Medellín, Antioquia',
      'Colombia']},
  'categories': [{'id': '4bf58dd8d48988d1fd931735',
    'name': 'Metro Station',
    'pluralName': 'Metro Stations',
    'shortName': 'Metro',
    'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/subway_',
      'suffix': '.png'},
    'primary': True}],
  'photos': {'count': 0, 'groups': []},
  'referralId': 'e-0-4c7fce54807576b07006a915-1'},
{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]},
'venue': {'id': '4d6eeb078781b60cbf6a3635',
  'name': 'Club De Tenis El Bosque',
  'location': {'lat': 6.293351297194083,
    'lng': -75.56852058480007,
    'labeledLatLngs': [{'label': 'display',
      'lat': 6.293351297194083,
      'lng': -75.56852058480007}],
    'distance': 351,
    'cc': 'CO',
    'city': 'Medellín',
    'state': 'Antioquia',
    'country': 'Colombia',
    'formattedAddress': ['Medellín, Antioquia', 'Colombia']},
  'categories': [{'id': '4e39a956bd410d7aed40cbc3',
    'name': 'Tennis Court',
    'pluralName': 'Tennis Courts',
    'shortName': 'Tennis Court',
    'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/arts_entertainment/stadium_tennis_',
      'suffix': '.png'},
    'primary': True}],
  'photos': {'count': 0, 'groups': []},
  'referralId': 'e-0-4d6eeb078781b60cbf6a3635-2'},
{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]},
'venue': {'id': '511fc029e4b002b6e6a2259e',
  'name': 'Parche Tricen,Tienda mixta',
```

```
{
  'location': {'lat': 6.292669926243635,
               'lng': -75.56455105038293,
               'labeledLatLngs': [{'label': 'display',
                                     'lat': 6.292669926243635,
                                     'lng': -75.56455105038293}]},
  'distance': 265,
  'cc': 'CO',
  'city': 'Medellín',
  'state': 'Antioquia',
  'country': 'Colombia',
  'formattedAddress': ['Medellín, Antioquia', 'Colombia']],
  'categories': [{'id': '4bf58dd8d48988d118951735',
                  'name': 'Grocery Store',
                  'pluralName': 'Grocery Stores',
                  'shortName': 'Grocery Store',
                  'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/shops/food_grocery_',
                           'suffix': '.png'},
                  'primary': True}],
  'photos': {'count': 0, 'groups': []}},
  'referralId': 'e-0-511fc029e4b002b6e6a2259e-3'}}]]}}}
```

```
In [21]: # función para extraer la categoría del sitio
def get_category_type(row):
    try:
        categories_list = row['categories']
    except:
        categories_list = row['venue.categories']

    if len(categories_list) == 0:
        return None
    else:
        return categories_list[0]['name']
```

```
In [22]: venues = results['response']['groups'][0]['items']

nearby_venues = json_normalize(venues) # objeto JSON

# filtrar columnas
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
nearby_venues = nearby_venues.loc[:, filtered_columns]

# filtrar la categoría para cada fila
nearby_venues['venue.categories'] = nearby_venues.apply(get_category_type, axis=1)

# limpiar columnas
nearby_venues.columns = [col.split(".")[1] for col in nearby_venues.columns]

nearby_venues.head()
```

```
<ipython-input-22-1c6db9e35c87>:3: FutureWarning: pandas.io.json.json_normalize is deprecated, use pandas.json_normalize instead
nearby_venues = json_normalize(venues) # objeto JSON
```

```
Out[22]:
```

	name	categories	lat	lng
0	Parque Juanes de la Paz	Recreation Center	6.292663	-75.568673
1	METRO - Estacion Tricentenario	Metro Station	6.290542	-75.564733
2	Club De Tenis El Bosque	Tennis Court	6.293351	-75.568521
3	Parche Tricen,Tienda mixta	Grocery Store	6.292670	-75.564551

Analizar Barrios de Medellín

```
In [23]: def getNearbyVenues(names, latitudes, longitudes, radius=500):

    venues_list=[]
    for name, lat, lng in zip(names, latitudes, longitudes):
        print(name)

        # crear la URL de solicitud de API
        url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}&sort=score'
        CLIENT_ID,
        CLIENT_SECRET,
        VERSION,
        lat,
        lng,
        radius,
```



```

LIMIT)

# solicitud GET
results = requests.get(url).json()["response"][0]['items']

# regresa solo información relevante de cada sitio cercano
venues_list.append((
    name,
    lat,
    lng,
    v['venue']['name'],
    v['venue']['location']['lat'],
    v['venue']['location']['lng'],
    v['venue']['categories'][0]['name']) for v in results))

nearby_venues = pd.DataFrame([item for venue_list in venues_list for item in venue_list])
nearby_venues.columns = ['Neighborhood',
    'Neighborhood Latitude',
    'Neighborhood Longitude',
    'Venue',
    'Venue Latitude',
    'Venue Longitude',
    'Venue Category']

return(nearby_venues)

```

Ejecutar función en cada barrio

```

In [24]: medellin_venues = getNearbyVenues(names=df['Neighborhood'],
    latitudes=df['Latitude'],
    longitudes=df['Longitude']
    )

```

Tricentenario
 Villa Niza
 Nueva Villa de La Iguaná
 Alejandro Echavarría
 Moscú No.2
 Santo Domingo Savio No.1
 Calasanz Parte Alta
 Playón de Los Comuneros
 El Chagualo
 Asomadera No.3
 El Pesebre
 Manrique Central No.1
 Las Independencias
 Moscú No.1
 Bosques de San Pablo
 Los Mangos
 Los Cerros El Vergel
 San José La Cima No.1
 María Cano-Carambolas
 La Pilarica
 Tejelo
 Cuarta Brigada
 Aures No.1
 Carpinelo
 Carlos E. Restrepo
 Juan XXIII La Quiebra
 Veinte de Julio
 Las Lomas No.2
 Barrio Caicedo
 Suramericana
 Villa Turbay
 Asomadera No.1
 Bomboná No.2
 Progreso No.2
 Barrio Cristóbal
 Los Balsos No.2
 Los Colores
 Batallón Girardot
 Villatina
 San José La Cima No.2
 Doce de Octubre No.2
 Granizal
 San Antonio de Prado
 Batallón Cuarta Brigada
 Los Balsos No.1
 Villa Carlota
 El Compromiso
 Villa Lilliam
 Monteclaro
 La Mansión

Diego Echavarría
 Campo Valdés No.1
 Manrique Central No.2
 Calasanz
 Bermejál-Los Álamos
 Ocho de Marzo
 Cucaracho
 Belencito
 Cerro Nutibara
 Universidad de Antioquia
 San Javier No.2
 Cerro Nutibara
 Mirador del Doce
 El Nogal-Los Almendros
 Las Estancias
 Ecoparque Cerro El Volador
 Versalles No.1
 Barrios de Jesús
 La Aguacatala
 Santo Domingo Savio No.2
 Francisco Antonio Zea
 Llanaditas
 Nuevos Conquistadores
 U.D. Atanasio Girardot
 Manrique Oriental
 La Esperanza No.2
 Trece de Noviembre
 Doce de Octubre No.1
 La Loma de Los Bernal
 El Diamante No.2
 Nueva Villa del Aburrá
 Aldea Pablo VI
 Las Lomas No.1
 Piedras Blancas - Matasano
 Pedregal Alto
 Estación Villa
 Ferrini
 Asomadera No.2
 Aures No.2
 López de Mesa
 San Javier No.1
 Héctor Abad Gómez
 Florida Nueva
 Versalles No.2
 Bomboná No.1
 Campo Valdés No.2
 Altavista
 La Frisola
 Volcana Guayabal

```

In [25]: # tamaño del dataframe resultante
print(medellin_venues.shape)
medellin_venues.head()
  
```

(871, 7)

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Tricentenario	6.291070	-75.566325	Parque Juanes de la Paz	6.292663	-75.568673	Recreation Center
1	Tricentenario	6.291070	-75.566325	METRO - Estacion Tricentenario	6.290542	-75.564733	Metro Station
2	Tricentenario	6.291070	-75.566325	Club De Tennis El Bosque	6.293351	-75.568521	Tennis Court
3	Tricentenario	6.291070	-75.566325	Parche Tricen,Tienda mixta	6.292670	-75.564551	Grocery Store
4	Villa Niza	6.295645	-75.563450	Central Ganadera S.A.	6.296084	-75.565180	Farm

```

In [26]: # Analizar cada barrio
# codificación
medellin_onehot = pd.get_dummies(medellin_venues[['Venue Category']])

# añadir la columna de barrio de regreso al dataframe
medellin_onehot['Neighborhood'] = medellin_venues['Neighborhood']

# mover la columna de barrio a la primer columna
fixed_columns = [medellin_onehot.columns[-1]] + list(medellin_onehot.columns[:-1])
medellin_onehot = medellin_onehot[fixed_columns]
  
```

```
medellin_onehot.head()
```

Out [26]:

	Neighborhood	Venue Category_Airport	Venue Category_American Restaurant	Venue Category_Amphitheater	Venue Category_Arepa Restaurant	Venue Category_Argentinian Restaurant	Venue Category_Art Gallery	Ver Category_Muse
0	Tricentenario	0	0	0	0	0	0	
1	Tricentenario	0	0	0	0	0	0	
2	Tricentenario	0	0	0	0	0	0	
3	Tricentenario	0	0	0	0	0	0	
4	Villa Niza	0	0	0	0	0	0	

In [27]:

```
medellin_grouped = medellin_onehot.groupby('Neighborhood').mean().reset_index()
medellin_grouped.head()
```

Out [27]:

	Neighborhood	Venue Category_Airport	Venue Category_American Restaurant	Venue Category_Amphitheater	Venue Category_Arepa Restaurant	Venue Category_Argentinian Restaurant	Venue Category_Art Gallery	Ver Category_Muse
0	Aldea Pablo VI	0.0	0.0	0.0	0.0	0.000000	0.0	
1	Alejandro Echavarría	0.0	0.0	0.0	0.0	0.000000	0.0	
2	Asomadera No.1	0.0	0.0	0.0	0.0	0.000000	0.0	
3	Asomadera No.2	0.0	0.0	0.0	0.0	0.029412	0.0	
4	Asomadera No.3	0.0	0.0	0.0	0.0	0.000000	0.0	

Imprimir cada barrio junto con los 5 sitios mas comunes

In [28]:

```
num_top_venues = 5

for hood in medellin_grouped['Neighborhood']:
    print('----', hood, '----')
    temp = medellin_grouped[medellin_grouped['Neighborhood'] == hood].T.reset_index()
    temp.columns = ['venue', 'freq']
    temp = temp.iloc[1:]
    temp['freq'] = temp['freq'].astype(float)
    temp = temp.round({'freq': 2})
    print(temp.sort_values('freq', ascending=False).reset_index(drop=True).head(num_top_venues))
    print('\n')
```

---- Aldea Pablo VI ----

	venue	freq
0	Venue Category_Construction & Landscaping	0.67
1	Venue Category_Restaurant	0.33
2	Venue Category_Airport	0.00
3	Venue Category_Pie Shop	0.00
4	Venue Category_Other Nightlife	0.00

---- Alejandro Echavarría ----

	venue	freq
0	Venue Category_Ice Cream Shop	0.25
1	Venue Category_Tram Station	0.25
2	Venue Category_Shopping Mall	0.25
3	Venue Category_Miscellaneous Shop	0.25
4	Venue Category_Airport	0.00

---- Asomadera No.1 ----

	venue	freq
0	Venue Category_Bar	0.12
1	Venue Category_Sushi Restaurant	0.12
2	Venue Category_Restaurant	0.12
3	Venue Category_Brazilian Restaurant	0.12
4	Venue Category_Fast Food Restaurant	0.12

---- Asomadera No.2 ----

	venue	freq
0	Venue Category_Nightclub	0.15

1	Venue Category_Restaurant	0.06
2	Venue Category_Italian Restaurant	0.06
3	Venue Category_Supermarket	0.06
4	Venue Category_Hotel	0.06

---- Asomadera No.3 ----

	venue	freq
0	Venue Category_Hotel	0.29
1	Venue Category_South American Restaurant	0.14
2	Venue Category_Tennis Court	0.14
3	Venue Category_Scenic Lookout	0.14
4	Venue Category_Supermarket	0.14

---- Aures No.1 ----

	venue	freq
0	Venue Category_Construction & Landscaping	1.0
1	Venue Category_Airport	0.0
2	Venue Category_Pie Shop	0.0
3	Venue Category_Other Nightlife	0.0
4	Venue Category_Other Repair Shop	0.0

---- Aures No.2 ----

	venue	freq
0	Venue Category_Construction & Landscaping	0.5
1	Venue Category_Home Service	0.5
2	Venue Category_Airport	0.0
3	Venue Category_Pie Shop	0.0
4	Venue Category_Other Nightlife	0.0

---- Barrio Caicedo ----

	venue	freq
0	Venue Category_Bar	0.25
1	Venue Category_Museum	0.25
2	Venue Category_Park	0.25
3	Venue Category_Food Court	0.25
4	Venue Category_Airport	0.00

---- Barrio Cristóbal ----

	venue	freq
0	Venue Category_Pizza Place	0.2
1	Venue Category_Park	0.2
2	Venue Category_Convenience Store	0.2
3	Venue Category_BBQ Joint	0.2
4	Venue Category_Burger Joint	0.2

---- Barrios de Jesús ----

	venue	freq
0	Venue Category_Shoe Store	1.0
1	Venue Category_Airport	0.0
2	Venue Category_Real Estate Office	0.0
3	Venue Category_Other Great Outdoors	0.0
4	Venue Category_Other Nightlife	0.0

---- Batallón Cuarta Brigada ----

	venue	freq
0	Venue Category_Mexican Restaurant	0.15
1	Venue Category_Shopping Mall	0.15
2	Venue Category_Gay Bar	0.08
3	Venue Category_Steakhouse	0.08
4	Venue Category_Clothing Store	0.08

---- Belencito ----

	venue	freq
0	Venue Category_Ice Cream Shop	0.50
1	Venue Category_Museum	0.25
2	Venue Category_Coffee Shop	0.25
3	Venue Category_Airport	0.00
4	Venue Category_Pie Shop	0.00

---- Bermejál-Los Álamos ----

	venue	freq
0	Venue Category_Recreation Center	0.25
1	Venue Category_Plaza	0.25
2	Venue Category_Art Museum	0.25

```
3 Venue Category_Burger Joint 0.25
4 Venue Category_Pharmacy 0.00
```

---- Bomboná No.1 ----

```
venue freq
0 Venue Category_Theater 0.12
1 Venue Category_Restaurant 0.12
2 Venue Category_Burger Joint 0.06
3 Venue Category_Park 0.06
4 Venue Category_Colombian Restaurant 0.06
```

---- Bomboná No.2 ----

```
venue freq
0 Venue Category_Gym 1.0
1 Venue Category_Airport 0.0
2 Venue Category_Nightclub 0.0
3 Venue Category_Other Great Outdoors 0.0
4 Venue Category_Other Nightlife 0.0
```

---- Bosques de San Pablo ----

```
venue freq
0 Venue Category_Park 0.33
1 Venue Category_Pizza Place 0.33
2 Venue Category_Gym 0.33
3 Venue Category_Airport 0.00
4 Venue Category_Pet Store 0.00
```

---- Calasanz ----

```
venue freq
0 Venue Category_Grocery Store 0.18
1 Venue Category_Fast Food Restaurant 0.12
2 Venue Category_Ice Cream Shop 0.12
3 Venue Category_Café 0.12
4 Venue Category_Juice Bar 0.06
```

---- Calasanz Parte Alta ----

```
venue freq
0 Venue Category_Café 1.0
1 Venue Category_Airport 0.0
2 Venue Category_Noodle House 0.0
3 Venue Category_Other Nightlife 0.0
4 Venue Category_Other Repair Shop 0.0
```

---- Campo Valdés No.1 ----

```
venue freq
0 Venue Category_Grocery Store 0.25
1 Venue Category_History Museum 0.25
2 Venue Category_Gym 0.25
3 Venue Category_Burger Joint 0.25
4 Venue Category_Airport 0.00
```

---- Campo Valdés No.2 ----

```
venue freq
0 Venue Category_Construction & Landscaping 0.33
1 Venue Category_Grocery Store 0.33
2 Venue Category_History Museum 0.33
3 Venue Category_Airport 0.00
4 Venue Category_Pharmacy 0.00
```

---- Carlos E. Restrepo ----

```
venue freq
0 Venue Category_Pizza Place 0.09
1 Venue Category_Seafood Restaurant 0.09
2 Venue Category_Bakery 0.09
3 Venue Category_Latin American Restaurant 0.04
4 Venue Category_Hotel 0.04
```

---- Carpinelo ----

```
venue freq
0 Venue Category_Construction & Landscaping 0.67
1 Venue Category_Restaurant 0.33
2 Venue Category_Airport 0.00
3 Venue Category_Pie Shop 0.00
4 Venue Category_Other Nightlife 0.00
```

---- Cerro Nutibara ----

	venue	freq
0	Venue Category_Bar	0.18
1	Venue Category_History Museum	0.09
2	Venue Category_Amphitheater	0.09
3	Venue Category_Indie Theater	0.09
4	Venue Category_Park	0.09

---- Cuarta Brigada ----

	venue	freq
0	Venue Category_Italian Restaurant	0.08
1	Venue Category_Shopping Mall	0.08
2	Venue Category_Hotel	0.08
3	Venue Category_Gym	0.08
4	Venue Category_Soccer Stadium	0.04

---- Cucaracho ----

	venue	freq
0	Venue Category_Rental Service	0.5
1	Venue Category_Other Repair Shop	0.5
2	Venue Category_Real Estate Office	0.0
3	Venue Category_Other Great Outdoors	0.0
4	Venue Category_Other Nightlife	0.0

---- Diego Echavarría ----

	venue	freq
0	Venue Category_Shopping Mall	0.19
1	Venue Category_Supermarket	0.07
2	Venue Category_Sandwich Place	0.07
3	Venue Category_Pizza Place	0.07
4	Venue Category_Italian Restaurant	0.07

---- Doce de Octubre No.1 ----

	venue	freq
0	Venue Category_Scenic Lookout	0.33
1	Venue Category_Soccer Field	0.33
2	Venue Category_Mountain	0.33
3	Venue Category_Airport	0.00
4	Venue Category_Other Nightlife	0.00

---- Doce de Octubre No.2 ----

	venue	freq
0	Venue Category_Recreation Center	0.25
1	Venue Category_Scenic Lookout	0.25
2	Venue Category_Café	0.25
3	Venue Category_Playground	0.25
4	Venue Category_Other Nightlife	0.00

---- Ecoparque Cerro El Volador ----

	venue	freq
0	Venue Category_Scenic Lookout	0.33
1	Venue Category_Pool	0.33
2	Venue Category_Mountain	0.33
3	Venue Category_Pharmacy	0.00
4	Venue Category_Other Nightlife	0.00

---- El Chagualo ----

	venue	freq
0	Venue Category_Bar	0.17
1	Venue Category_Food Court	0.17
2	Venue Category_Café	0.17
3	Venue Category_Shopping Mall	0.17
4	Venue Category_Supermarket	0.17

---- El Compromiso ----

	venue	freq
0	Venue Category_Construction & Landscaping	1.0
1	Venue Category_Airport	0.0
2	Venue Category_Pie Shop	0.0
3	Venue Category_Other Nightlife	0.0
4	Venue Category_Other Repair Shop	0.0

```

---- El Diamante No.2 ----
                                venue  freq
0      Venue Category_Gym  0.13
1      Venue Category_Supermarket  0.13
2  Venue Category_Fast Food Restaurant  0.07
3      Venue Category_Mexican Restaurant  0.07
4      Venue Category_French Restaurant  0.07

---- El Nogal-Los Almendros ----
                                venue  freq
0      Venue Category_Bar  0.20
1      Venue Category_Steakhouse  0.07
2      Venue Category_Spa  0.03
3      Venue Category_Diner  0.03
4  Venue Category_Cocktail Bar  0.03

---- El Pesebre ----
                                venue  freq
0  Venue Category_Gym / Fitness Center  0.33
1      Venue Category_Mountain  0.33
2      Venue Category_Park  0.33
3      Venue Category_Airport  0.00
4  Venue Category_Other Great Outdoors  0.00

---- Estación Villa ----
                                venue  freq
0      Venue Category_Art Museum  0.22
1  Venue Category_Colombian Restaurant  0.11
2      Venue Category_Café  0.11
3      Venue Category_Historic Site  0.11
4      Venue Category_Farmers Market  0.11

---- Ferrini ----
                                venue  freq
0      Venue Category_Sandwich Place  0.17
1      Venue Category_Ice Cream Shop  0.17
2      Venue Category_Juice Bar  0.17
3      Venue Category_Shopping Mall  0.17
4  Venue Category_Convenience Store  0.17

---- Florida Nueva ----
                                venue  freq
0      Venue Category_Restaurant  0.06
1      Venue Category_Sandwich Place  0.06
2  Venue Category_Italian Restaurant  0.06
3      Venue Category_Pizza Place  0.06
4      Venue Category_Bakery  0.06

---- Francisco Antonio Zea ----
                                venue  freq
0      Venue Category_Public Art  0.17
1  Venue Category_Fast Food Restaurant  0.17
2      Venue Category_Rest Area  0.17
3      Venue Category_Lake  0.17
4      Venue Category_Electronics Store  0.17

---- Granizal ----
                                venue  freq
0  Venue Category_South American Restaurant  0.5
1      Venue Category_Cable Car  0.5
2      Venue Category_Airport  0.0
3      Venue Category_Other Great Outdoors  0.0
4      Venue Category_Other Nightlife  0.0

---- Héctor Abad Gómez ----
                                venue  freq
0  Venue Category_Metro Station  0.25
1      Venue Category_Cable Car  0.25
2      Venue Category_Fabric Shop  0.25
3  Venue Category_Clothing Store  0.25
4      Venue Category_Airport  0.00

---- Juan XXIII La Quiebra ----
                                venue  freq

```

0	Venue Category_Clothing Store	0.5
1	Venue Category_Cable Car	0.5
2	Venue Category_Other Great Outdoors	0.0
3	Venue Category_Other Repair Shop	0.0
4	Venue Category_Park	0.0

---- La Aguacatala ----

	venue	freq
0	Venue Category_Hotel	0.08
1	Venue Category_Café	0.08
2	Venue Category_Italian Restaurant	0.06
3	Venue Category_Ice Cream Shop	0.05
4	Venue Category_Burger Joint	0.04

---- La Esperanza No.2 ----

	venue	freq
0	Venue Category_South American Restaurant	0.25
1	Venue Category_Cable Car	0.25
2	Venue Category_Plaza	0.25
3	Venue Category_Construction & Landscaping	0.25
4	Venue Category_Pharmacy	0.00

---- La Loma de Los Bernal ----

	venue	freq
0	Venue Category_Soccer Field	0.14
1	Venue Category_Clothing Store	0.14
2	Venue Category_Ice Cream Shop	0.14
3	Venue Category_Discount Store	0.14
4	Venue Category_Shopping Mall	0.14

---- La Mansión ----

	venue	freq
0	Venue Category_Burger Joint	0.5
1	Venue Category_Park	0.5
2	Venue Category_Noodle House	0.0
3	Venue Category_Other Great Outdoors	0.0
4	Venue Category_Other Nightlife	0.0

---- La Pilarica ----

	venue	freq
0	Venue Category_Park	0.25
1	Venue Category_Grocery Store	0.25
2	Venue Category_BBQ Joint	0.25
3	Venue Category_Food	0.25
4	Venue Category_Airport	0.00

---- Las Estancias ----

	venue	freq
0	Venue Category_Shoe Store	1.0
1	Venue Category_Airport	0.0
2	Venue Category_Real Estate Office	0.0
3	Venue Category_Other Great Outdoors	0.0
4	Venue Category_Other Nightlife	0.0

---- Las Independencias ----

	venue	freq
0	Venue Category_Ice Cream Shop	0.33
1	Venue Category_Coffee Shop	0.17
2	Venue Category_Café	0.17
3	Venue Category_Art Gallery	0.17
4	Venue Category_Scenic Lookout	0.17

---- Las Lomas No.1 ----

	venue	freq
0	Venue Category_Hotel	0.12
1	Venue Category_Peruvian Restaurant	0.10
2	Venue Category_Restaurant	0.07
3	Venue Category_BBQ Joint	0.07
4	Venue Category_Burger Joint	0.07

---- Las Lomas No.2 ----

	venue	freq
0	Venue Category_Hotel	0.16
1	Venue Category_Burger Joint	0.08

2	Venue Category_Shopping Mall	0.08
3	Venue Category_Gym / Fitness Center	0.08
4	Venue Category_Tapas Restaurant	0.04

---- Los Balsos No.1 ----

	venue	freq
0	Venue Category_Bakery	0.25
1	Venue Category_Deli / Bodega	0.12
2	Venue Category_Intersection	0.12
3	Venue Category_Argentinian Restaurant	0.12
4	Venue Category_Restaurant	0.12

---- Los Balsos No.2 ----

	venue	freq
0	Venue Category_Italian Restaurant	0.07
1	Venue Category_Ice Cream Shop	0.05
2	Venue Category_Café	0.05
3	Venue Category_Burger Joint	0.05
4	Venue Category_Coffee Shop	0.05

---- Los Cerros El Vergel ----

	venue	freq
0	Venue Category_Ice Cream Shop	0.25
1	Venue Category_Tram Station	0.25
2	Venue Category_Miscellaneous Shop	0.25
3	Venue Category_Pizza Place	0.25
4	Venue Category_Airport	0.00

---- Los Colores ----

	venue	freq
0	Venue Category_Juice Bar	0.22
1	Venue Category_Ice Cream Shop	0.22
2	Venue Category_Gastropub	0.11
3	Venue Category_Mexican Restaurant	0.11
4	Venue Category_Hotel	0.11

---- Los Mangos ----

	venue	freq
0	Venue Category_Home Service	1.0
1	Venue Category_Airport	0.0
2	Venue Category_Pharmacy	0.0
3	Venue Category_Other Great Outdoors	0.0
4	Venue Category_Other Nightlife	0.0

---- Manrique Central No.1 ----

	venue	freq
0	Venue Category_Department Store	0.25
1	Venue Category_Bar	0.25
2	Venue Category_Pedestrian Plaza	0.25
3	Venue Category_Cemetery	0.25
4	Venue Category_Other Repair Shop	0.00

---- Manrique Central No.2 ----

	venue	freq
0	Venue Category_Bar	0.33
1	Venue Category_Department Store	0.33
2	Venue Category_Pedestrian Plaza	0.33
3	Venue Category_Airport	0.00
4	Venue Category_Other Nightlife	0.00

---- Manrique Oriental ----

	venue	freq
0	Venue Category_Park	0.50
1	Venue Category_Clothing Store	0.25
2	Venue Category_Construction & Landscaping	0.25
3	Venue Category_Pier	0.00
4	Venue Category_Other Repair Shop	0.00

---- María Cano-Carambolas ----

	venue	freq
0	Venue Category_Park	0.5
1	Venue Category_Pedestrian Plaza	0.5
2	Venue Category_Airport	0.0
3	Venue Category_Indie Theater	0.0

4 Venue Category_Other Great Outdoors 0.0

---- Mirador del Doce ----

	venue	freq
0	Venue Category_Scenic Lookout	0.5
1	Venue Category_Playground	0.5
2	Venue Category_Pharmacy	0.0
3	Venue Category_Other Great Outdoors	0.0
4	Venue Category_Other Nightlife	0.0

---- Moscú No.1 ----

	venue	freq
0	Venue Category_Business Service	0.5
1	Venue Category_Fast Food Restaurant	0.5
2	Venue Category_Airport	0.0
3	Venue Category_Other Great Outdoors	0.0
4	Venue Category_Other Repair Shop	0.0

---- Moscú No.2 ----

	venue	freq
0	Venue Category_Rental Service	0.25
1	Venue Category_Park	0.25
2	Venue Category_Construction & Landscaping	0.25
3	Venue Category_Furniture / Home Store	0.25
4	Venue Category_Karaoke Bar	0.00

---- Nueva Villa de La Iguaná ----

	venue	freq
0	Venue Category_Hotel	0.17
1	Venue Category_Seafood Restaurant	0.17
2	Venue Category_Fast Food Restaurant	0.08
3	Venue Category_Gym	0.08
4	Venue Category_Soccer Stadium	0.08

---- Nueva Villa del Aburrá ----

	venue	freq
0	Venue Category_Pizza Place	0.11
1	Venue Category_Burger Joint	0.08
2	Venue Category_Bar	0.06
3	Venue Category_Sandwich Place	0.06
4	Venue Category_Italian Restaurant	0.06

---- Nuevos Conquistadores ----

	venue	freq
0	Venue Category_Soccer Field	0.5
1	Venue Category_Pier	0.5
2	Venue Category_Airport	0.0
3	Venue Category_Pet Store	0.0
4	Venue Category_Other Great Outdoors	0.0

---- Ocho de Marzo ----

	venue	freq
0	Venue Category_Grocery Store	0.5
1	Venue Category_BBQ Joint	0.5
2	Venue Category_Airport	0.0
3	Venue Category_Pie Shop	0.0
4	Venue Category_Other Nightlife	0.0

---- Playón de Los Comuneros ----

	venue	freq
0	Venue Category_Nightclub	1.0
1	Venue Category_Indie Theater	0.0
2	Venue Category_Other Great Outdoors	0.0
3	Venue Category_Other Nightlife	0.0
4	Venue Category_Other Repair Shop	0.0

---- Progreso No.2 ----

	venue	freq
0	Venue Category_Mountain	1.0
1	Venue Category_Airport	0.0
2	Venue Category_Noodle House	0.0
3	Venue Category_Other Nightlife	0.0
4	Venue Category_Other Repair Shop	0.0

---- San Antonio de Prado ----

	venue	freq
0	Venue Category_Spiritual Center	1.0
1	Venue Category_Nightclub	0.0
2	Venue Category_Noodle House	0.0
3	Venue Category_Other Great Outdoors	0.0
4	Venue Category_Other Nightlife	0.0

---- San Javier No.1 ----

	venue	freq
0	Venue Category_Fast Food Restaurant	0.25
1	Venue Category_Juice Bar	0.25
2	Venue Category_General Entertainment	0.25
3	Venue Category_Street Art	0.25
4	Venue Category_Airport	0.00

---- San Javier No.2 ----

	venue	freq
0	Venue Category_Soccer Field	0.25
1	Venue Category_General Entertainment	0.25
2	Venue Category_Street Art	0.25
3	Venue Category_Health & Beauty Service	0.25
4	Venue Category_Peruvian Restaurant	0.00

---- San José La Cima No.1 ----

	venue	freq
0	Venue Category_Park	1.0
1	Venue Category_Airport	0.0
2	Venue Category_Indie Theater	0.0
3	Venue Category_Other Great Outdoors	0.0
4	Venue Category_Other Nightlife	0.0

---- San José La Cima No.2 ----

	venue	freq
0	Venue Category_Rental Service	0.2
1	Venue Category_Soccer Field	0.2
2	Venue Category_French Restaurant	0.2
3	Venue Category_Construction & Landscaping	0.2
4	Venue Category_Park	0.2

---- Santo Domingo Savio No.1 ----

	venue	freq
0	Venue Category_South American Restaurant	0.33
1	Venue Category_Cable Car	0.33
2	Venue Category_Caribbean Restaurant	0.33
3	Venue Category_Pharmacy	0.00
4	Venue Category_Other Nightlife	0.00

---- Suramericana ----

	venue	freq
0	Venue Category_Seafood Restaurant	0.09
1	Venue Category_BBQ Joint	0.09
2	Venue Category_Sandwich Place	0.09
3	Venue Category_Latin American Restaurant	0.05
4	Venue Category_Hotel	0.05

---- Tejelo ----

	venue	freq
0	Venue Category_Ice Cream Shop	0.2
1	Venue Category_Park	0.2
2	Venue Category_BBQ Joint	0.2
3	Venue Category_Burger Joint	0.2
4	Venue Category_Fast Food Restaurant	0.2

---- Trece de Noviembre ----

	venue	freq
0	Venue Category_Scenic Lookout	0.33
1	Venue Category_Cable Car	0.33
2	Venue Category_Home Service	0.33
3	Venue Category_Airport	0.00
4	Venue Category_Other Nightlife	0.00

---- Tricentenario ----

	venue	freq
0	Venue Category_Recreation Center	0.25
1	Venue Category_Grocery Store	0.25
2	Venue Category_Metro Station	0.25
3	Venue Category_Tennis Court	0.25
4	Venue Category_Pet Store	0.00

---- U.D. Atanasio Girardot ----

	venue	freq
0	Venue Category_Gym	0.08
1	Venue Category_Shopping Mall	0.08
2	Venue Category_Stadium	0.08
3	Venue Category_Athletics & Sports	0.08
4	Venue Category_Hotel	0.08

---- Universidad de Antioquia ----

	venue	freq
0	Venue Category_Café	0.15
1	Venue Category_Restaurant	0.10
2	Venue Category_Shopping Mall	0.05
3	Venue Category_Bar	0.05
4	Venue Category_Gym / Fitness Center	0.05

---- Veinte de Julio ----

	venue	freq
0	Venue Category_Ice Cream Shop	0.4
1	Venue Category_Coffee Shop	0.2
2	Venue Category_Art Gallery	0.2
3	Venue Category_Café	0.2
4	Venue Category_Pier	0.0

---- Versailles No.1 ----

	venue	freq
0	Venue Category_Burger Joint	0.5
1	Venue Category_Other Great Outdoors	0.5
2	Venue Category_Noodle House	0.0
3	Venue Category_Other Nightlife	0.0
4	Venue Category_Other Repair Shop	0.0

---- Versailles No.2 ----

	venue	freq
0	Venue Category_Burger Joint	0.5
1	Venue Category_Other Great Outdoors	0.5
2	Venue Category_Noodle House	0.0
3	Venue Category_Other Nightlife	0.0
4	Venue Category_Other Repair Shop	0.0

---- Villa Carlota ----

	venue	freq
0	Venue Category_Gym	0.14
1	Venue Category_Italian Restaurant	0.10
2	Venue Category_Supermarket	0.10
3	Venue Category_TV Station	0.05
4	Venue Category_Breakfast Spot	0.05

---- Villa Lilliam ----

	venue	freq
0	Venue Category_Campground	1.0
1	Venue Category_Airport	0.0
2	Venue Category_Noodle House	0.0
3	Venue Category_Other Nightlife	0.0
4	Venue Category_Other Repair Shop	0.0

---- Villa Niza ----

	venue	freq
0	Venue Category_Real Estate Office	0.25
1	Venue Category_Health & Beauty Service	0.25
2	Venue Category_Grocery Store	0.25
3	Venue Category_Farm	0.25
4	Venue Category_Other Nightlife	0.00

---- Villa Turbay ----

	venue	freq
0	Venue Category_Cable Car	0.5

```

1 Venue Category_Campground 0.5
2 Venue Category_Airport 0.0
3 Venue Category_Other Great Outdoors 0.0
4 Venue Category_Other Repair Shop 0.0

```

---- Villatina ----

```

      venue  freq
0 Venue Category_Train Station 0.4
1 Venue Category_Soccer Field 0.2
2 Venue Category_Cosmetics Shop 0.2
3 Venue Category_Park 0.2
4 Venue Category_Pharmacy 0.0

```

---- Volcana Guayabal ----

```

      venue  freq
0 Venue Category_Café 0.14
1 Venue Category_Italian Restaurant 0.14
2 Venue Category_Sandwich Place 0.09
3 Venue Category_Coffee Shop 0.09
4 Venue Category_Juice Bar 0.05

```

escribamos una función para ordenar los sitios en orden descendente

```

In [59]: def return_most_common_venues(row, num_top_venues):
          row_categories = row.iloc[1:]
          row_categories_sorted = row_categories.sort_values(ascending=False)

          return row_categories_sorted.index.values[0:num_top_venues]

```

Generemos el nuevo dataframe y mostremos los primeros 10 sitios de cada barrio.

```

In [60]: num_top_venues = 10

          indicators = ['st', 'nd', 'rd']

          # crear las columnas acorde al numero de sitios populares
          columns = ['Neighborhood']
          for ind in np.arange(num_top_venues):
              try:
                  columns.append('{}{} Most Common Venue'.format(ind+1, indicators[ind]))
              except:
                  columns.append('{}th Most Common Venue'.format(ind+1))

          # crear un nuevo dataframe
          neighborhoods_venues_sorted = pd.DataFrame(columns=columns)
          neighborhoods_venues_sorted['Neighborhood'] = medellin_grouped['Neighborhood']

          for ind in np.arange(medellin_grouped.shape[0]):
              neighborhoods_venues_sorted.iloc[ind, 1:] = return_most_common_venues(medellin_grouped.iloc[ind, :], num_top_venues)

          neighborhoods_venues_sorted.head()

```

Out[60]:

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue
0	Aldea Pablo VI	Venue Category_Construction & Landscaping	Venue Category_Restaurant	Venue Category_Wings Joint	Venue Category_Fabric Shop	Venue Category_Food Stand	Venue Category_Food Court
1	Alejandro Echavarría	Venue Category_Ice Cream Shop	Venue Category_Train Station	Venue Category_Miscellaneous Shop	Venue Category_Shopping Mall	Venue Category_Farm	Venue Category_Food Stand
2	Asomadera No.1	Venue Category_Brazilian Restaurant	Venue Category_Sushi Restaurant	Venue Category_Business Service	Venue Category_Food	Venue Category_Fast Food Restaurant	Venue Category_Restaurant
3	Asomadera No.2	Venue Category_Nightclub	Venue Category_Shopping Mall	Venue Category_Restaurant	Venue Category_Bar	Venue Category_Italian Restaurant	Venue Category_Supermarket
4	Asomadera No.3	Venue Category_Hotel	Venue Category_Supermarket	Venue Category_South American Restaurant	Venue Category_Nightclub	Venue Category_Scenic Lookout	Venue Category_Tennis Court

k-means para agrupar los barrios en 5 agrupaciones

```
In [61]: # establecer el número de agrupaciones
kclusters = 5
medellin_grouped_clustering = medellin_grouped.drop('Neighborhood', 1)
# ejecutar k-means
kmeans = KMeans(n_clusters=kclusters, random_state=0).fit(medellin_grouped_clustering)

# revisar las etiquetas de las agrupaciones generadas para cada fila del dataframe
kmeans.labels_[0:10]
```

```
Out[61]: array([3, 1, 1, 1, 1, 3, 2, 1, 1, 4])
```

```
In [62]: # añadir etiquetas
neighborhoods_venues_sorted.insert(0, 'Cluster Labels', kmeans.labels_)
```

```
In [63]: medellin_merged = df

# juntar Medellin_grouped con df
medellin_merged = medellin_merged.join(neighborhoods_venues_sorted.set_index('Neighborhood'), on='Neighborhood')

medellin_merged.reset_index()
medellin_merged.head() # revisar las ultimas columnas
```

```
Out[63]:
```

	CODIGO	Neighborhood	Latitude	Longitude	Bandera	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Co
0	0510	Tricentenario	6.291070	-75.566325	1.0	1.0	Venue Category_Grocery Store	Venue Category_Recreation Center	Venue Category_Metro Station	Category_
1	0208	Villa Niza	6.295645	-75.563450	1.0	1.0	Venue Category_Real Estate Office	Venue Category_Grocery Store	Venue Category_Health & Beauty Service	Category
8	0725	Nueva Villa de La Iguaná	6.259940	-75.581743	1.0	1.0	Venue Category_Hotel	Venue Category_Seafood Restaurant	Venue Category_Housing Development	Category_C
9	0905	Alejandro Echavarría	6.238770	-75.546348	1.0	1.0	Venue Category_Ice Cream Shop	Venue Category_Tram Station	Venue Category_Miscellaneous Shop	Category_Sh
11	0105	Moscú No.2	6.289982	-75.549095	1.0	1.0	Venue Category_Rental Service	Venue Category_Construction & Landscaping	Venue Category_Furniture / Home Store	Categor

```
In [64]: medellin_merged.shape
```

```
Out[64]: (99, 16)
```

```
In [65]: #medellin_merged.to_csv(r'C:\Users\jaimea.munoz\Documents\DATA SCIENCE\Curso 9 Final\Categorias.csv')
```

```
In [66]: #Borrar Null
medellin_merged = medellin_merged.dropna()
medellin_merged.head()
medellin_merged.shape
```

```
Out[66]: (90, 16)
```

```
In [67]: #Convertir "Cluster labels" a int
medellin_merged['Cluster Labels'] = medellin_merged['Cluster Labels'].astype('int')
```

```
In [68]: # crear mapa
map_clusters = folium.Map(location=[latitude, longitude], zoom_start=11)

# establecer el esquema de color para las agrupaciones
x = np.arange(kclusters)
ys = [i + x + (i*x)**2 for i in range(kclusters)]
colors_array = cm.rainbow(np.linspace(0, 1, len(ys)))
rainbow = [colors.rgb2hex(i) for i in colors_array]

# añadir marcadores al mapa
markers_colors = []
for lat, lon, poi, cluster in zip(medellin_merged['Latitude'], medellin_merged['Longitude'], medellin_merged['Neighborhood'], medellin_merged['Cluster Labels']):
    label = folium.Popup(str(poi) + ' Cluster ' + str(cluster), parse_html=True)
```

```
folium.CircleMarker(  
    [lat, lon],  
    radius=5,  
    popup=label,  
    color=rainbow[cluster-1],  
    fill=True,  
    fill_color=rainbow[cluster-1],  
    fill_opacity=0.7).add_to(map_clusters)  
  
map_clusters
```

Out[68]: Make this Notebook Trusted to load map: File -> Trust Notebook

Sitios donde es mas común discotecas

```
In [78]: #Barber shop es común en el barrio la castellana y en el Nogal  
medellin_venues[medellin_venues['Venue Category'] == 'Bar']
```

Out[78]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
34	El Chagualo	6.262212	-75.570487	Lico fuente - La mona	6.264126	-75.567900	Bar
51	Manrique Central No.1	6.266456	-75.557399	Gin Tonic	6.265420	-75.555295	Bar
109	Carlos E. Restrepo	6.257775	-75.580938	Aula	6.256565	-75.578337	Bar
166	Barrio Caicedo	6.243292	-75.555425	Humo Rock Bar	6.240764	-75.552485	Bar
196	Asomadera No.1	6.229427	-75.563471	Tapiando	6.227021	-75.565489	Bar
262	Los Balsos No.2	6.195344	-75.570364	Beer Store	6.196202	-75.574525	Bar
371	Manrique Central No.2	6.265049	-75.553665	Gin Tonic	6.265420	-75.555295	Bar
404	Cerro Nutibara	6.236220	-75.579527	Hamburgo	6.233525	-75.580971	Bar
411	Cerro Nutibara	6.236220	-75.579527	Tropical Cocktails La 33	6.239484	-75.579056	Bar
420	Universidad de Antioquia	6.267854	-75.569022	Lico fuente - La mona	6.264126	-75.567900	Bar
439	Cerro Nutibara	6.236220	-75.579527	Hamburgo	6.233525	-75.580971	Bar
446	Cerro Nutibara	6.236220	-75.579527	Tropical Cocktails La 33	6.239484	-75.579056	Bar
460	El Nogal-Los Almendros	6.237403	-75.597307	Public House	6.239012	-75.597754	Bar
461	El Nogal-Los Almendros	6.237403	-75.597307	Underground	6.239096	-75.600692	Bar
463	El Nogal-Los Almendros	6.237403	-75.597307	Orange	6.238929	-75.597765	Bar
471	El Nogal-Los Almendros	6.237403	-75.597307	Le Cafe	6.238975	-75.601329	Bar
	El Nogal-Los						

475	Almendros	6.237403	-75.597307	Memorias Video Bar	6.238944	-75.594963	Bar
476	El Nogal-Los Almendros	6.237403	-75.597307	Sabana Bar la 33	6.238900	-75.600000	Bar
579	La Aguacatala	6.198763	-75.577201	La Boutique "Galeria-Bar"	6.198944	-75.573096	Bar
674	Nueva Villa del Aburrá	6.235657	-75.604301	Valhala Bar Rock	6.235408	-75.601985	Bar
687	Nueva Villa del Aburrá	6.235657	-75.604301	Le Cafe	6.238975	-75.601329	Bar
774	Asomadera No.2	6.221321	-75.563557	Tapiando	6.217571	-75.566011	Bar
782	Asomadera No.2	6.221321	-75.563557	Fonda La Chismosa	6.217744	-75.566219	Bar
795	Florida Nueva	6.251355	-75.590808	Son Havana	6.250252	-75.592160	Bar
819	Florida Nueva	6.251355	-75.590808	A pico de botella	6.251604	-75.588246	Bar
839	Bomboná No.1	6.244064	-75.562360	Arcángel	6.244689	-75.563818	Bar

Analizando Cluster de el barrio El Chagualo

In [90]:

#Hacemos zoom al barrio la castellana
medellin_merged[medellin_merged['Neighborhood']=='Cerro Nutibara']

Out[90]:

	CODIGO	Neighborhood	Latitude	Longitude	Bandera	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue
191	1621	Cerro Nutibara	6.23622	-75.579527	1.0	1	Venue Category_Bar	Venue Category_Restaurant	Venue Category_Amphitheater	Venue Category_Scenic Lookout
200	Inst_18	Cerro Nutibara	6.23622	-75.579527	1.0	1	Venue Category_Bar	Venue Category_Restaurant	Venue Category_Amphitheater	Venue Category_Scenic Lookout

In [94]:

#Hacemos zoom al barrio la castellana
medellin_merged[medellin_merged['Neighborhood']=='El Nogal-Los Almendros']

Out[94]:

	CODIGO	Neighborhood	Latitude	Longitude	Bandera	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue
202	1620	El Nogal-Los Almendros	6.237403	-75.597307	1.0	1	Venue Category_Bar	Venue Category_Steakhouse	Venue Category_Market	Venue Category_Plaza

Metodología

Se recurrió a la base de datos de barrios de Medellín proporcionada en la página web de Geo Medellín de la Alcaldía, la cual contiene todos los barrios de Medellín con sus respectivos atributos como Nombre, Id, área, comuna a la que pertenece, entre otros.

Posteriormente se realizó limpieza de la data, dejando solo aquellos campos de interés.

Luego se hizo uso de la librería Geopy para agregar al DataFrame los valores de latitud y longitud de cada barrio; gracias a esto tenemos nuestro input completo para interactuar con la API de Foursquare, la cual nos permite hacer un análisis profundo de cada uno de los barrios. al conectarnos con la API podemos conocer cuáles son los sitios o las categorías de negocios más comunes en cada uno de los barrios.

Una vez con los datos necesarios, procedemos a construir la url de consulta a la API de Foursquare, y con la respuesta que nos da la API, realizamos el análisis de todos los barrios de Medellín, arrojando como resultado las 10 categorías de lugares más comunes en cada uno de los barrios de Medellín.

Por último se realiza modelo de clustering con algoritmo K-Means, agrupando todo el set de datos en 5 clústeres

Resultados

In [82]:

Agrupacion 1
medellin_merged.loc[medellin_merged['Cluster Labels'] == 0, medellin_merged.columns[[1] + list(range(5, medellin_

Out[82]:

	Neighborhood	Cluster	1st Most Common	2nd Most Common	3rd Most	4th Most	5th Most Common	6th Most Common	7
--	--------------	---------	-----------------	-----------------	----------	----------	-----------------	-----------------	---

Labels			Venue		Venue	Common Venue		Common Venue		Venue	Venue
29	El Pesebre	0	Venue Category_Mountain	Venue	Category_Park	Venue Category_Gym / Fitness Center	Venue Category_Wings Joint	Venue Category_Farm	Venue Category_Food Stand	Catego	
35	Bosques de San Pablo	0	Venue Category_Pizza Place	Venue	Category_Park	Venue Category_Gym	Venue Category_Wings Joint	Venue Category_Fabric Shop	Venue Category_Food Court	Catego & Dri	
42	San José La Cima No.1	0	Venue Category_Park	Venue	Category_Wings Joint	Venue Category_Cuban Restaurant	Venue Category_Food Truck	Venue Category_Food Stand	Venue Category_Food Court	Catego & Dri	
51	María Cano- Carambolas	0	Venue Category_Park	Venue	Category_Pedestrian Plaza	Venue Category_Wings Joint	Venue Category_Cuban Restaurant	Venue Category_Food Stand	Venue Category_Food Court	Catego & Dri	
53	La Pilarica	0	Venue Category_BBQ Joint	Venue	Category_Food	Venue Category_Park	Venue Category_Grocery Store	Venue Category_Farm	Venue Category_Food Stand	Catego	
170	La Mansión	0	Venue Category_Burger Joint	Venue	Category_Park	Venue Category_Wings Joint	Venue Category_French Restaurant	Venue Category_Food Stand	Venue Category_Food Court	Catego & Dri	
244	Manrique Oriental	0	Venue Category_Park	Venue	Category_Construction & Landscaping	Venue Category_Clothing Store	Venue Category_Wings Joint	Venue Category_Farm	Venue Category_Food Stand	Catego	

In [83]:

```
# Agrupacion 2
medellin_merged.loc[medellin_merged['Cluster Labels'] == 1, medellin_merged.columns[[1] + list(range(5, medellin_
```

Out[83]:		Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	
0	Tricentenario	1	Venue Category_Grocery Store	Venue Category_Recreation Center	Venue Category_Metro Station	Venue Category_Tennis Court	Venue Category_Electronics Store	Vi	
1	Villa Niza	1	Venue Category_Real Estate Office	Venue Category_Grocery Store	Venue Category_Health & Beauty Service	Venue Category_Farm	Venue Category_Food Stand	Vi	
8	Nueva Villa de La Iguaná	1	Venue Category_Hotel	Venue Category_Seafood Restaurant	Venue Category_Housing Development	Venue Category_Cocktail Bar	Venue Category_Soccer Stadium	V	
9	Alejandro Echavarría	1	Venue Category_Ice Cream Shop	Venue Category_Tram Station	Venue Category_Miscellaneous Shop	Venue Category_Shopping Mall	Venue Category_Farm	Vi	
11	Moscú No.2	1	Venue Category_Rental Service	Venue Category_Construction & Landscaping	Venue Category_Furniture / Home Store	Venue Category_Park	Venue Category_Wings Joint	Vi	
12	Santo Domingo Savio No.1	1	Venue Category_South American Restaurant	Venue Category_Cable Car	Venue Category_Caribbean Restaurant	Venue Category_Farmers Market	Venue Category_Food Truck	Vi	
21	Calasanz Parte Alta	1	Venue Category_Café	Venue Category_Wings Joint	Venue Category_Cuban Restaurant	Venue Category_Food Truck	Venue Category_Food Stand	Vi	
23	Playón de Los Comuneros	1	Venue Category_Nightclub	Venue Category_Wings Joint	Venue Category_Cuban Restaurant	Venue Category_Food Truck	Venue Category_Food Stand	Vi	
24	El Chagualo	1	Venue Category_Soccer Field	Venue Category_Bar	Venue Category_Shopping Mall	Venue Category_Food Court	Venue Category_Café	Ce	
27	Asomadera No.3	1	Venue Category_Hotel	Venue Category_Supermarket	Venue Category_South American Restaurant	Venue Category_Nightclub	Venue Category_Scenic Lookout	Ce	
31	Manrique Central No.1	1	Venue Category_Cemetery	Venue Category_Department Store	Venue Category_Pedestrian Plaza	Venue Category_Bar	Venue Category_Farmers Market	Vi	
32	Las Independencias	1	Venue Category_Ice Cream Shop	Venue Category_Art Gallery	Venue Category_Café	Venue Category_Coffee Shop	Venue Category_Scenic Lookout	C	
34	Moscú No.1	1	Venue Category_Business Service	Venue Category_Fast Food Restaurant	Venue Category_Wings Joint	Venue Category_Cuban Restaurant	Venue Category_Food Truck	Vi	
37	Los Cerros El Vergel	1	Venue Category_Ice Cream Shop	Venue Category_Tram Station	Venue Category_Miscellaneous Shop	Venue Category_Pizza Place	Venue Category_Farm	Vi	
57	Tejelo	1	Venue Category_BBQ Joint	Venue Category_Fast Food Restaurant	Venue Category_Park	Venue Category_Burger Joint	Venue Category_Ice Cream Shop		

185	Calasanz	1	Category_Grocery Store	Venue Category_Café	Venue Category_Ice Cream Shop	Venue Category_Fast Food Restaurant	Venue Category_Burger Joint	
186	Bermejal-Los Álamos	1	Venue Category_Burger Joint	Venue Category_Plaza	Venue Category_Recreation Center	Venue Category_Art Museum	Venue Category_Fabric Shop	Venue Category_Food Court
188	Ocho de Marzo	1	Venue Category_BBQ Joint	Venue Category_Grocery Store	Venue Category_Farm	Venue Category_Food Truck	Venue Category_Food Stand	Venue Category_Fabric Shop
189	Cucaracho	1	Venue Category_Rental Service	Venue Category_Other Repair Shop	Venue Category_Wings Joint	Venue Category_Fabric Shop	Venue Category_Food Court	Venue Category_Fabric Shop
190	Belencito	1	Venue Category_Ice Cream Shop	Venue Category_Coffee Shop	Venue Category_Museum	Venue Category_Farm	Venue Category_Food Truck	Venue Category_Fabric Shop
191	Cerro Nutibara	1	Venue Category_Bar	Venue Category_Restaurant	Venue Category_Amphitheater	Venue Category_Scenic Lookout	Venue Category_Indie Theater	
193	Universidad de Antioquia	1	Venue Category_Café	Venue Category_Restaurant	Venue Category_Metro Station	Venue Category_BBQ Joint	Venue Category_Food Court	
194	San Javier No.2	1	Venue Category_Health & Beauty Service	Venue Category_General Entertainment	Venue Category_Street Art	Venue Category_Soccer Field	Venue Category_Wings Joint	Venue Category_Fabric Shop
200	Cerro Nutibara	1	Venue Category_Bar	Venue Category_Restaurant	Venue Category_Amphitheater	Venue Category_Scenic Lookout	Venue Category_Indie Theater	
201	Mirador del Doce	1	Venue Category_Playground	Venue Category_Scenic Lookout	Venue Category_Wings Joint	Venue Category_Fabric Shop	Venue Category_Food Court	Venue Category_Fabric Shop
202	El Nogal-Los Almendros	1	Venue Category_Bar	Venue Category_Steakhouse	Venue Category_Market	Venue Category_Plaza	Venue Category_Salon / Barbershop	Venue Category_Fabric Shop
209	Ecoparque Cerro El Volador	1	Venue Category_Pool	Venue Category_Mountain	Venue Category_Scenic Lookout	Venue Category_Farm	Venue Category_Food Stand	Venue Category_Fabric Shop
210	Versalles No.1	1	Venue Category_Burger Joint	Venue Category_Other Great Outdoors	Venue Category_Wings Joint	Venue Category_French Restaurant	Venue Category_Food Stand	Venue Category_Fabric Shop
227	La Aguacatala	1	Venue Category_Café	Venue Category_Hotel	Venue Category_Italian Restaurant	Venue Category_Ice Cream Shop	Venue Category_Salad Place	Venue Category_Fabric Shop
233	Francisco Antonio Zea	1	Venue Category_Public Art	Venue Category_Electronics Store	Venue Category_Fast Food Restaurant	Venue Category_Rest Area	Venue Category_School	Venue Category_Fabric Shop
238	Nuevos Conquistadores	1	Venue Category_Soccer Field	Venue Category_Pier	Venue Category_Fabric Shop	Venue Category_Food Stand	Venue Category_Food Court	Venue Category_Fabric Shop
242	U.D. Atanasio Girardot	1	Venue Category_Stadium	Venue Category_Hotel	Venue Category_Gym	Venue Category_Athletics & Sports	Venue Category_Shopping Mall	Venue Category_Fabric Shop
245	La Esperanza No.2	1	Venue Category_South American Restaurant	Venue Category_Plaza	Venue Category_Construction & Landscaping	Venue Category_Cable Car	Venue Category_Farm	Venue Category_Fabric Shop
248	Trece de Noviembre	1	Venue Category_Home Service	Venue Category_Cable Car	Venue Category_Scenic Lookout	Venue Category_Wings Joint	Venue Category_Farm	Venue Category_Fabric Shop
249	Doce de Octubre No.1	1	Venue Category_Mountain	Venue Category_Scenic Lookout	Venue Category_Soccer Field	Venue Category_Wings Joint	Venue Category_Farm	Venue Category_Fabric Shop
250	La Loma de Los Bernal	1	Venue Category_Soccer Field	Venue Category_Market	Venue Category_Ice Cream Shop	Venue Category_Shopping Mall	Venue Category_Discount Store	
253	El Diamante No.2	1	Venue Category_Supermarket	Venue Category_Gym	Venue Category_Creperie	Venue Category_Ice Cream Shop	Venue Category_Golf Course	
254	Nueva Villa del Aburrá	1	Venue Category_Pizza Place	Venue Category_Burger Joint	Venue Category_Sandwich Place	Venue Category_Café	Venue Category_Bar	Venue Category_Fabric Shop
262	Las Lomas No.1	1	Venue Category_Hotel	Venue Category_Peruvian Restaurant	Venue Category_Restaurant	Venue Category_Burger Joint	Venue Category_BBQ Joint	Venue Category_Fabric Shop
284	Estación Villa	1	Venue Category_Art Museum	Venue Category_Hotel	Venue Category_Colombian Restaurant	Venue Category_Farmers Market	Venue Category_Café	Venue Category_Fabric Shop
287	Ferrini	1	Venue Category_Ice Cream Shop	Venue Category_Juice Bar	Venue Category_Shopping Mall	Venue Category_Sandwich Place	Venue Category_Grocery Store	Venue Category_Fabric Shop
	Asomadera		Venue	Venue	Venue		Venue	

290	No.2	1	Category_Nightclub	Category_Shopping Mall	Category_Restaurant	Venue Category_Bar	Category_Italian Restaurant	Ca
311	San Javier No.1	1	Venue Category_Juice Bar	Venue Category_General Entertainment	Venue Category_Fast Food Restaurant	Venue Category_Street Art	Venue Category_Wings Joint	Va
312	Héctor Abad Gómez	1	Venue Category_Cable Car	Venue Category_Metro Station	Venue Category_Fabric Shop	Venue Category_Clothing Store	Venue Category_Wings Joint	V
314	Florida Nueva	1	Venue Category_Burger Joint	Venue Category_Pizza Place	Venue Category_Sandwich Place	Venue Category_Italian Restaurant	Venue Category_Bar	
317	Versalles No.2	1	Venue Category_Burger Joint	Venue Category_Other Great Outdoors	Venue Category_Wings Joint	Venue Category_French Restaurant	Venue Category_Food Stand	Va
318	Bomboná No.1	1	Venue Category_Restaurant	Venue Category_Theater	Venue Category_Snack Place	Venue Category_Colombian Restaurant	Venue Category_Burger Joint	Ve
321	Campo Valdés No.2	1	Venue Category_Construction & Landscaping	Venue Category_History Museum	Venue Category_Grocery Store	Venue Category_Wings Joint	Venue Category_Fabric Shop	Va
329	Volcana Guayabal	1	Venue Category_Café	Venue Category_Italian Restaurant	Venue Category_Sandwich Place	Venue Category_Coffee Shop	Venue Category_Hotel	

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In [84]: # Agrupacion 3
medellin_merged.loc[medellin_merged['Cluster Labels'] == 2, medellin_merged.columns[[1] + list(range(5, medellin_
```

	Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue
36	Los Mangos	2	Venue Category_Home Service	Venue Category_Wings Joint	Venue Category_Fabric Shop	Venue Category_Food Stand	Venue Category_Food Court	Venue Category_Food & Drink Shop	Venue Category_Food
292	Aures No.2	2	Venue Category_Construction & Landscaping	Venue Category_Home Service	Venue Category_Wings Joint	Venue Category_Fabric Shop	Venue Category_Food Stand	Venue Category_Food Court	Venue Category_Food & Drink Shop

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In [85]: # Agrupacion 4
medellin_merged.loc[medellin_merged['Cluster Labels'] == 3, medellin_merged.columns[[1] + list(range(5, medellin_
```

	Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Common V
68	Aures No.1	3	Venue Category_Construction & Landscaping	Venue Category_Wings Joint	Venue Category_Farm	Venue Category_Food Truck	Venue Category_Food Stand	Venue Category_Food Court	Venue Category_Food & Drink
71	Carpinelo	3	Venue Category_Construction & Landscaping	Venue Category_Restaurant	Venue Category_Wings Joint	Venue Category_Fabric Shop	Venue Category_Food Stand	Venue Category_Food Court	Venue Category_Food & Drink
158	El Compromiso	3	Venue Category_Construction & Landscaping	Venue Category_Wings Joint	Venue Category_Farm	Venue Category_Food Truck	Venue Category_Food Stand	Venue Category_Food Court	Venue Category_Food & Drink
260	Aldea Pablo VI	3	Venue Category_Construction & Landscaping	Venue Category_Restaurant	Venue Category_Wings Joint	Venue Category_Fabric Shop	Venue Category_Food Stand	Venue Category_Food Court	Venue Category_Food & Drink

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In [86]: # Agrupacion 5
medellin_merged.loc[medellin_merged['Cluster Labels'] == 4, medellin_merged.columns[[1] + list(range(5, medellin_
```

	Neighborhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue
207	Las Estancias	4	Venue Category_Shoe Store	Venue Category_Wings Joint	Venue Category_French Restaurant	Venue Category_Food Stand	Venue Category_Food Court	Venue Category_Food & Drink Shop	Venue Category_Food
221	Barrios de Jesús	4	Venue Category_Shoe Store	Venue Category_Wings Joint	Venue Category_French Restaurant	Venue Category_Food Stand	Venue Category_Food Court	Venue Category_Food & Drink Shop	Venue Category_Food

