Coursera - IBM - Applied Data Science Capstone

The Battle of Neighborhoods (Week 2)

by: Josemar Tadeu Migowski - October 2019

Introduction

The purpose of this project is to identify the commercial neighborhood of residential areas in the city of ***Brasilia (DF) - Brazil***, in order to support decision making for investors interested in starting commercial activities or services to meet the current and future demands of each region.

The work began by obtaining shapefiles from the Federal District state containing the geometry of the neighborhoods in order to allow specifying the target neighborhood of the analyzes to be formulated. These files were obtained from the IBGE (Brazilian Institute of Geography and Statistics) website at the URL https://portaldemapas.ibge.gov.br/portal.php#mapa201483 (https://portaldemapas.ibge.gov.br/portal.php#mapa201483).

Problem:

Investors are always looking for information on the most appropriate types of businesses and places to start a business and minimize the risks involved. For this reason, we decided to present a study that seeks the appropriate information for decision making regarding the type of business and the most appropriate location for its implementation in the Federal District - Brazil region.

This project aims to gather and cross-check information obtained from various sources to facilitate decision making for investors interested in investing in the ***Federal District - Brazil region.***

Methodology:

Data Sources:

For the development of this work, several open data sources were consulted in order to identify the pertinent information for the project in question. Among which are:

1. ***CODEPLAN - Planalto Central Development Company*** website, where it provides a report containing data on the ***Urban Density of each Administrative Region of the Federal District***. Available at: http://www.codeplan.df.gov.br/wp-content/uploads/2018/02/TD_22_Densidades_Urbanas_nas_Regi%C3%B5es_Administrativas_DF.pdf (http://www.codeplan.df.gov.br/wp-content/uploads/2018/02/TD_22_Densidades_Urbanas_nas_Regi%C3%B5es_Administrativas_DF.pdf);
2. Georeferencing data making it possible to present the results of the work visually, facilitating their comprehension. ShapeFile available at the link: http://dados.gov.br/dataset/dados-georreferenciados-siturb-segeth/resource/c5898ba4-d1a4-49fb-9075-60f6dda74097 (http://dados.gov.br/dataset/dados-georreferenciados-siturb-segeth/resource/c5898ba4-d1a4-49fb-9075-60f6dda74097);
3. ***FourSquare API*** - The search for information on the types of business existing in the administrative regions of DF was only possible thanks to the availability of the FourSquare API. Through this API, it became possible to perform business-related searches within 3000 meters from the central point of each administrative region. It should be noted that as the use of this API was made for testing purposes only, the results obtained are limited.

Importing the necessary libraries:

In [1]:
```
import pandas as pd
import geopandas as gpd
import matplotlib.pyplot as plt
from pandas.io.json import json_normalize
import folium
from geopy.geocoders import Nominatim
import requests
import json
from geojson import Feature, FeatureCollection, Point
```

Configuring Foursquare credentials API

In [2]:
```
CLIENT_ID = 'Client ID from Frousquare'
CLIENT_SECRET = 'Secret'
VERSION = '20180604'
LIMIT = 2000
RADIUS = 1500
```

Get information regarding urban densities in the Administrative Regions of the Federal District

site: http://www.codeplan.df.gov.br/wp-content/uploads/2018/02/TD_22_Densidades_Urbanas_nas_Regi%C3%B5es_Administrativas_DF.pdf (http://www.codeplan.df.gov.br/wp-content/uploads/2018/02/TD_22_Densidades_Urbanas_nas_Regi%C3%B5es_Administrativas_DF.pdf)

In [3]:
```
Densidade_DF = pd.read_csv('densidade.csv',sep=';',encoding='utf-8')
```

In [4]:
```
## Printing dataframe information with urban density data by DF Administrative Region

Densidade_DF.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 31 entries, 0 to 30
Data columns (total 11 columns):
num_ra                                31 non-null object
Nome                                  31 non-null object
População 2013                        31 non-null int64
População2015/16                      31 non-null int64
TMGCA(%)                              31 non-null float64
Área Ocupada Urbana (Ha)              31 non-null float64
Densidade Urbana 2015(hab/ha)         31 non-null float64
Área Total da RA (em ha)              31 non-null float64
Densidade Demográfica 2015 (hab/ha)   31 non-null float64
Casas (%)                             31 non-null float64
Apt+Quit (%)                          31 non-null object
dtypes: float64(6), int64(2), object(3)
memory usage: 2.8+ KB
```

In [5]:
```
## Printing dataframe with urban density data by DF Administrative Region

Densidade_DF
```

Out[5]:

	num_ra	Nome	População 2013	População2015/16	TMGCA(%)	Área Ocupada Urbana (Ha)	Densidade Urbana 2015(hab/ha)	Área Total da RA (em ha)	Densidade Demográfica 2015 (hab/ha)	Casas (%)	Apt+Quit (%)
0	XXIII	Varjão	9292	8453	-4.62	59.42	142.27	75.56	111.87	75.75	20.44
1	XIX	Candangolândia	16886	15641	-3.76	113.85	137.38	662.70	23.60	87.20	12
2	IX	Ceilândia	451872	479713	3.03	3691.92	129.94	23401.14	20.50	94.36	4.25
3	XV	Recanto das Emas	138997	146906	2.81	1246.27	117.88	10261.11	14.32	96.98	2.76
4	XIV	São Sebastião	98908	99525	0.31	882.69	112.75	35571.37	2.80	92.71	6.61
5	XXV	SCIA/Estrutural	35094	38429	4.64	350.21	109.73	741.75	51.81	92.40	0.6
6	XXII	Sudoeste/Octogonal	52273	52990	0.68	505.80	104.77	585.61	90.49	0.11	99.89
7	XII	Samambaia	228356	258457	6.39	2501.67	103.31	10125.85	25.52	89.29	10.49
8	XI	Cruzeiro	32182	29535	-4.20	290.60	101.63	323.05	91.43	22.80	77.2
9	IV	Brazlândia	51121	51816	0.68	554.03	93.52	47684.84	1.09	89.85	7.4
10	VII	Paranoá	46233	44975	-1.37	487.46	92.26	78876.96	0.57	85.28	12.98
11	XVII	Riacho Fundo	37606	40098	3.26	465.93	86.06	2382.93	16.83	68.00	32
12	XXI	Riacho Fundo II	39424	51709	14.53	618.63	83.59	3226.31	16.03	95.99	2.92
13	XXVIII	Itapoã	59694	67238	6.13	820.65	81.93	3015.59	22.30	98.80	0.8
14	III	Taguatinga	212863	207045	-1.38	2572.11	80.50	8056.15	25.70	69.73	30
15	VIII	Núcleo Bandeirante	23714	23562	-0.32	299.77	78.60	466.94	50.46	40.40	59.6
16	X	Guará	119923	133171	5.38	1810.57	73.55	2562.92	51.96	45.25	54.5
17	XX	Águas Claras	118864	138562	7.97	1937.03	71.53	2285.82	60.62	23.06	76.84
18	VI	Planaltina	185375	190495	1.37	2989.46	63.72	153847.95	1.24	94.49	4.86
19	XXVI	Sobradinho II	97466	100683	1.64	1708.30	58.94	22307.29	4.51	92.36	7.26
20	XIII	Santa Maria	122721	125559	1.15	2180.00	57.60	21463.18	5.85	94.57	4.84
21	II	Gama	134958	134111	-0.31	2631.71	50.96	27559.42	4.87	81.76	17.02
22	V	Sobradinho	63715	62763	-0.75	1503.93	41.73	20122.20	3.12	75.42	23.57
23	XXX	Vicente Pires	72415	72733	0.22	2276.79	31.95	2574.01	28.26	98.48	0.76
24	XXXI	Fercal	8408	8288	-0.72	280.27	29.57	11876.50	0.70	97.80	1
25	I	Plano Piloto	216489	210067	-1.49	10176.75	20.64	40989.31	5.12	9.19	90.45
26	XVIII	Lago Norte	34182	36394	3.18	3641.56	9.99	6554.02	5.55	70.00	29.8
27	XXVII	Jardim Botânico	25302	26882	3.08	3018.40	8.91	9115.08	2.95	98.40	1.6
28	XVI	Lago Sul	30629	28981	-2.73	4352.02	6.66	18342.78	1.58	98.00	8 0.4
29	XXIV	Park Way	19727	19803	0.19	5653.35	3.50	7646.32	2.59	97.80	2.2
30	XXIX	SIA	1997	1990	-0.18	1845.37	1.08	2703.90	0.74	72.24	20

Shapefile with DF Administrative Region boundary definitions:

site: http://dados.gov.br/dataset/dados-georreferenciados-siturb-segeth/resource/c5898ba4-d1a4-49fb-9075-60f6dda74097 (http://dados.gov.br/dataset/dados-georreferenciados-siturb-segeth/resource/c5898ba4-d1a4-49fb-9075-60f6dda74097)

In [6]:
```
ragdf = gpd.read_file('./RegioesAdministrativasDF/Proposta Regi├┤es Administrativas.shp')
```

In [7]:
```
## Printing Map with Geopandas of the Federal District and its Administrative Regions

ragdf.plot(figsize=(22, 18),color = "whitesmoke", alpha=0.5, edgecolor='black',linewidth = 0.5)
```

Out[7]: <matplotlib.axes._subplots.AxesSubplot at 0x7f0e1ccc9c90>

GeoPandas DataFrame of DF Administrative Regions:

In [8]:
```
## Geopandas DataFrame

ragdf
```

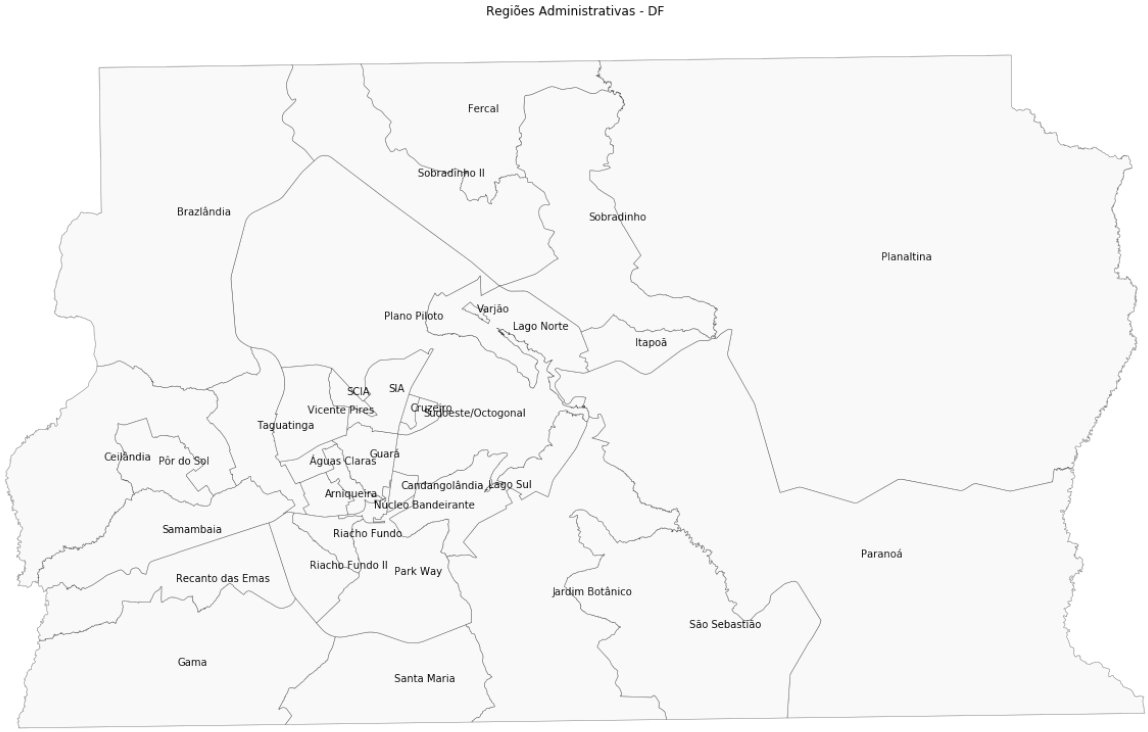
Out[8]:

	ra_num	ra	num_ra	link	shape_leng	st_area_sh	st_length_	geometr
0	1.0	Plano Piloto	I	https://www.geoportal.seduh.df.gov.br/static/m...	184204.574473	4.372014e+08	184204.574473	POLYGO ((193478.14 8263481.14 193477.162 8.
1	2.0	Gama	II	https://www.geoportal.seduh.df.gov.br/static/m...	88897.980244	2.760534e+08	88897.980244	POLYGO ((174717.48 8234729.90 174835.804 8.
2	4.0	Brazlândia	IV	https://www.geoportal.seduh.df.gov.br/static/m...	107050.466657	4.701836e+08	107050.466657	POLYGO ((156150.49 8257172.99 156196.454 8.
3	5.0	Sobradinho	V	https://www.geoportal.seduh.df.gov.br/static/m...	102972.805688	1.935265e+08	102972.805688	POLYGO ((203513.96 8281431.43 203513.986 8.
4	6.0	Planaltina	VI	https://www.geoportal.seduh.df.gov.br/static/m...	228787.515933	1.531401e+09	228787.515933	POLYGO ((240552.97 8284705.23 240583.535 8.
5	7.0	Paranoá	VII	https://www.geoportal.seduh.df.gov.br/static/m...	215012.822589	8.312098e+08	215012.822589	POLYGO ((214739.17 8258683.40 214710.678 8.
6	10.0	Guará	X	https://www.geoportal.seduh.df.gov.br/static/m...	24813.097261	2.522335e+07	24813.097261	POLYGO ((181753.94 8250237.15 181748.876 8.
7	12.0	Samambaia	XII	https://www.geoportal.seduh.df.gov.br/static/m...	71223.324610	9.999229e+07	71223.324610	POLYGO ((173592.47 8244234.28 173592.778 8.
8	13.0	Santa Maria	XIII	https://www.geoportal.seduh.df.gov.br/static/m...	54220.965466	1.315831e+08	54220.965466	POLYGO ((190476.86 8232091.94 190489.180 8.
9	14.0	São Sebastião	XIV	https://www.geoportal.seduh.df.gov.br/static/m...	100738.242604	2.627052e+08	100738.242604	POLYGO ((201111.60 8242884.87 201192.650 8.
10	24.0	Park Way	XXIV	https://www.geoportal.seduh.df.gov.br/static/m...	86580.055638	1.184056e+08	86580.055638	MULTIPOLYGO (((184531.66 8242744.81 184385.
11	26.0	Sobradinho II	XXVI	https://www.geoportal.seduh.df.gov.br/static/m...	88404.720850	1.813521e+08	88404.720850	POLYGO ((181653.24 8280678.52 181680.163 8.
12	27.0	Jardim Botânico	XXVII	https://www.geoportal.seduh.df.gov.br/static/m...	138135.914460	2.914276e+08	138135.914460	POLYGO ((210104.95 8240961.34 210099.721 8.
13	20.0	Águas Claras	XX	None	16727.037341	9.186564e+06	16727.037341	POLYGO ((178086.10 8249266.72 178088.590 8.
14	9.0	Ceilândia	IX	None	117499.507889	1.926569e+08	117499.507889	POLYGO ((166533.08 8253994.36 166542.394 8.
15	32.0	Pôr do Sol	XXXII	None	37498.813107	4.049166e+07	37498.813107	POLYGO ((161030.45 8251189.86 161532.437 8.
16	31.0	Fercal	XXXI	https://www.geoportal.seduh.df.gov.br/static/m...	78975.903773	1.543800e+08	78975.903773	POLYGO ((202618.67 8284141.91 202624.984 8.
17	3.0	Taguatinga	III	None	52654.298610	6.304456e+07	52654.298610	POLYGO ((173604.78 8255372.85 173636.964 8.

	ra_num	ra	num_ra	link	shape_leng	st_area_sh	st_length_	geometr
18	33.0	Arniqueira	XXXIII	None	17003.195744	1.335850e+07	17003.195744	POLYGO ((177625.92 8246008.75 177672.626 8.
19	8.0	Núcleo Bandeirante	VIII	https://www.geoportal.seduh.df.gov.br/static/m...	20102.785727	5.046810e+06	20102.785727	POLYGO ((183531.15 8245604.81 183521.071 8.
20	11.0	Cruzeiro	XI	https://www.geoportal.seduh.df.gov.br/static/m...	8229.894406	3.191164e+06	8229.894406	POLYGO ((185218.91 8250376.73 185060.128 8.
21	17.0	Riacho Fundo	XVII	https://www.geoportal.seduh.df.gov.br/static/m...	24477.933123	1.778112e+07	24477.933123	POLYGO ((177428.09 8242214.33 177470.544 8.
22	15.0	Recanto das Emas	XV	https://www.geoportal.seduh.df.gov.br/static/m...	75933.108888	1.026185e+08	75933.108888	POLYGO ((173758.00 8237037.34 173798.167 8.
23	16.0	Lago Sul	XVI	https://www.geoportal.seduh.df.gov.br/static/m...	80457.280629	7.604873e+07	80457.280629	POLYGO ((199614.24 8252004.64 199620.726 8.
24	18.0	Lago Norte	XVIII	https://www.geoportal.seduh.df.gov.br/static/m...	90173.204447	7.549172e+07	90173.204447	POLYGO ((191773.59 8262830.86 191784.192 8.
25	19.0	Candangolândia	XIX	https://www.geoportal.seduh.df.gov.br/static/m...	11012.005644	6.601864e+06	11012.005644	POLYGO ((185918.03 8245317.55 185912.291 8.
26	21.0	Riacho Fundo II	XXI	https://www.geoportal.seduh.df.gov.br/static/m...	29818.864175	3.846716e+07	29818.864175	POLYGO ((174586.60 8242596.51 174580.897 8.
27	22.0	Sudoeste/Octogonal	XXII	https://www.geoportal.seduh.df.gov.br/static/m...	13710.901645	6.467437e+06	13710.901645	POLYGO ((186142.66 8253197.26 186156.379 8.
28	23.0	Varjão	XXIII	https://www.geoportal.seduh.df.gov.br/static/m...	8196.192315	1.629437e+06	8196.192315	POLYGO ((192598.31 8260342.54 192433.544 8.
29	25.0	SCIA	XXV	https://www.geoportal.seduh.df.gov.br/static/m...	14266.639400	7.386587e+06	14266.639400	POLYGO ((178033.54 8255886.52 178045.571 8.
30	28.0	Itapoã	XXVIII	https://www.geoportal.seduh.df.gov.br/static/m...	34322.430048	3.430157e+07	34322.430048	POLYGO ((203989.37 8260842.87 204002.648 8.
31	29.0	SIA	XXIX	https://www.geoportal.seduh.df.gov.br/static/m...	31328.941199	2.905090e+07	31328.941199	POLYGO ((187388.40 8257642.71 186391.451 8.
32	30.0	Vicente Pires	XXX	https://www.geoportal.seduh.df.gov.br/static/m...	29288.369501	4.287804e+07	29288.369501	POLYGO ((177677.44 8249114.24 177431.580 8.

Geopandas map adjustments to include Administrative Region names:

In [9]:
```
ragdf["center"] = ragdf["geometry"].centroid     ## Creating the 'Center' column to store the center point of ea
ch administrative region.
ragdf_points = ragdf.copy()
ragdf_points.set_geometry("center", inplace = True)
ax = ragdf.plot(figsize=(22, 18),color = "whitesmoke", alpha=0.5, edgecolor='black',linewidth = 0.5)
texts = []
for x, y, label in zip(ragdf_points.geometry.x, ragdf_points.geometry.y, ragdf_points["ra"]):
    texts.append(plt.text(x, y, label, fontsize = 10))
ax.set_title('Regiões Administrativas - DF')
ax.set_axis_off()
```



DF Administrative Regions DataFrame with central point marking of each RA:

In [10]:
```
ragdf
```

Out[10]:

	ra_num	ra	num_ra	link	shape_leng	st_area_sh	st_length_	geometr
0	1.0	Plano Piloto	I	https://www.geoportal.seduh.df.gov.br/static/m...	184204.574473	4.372014e+08	184204.574473	POLYGO ((193478.14 8263481.14 193477.162 8.
1	2.0	Gama	II	https://www.geoportal.seduh.df.gov.br/static/m...	88897.980244	2.760534e+08	88897.980244	POLYGO ((174717.48 8234729.90 174835.804 8.
2	4.0	Brazlândia	IV	https://www.geoportal.seduh.df.gov.br/static/m...	107050.466657	4.701836e+08	107050.466657	POLYGO ((156150.49 8257172.99 156196.454 8.
3	5.0	Sobradinho	V	https://www.geoportal.seduh.df.gov.br/static/m...	102972.805688	1.935265e+08	102972.805688	POLYGO ((203513.96 8281431.43 203513.986 8.
4	6.0	Planaltina	VI	https://www.geoportal.seduh.df.gov.br/static/m...	228787.515933	1.531401e+09	228787.515933	POLYGO ((240552.97 8284705.23 240583.535 8.
5	7.0	Paranoá	VII	https://www.geoportal.seduh.df.gov.br/static/m...	215012.822589	8.312098e+08	215012.822589	POLYGO ((214739.17 8258683.40 214710.678 8.
6	10.0	Guará	X	https://www.geoportal.seduh.df.gov.br/static/m...	24813.097261	2.522335e+07	24813.097261	POLYGO ((181753.94 8250237.15 181748.876 8.
7	12.0	Samambaia	XII	https://www.geoportal.seduh.df.gov.br/static/m...	71223.324610	9.999229e+07	71223.324610	POLYGO ((173592.47 8244234.28 173592.778 8.
8	13.0	Santa Maria	XIII	https://www.geoportal.seduh.df.gov.br/static/m...	54220.965466	1.315831e+08	54220.965466	POLYGO ((190476.86 8232091.94 190489.180 8.
9	14.0	São Sebastião	XIV	https://www.geoportal.seduh.df.gov.br/static/m...	100738.242604	2.627052e+08	100738.242604	POLYGO ((201111.60 8242884.87 201192.650 8.
10	24.0	Park Way	XXIV	https://www.geoportal.seduh.df.gov.br/static/m...	86580.055638	1.184056e+08	86580.055638	MULTIPOLYGO (((184531.66 8242744.81 184385.
11	26.0	Sobradinho II	XXVI	https://www.geoportal.seduh.df.gov.br/static/m...	88404.720850	1.813521e+08	88404.720850	POLYGO ((181653.24 8280678.52 181680.163 8.
12	27.0	Jardim Botânico	XXVII	https://www.geoportal.seduh.df.gov.br/static/m...	138135.914460	2.914276e+08	138135.914460	POLYGO ((210104.95 8240961.34 210099.721 8.
13	20.0	Águas Claras	XX	None	16727.037341	9.186564e+06	16727.037341	POLYGO ((178086.10 8249266.72 178088.590 8.
14	9.0	Ceilândia	IX	None	117499.507889	1.926569e+08	117499.507889	POLYGO ((166533.08 8253994.36 166542.394 8.
15	32.0	Pôr do Sol	XXXII	None	37498.813107	4.049166e+07	37498.813107	POLYGO ((161030.45 8251189.86 161532.437 8.
16	31.0	Fercal	XXXI	https://www.geoportal.seduh.df.gov.br/static/m...	78975.903773	1.543800e+08	78975.903773	POLYGO ((202618.67 8284141.91 202624.984 8.
17	3.0	Taguatinga	III	None	52654.298610	6.304456e+07	52654.298610	POLYGO ((173604.78 8255372.85 173636.964 8.

	ra_num	ra	num_ra	link	shape_leng	st_area_sh	st_length_	geometr
18	33.0	Arniqueira	XXXIII	None	17003.195744	1.335850e+07	17003.195744	POLYGO ((177625.92 8246008.75 177672.626 8.
19	8.0	Núcleo Bandeirante	VIII	https://www.geoportal.seduh.df.gov.br/static/m...	20102.785727	5.046810e+06	20102.785727	POLYGO ((183531.15 8245604.81 183521.071 8.
20	11.0	Cruzeiro	XI	https://www.geoportal.seduh.df.gov.br/static/m...	8229.894406	3.191164e+06	8229.894406	POLYGO ((185218.91 8250376.73 185060.128 8.
21	17.0	Riacho Fundo	XVII	https://www.geoportal.seduh.df.gov.br/static/m...	24477.933123	1.778112e+07	24477.933123	POLYGO ((177428.09 8242214.33 177470.544 8.
22	15.0	Recanto das Emas	XV	https://www.geoportal.seduh.df.gov.br/static/m...	75933.108888	1.026185e+08	75933.108888	POLYGO ((173758.00 8237037.34 173798.167 8.
23	16.0	Lago Sul	XVI	https://www.geoportal.seduh.df.gov.br/static/m...	80457.280629	7.604873e+07	80457.280629	POLYGO ((199614.24 8252004.64 199620.726 8.
24	18.0	Lago Norte	XVIII	https://www.geoportal.seduh.df.gov.br/static/m...	90173.204447	7.549172e+07	90173.204447	POLYGO ((191773.59 8262830.86 191784.192 8.
25	19.0	Candangolândia	XIX	https://www.geoportal.seduh.df.gov.br/static/m...	11012.005644	6.601864e+06	11012.005644	POLYGO ((185918.03 8245317.55 185912.291 8.
26	21.0	Riacho Fundo II	XXI	https://www.geoportal.seduh.df.gov.br/static/m...	29818.864175	3.846716e+07	29818.864175	POLYGO ((174586.60 8242596.51 174580.897 8.
27	22.0	Sudoeste/Octogonal	XXII	https://www.geoportal.seduh.df.gov.br/static/m...	13710.901645	6.467437e+06	13710.901645	POLYGO ((186142.66 8253197.26 186156.379 8.
28	23.0	Varjão	XXIII	https://www.geoportal.seduh.df.gov.br/static/m...	8196.192315	1.629437e+06	8196.192315	POLYGO ((192598.31 8260342.54 192433.544 8.
29	25.0	SCIA	XXV	https://www.geoportal.seduh.df.gov.br/static/m...	14266.639400	7.386587e+06	14266.639400	POLYGO ((178033.54 8255886.52 178045.571 8.
30	28.0	Itapoã	XXVIII	https://www.geoportal.seduh.df.gov.br/static/m...	34322.430048	3.430157e+07	34322.430048	POLYGO ((203989.37 8260842.87 204002.648 8.
31	29.0	SIA	XXIX	https://www.geoportal.seduh.df.gov.br/static/m...	31328.941199	2.905090e+07	31328.941199	POLYGO ((187388.40 8257642.71 186391.451 8.
32	30.0	Vicente Pires	XXX	https://www.geoportal.seduh.df.gov.br/static/m...	29288.369501	4.287804e+07	29288.369501	POLYGO ((177677.44 8249114.24 177431.580 8.

Getting Wikipedia data from Income per Capita by DF Administrative Region:

In [11]:
```
url2 = 'https://pt.wikipedia.org/wiki/Lista_de_regi%C3%B5es_administrativas_do_Distrito_Federal_por_renda_per_capita'
renda_df = pd.read_html(url2, decimal=',',thousands='.')
renda_df = renda_df[0]
renda_df = renda_df.rename(columns={'Região administrativa':'ra'})
renda_df.head()
```

Out[11]:

	Posição	ra	Renda per capita
0	1	Lago Sul	8317.4
1	2	Sudoeste/Octogonal	7073.7
2	3	Plano Piloto	6778.0
3	4	Lago Norte	6362.3
4	5	Park Way	5902.9

Insert columns "Longitude" and "Latitude" on geopandas dataframe:

In [16]:
```
ragdf['Longitude'] = ragdf.geometry.centroid.x
ragdf['Latitude'] = ragdf.geometry.centroid.y
print(ragdf['geometry'].crs)
teste1 = ragdf
teste1['geometry'] = ragdf['geometry'].to_crs(epsg=4326)
print(teste1['geometry'].crs)
teste1.head()
```

```
{'init': 'epsg:31983'}
{'init': 'epsg:31983'}
```

Out[16]:

	ra_num	ra	num_ra	link	shape_leng	st_area_sh	st_length_	geometry	cer
0	1.0	Plano Piloto	I	https://www.geoportal.seduh.df.gov.br/static/m...	184204.574473	4.372014e+08	184204.574473	POLYGON ((-135.23474 -85.52569, -135.23474 -85...	PO (182864.5 8260433.7
1	2.0	Gama	II	https://www.geoportal.seduh.df.gov.br/static/m...	88897.980244	2.760534e+08	88897.980244	POLYGON ((-135.23476 -85.52569, -135.23476 -85...	PO (163796.3 8228531.5
2	4.0	Brazlândia	IV	https://www.geoportal.seduh.df.gov.br/static/m...	107050.466657	4.701836e+08	107050.466657	POLYGON ((-135.23474 -85.52568, -135.23474 -85...	PO (163814.5 8269927.1
3	5.0	Sobradinho	V	https://www.geoportal.seduh.df.gov.br/static/m...	102972.805688	1.935265e+08	102972.805688	POLYGON ((-135.23472 -85.52569, -135.23472 -85...	PO (201689.5 8269503.3
4	6.0	Planaltina	VI	https://www.geoportal.seduh.df.gov.br/static/m...	228787.515933	1.531401e+09	228787.515933	POLYGON ((-135.23471 -85.52569, -135.23472 -85...	PO (228573.4 8265867.9

In [17]:
```
# Merge dataframes
lat_log_list = ragdf[['ra','Longitude','Latitude']]
lat_log_list = pd.merge(lat_log_list, renda_df, on='ra')
lat_log_list
```

Out[17]:

	ra	Longitude	Latitude	Posição	Renda per capita
0	Plano Piloto	-47.958782	-15.714441	3	6778.0
1	Gama	-48.140983	-15.999901	16	1596.4
2	Brazlândia	-48.135062	-15.626260	21	1118.9
3	Sobradinho	-47.782217	-15.634853	15	2192.3
4	Planaltina	-47.532036	-15.670708	20	1140.2
5	Paranoá	-47.552538	-15.917338	28	826.8
6	Guará	-47.973383	-15.829029	10	3642.6
7	Samambaia	-48.152634	-15.889076	23	99230.0
8	Santa Maria	-47.954339	-16.016189	24	977.0
9	São Sebastião	-47.700278	-15.974347	18	1351.2
10	Park Way	-47.953064	-15.927289	5	5902.9
11	Sobradinho II	-47.928700	-15.596131	13	2362.2
12	Jardim Botânico	-47.817637	-15.945423	6	5861.9
13	Águas Claras	-48.024603	-15.834096	7	4407.5
14	Ceilândia	-48.201381	-15.828104	22	1116.1
15	Fercal	-47.884513	-15.543466	29	813.4
16	Taguatinga	-48.070055	-15.803703	14	2206.6
17	Núcleo Bandeirante	-47.969780	-15.871768	12	2381.1
18	Cruzeiro	-47.937448	-15.791643	8	3754.8
19	Riacho Fundo	-48.005647	-15.894611	19	1310.4
20	Recanto das Emas	-48.141137	-15.930624	26	857.6
21	Lago Sul	-47.871687	-15.855757	1	8317.4
22	Lago Norte	-47.848483	-15.725196	4	6362.3
23	Candangolândia	-47.946104	-15.856199	17	1415.7
24	Riacho Fundo II	-48.025713	-15.920650	30	797.1
25	Sudoeste/Octogonal	-47.926811	-15.796007	2	7073.7
26	Varjão	-47.879596	-15.709629	27	834.2
27	SCIA	-47.992175	-15.777561	31	570.3
28	Itapoã	-47.743945	-15.739397	25	925.8
29	SIA	-47.955670	-15.775186	9	3815.2
30	Vicente Pires	-48.026170	-15.791605	11	2686.6

Searching for Venues Information with the Foursquare API:

Foursquare API searches will be conducted for each Administrative Region of the Federal District

In [18]:
```
columns_name = ['id', 'Name', 'Latitude', 'Longitude', 'Categorie_name','ra']
nearby_venues = pd.DataFrame(columns=columns_name)
for index, row in lat_log_list.iterrows():
    print(index,row['ra'],row['Longitude'],row['Latitude'])
    ra = row['ra']
    URL = 'https://api.foursquare.com/v2/venues/search?intent=browse&client_id={}\
    &client_secret={}\
    &v={}&ll={},{}\
    &radius={}&\
    limit={}'.format(\
                    CLIENT_ID,\
                    CLIENT_SECRET,\
                    VERSION,\
                    float(row['Latitude']),\
                    float(row['Longitude']),\
                    3000,\
                    50)
    result = requests.get(URL).json()
    venues = result['response']['venues']
    for x in range(len(venues)):
        df_temp = venues[x]
        if len(df_temp['categories']) > 0:
            categorie_name = df_temp['categories'][0]['name']
        else:
            categorie_name = 'Não Informado'
        nearby_venues = nearby_venues.append({'id': df_temp['id'],\
                                              'Name': df_temp['name'],\
                                              'Latitude': df_temp['location']['lat'],\
                                              'Longitude': df_temp['location']['lng'],\
                                              'Categorie_name': categorie_name,\
                                              'ra': ra},ignore_index=True)
```

```
0 Plano Piloto -47.95878210139519 -15.714440663638443
1 Gama -48.14098322099339 -15.999901313821143
2 Brazlândia -48.135062094607115 -15.626259548368463
3 Sobradinho -47.782216793713665 -15.63485251310192
4 Planaltina -47.53203556308109 -15.670707542655371
5 Paranoá -47.55253845476664 -15.917337756045992
6 Guará -47.973383126250766 -15.829028594444559
7 Samambaia -48.152633938492045 -15.889076197152397
8 Santa Maria -47.95433869502863 -16.016189332771827
9 São Sebastião -47.70027812604116 -15.97434741723731
10 Park Way -47.953064476565764 -15.927288626705591
11 Sobradinho II -47.92870007878245 -15.59613070378277
12 Jardim Botânico -47.81763745839281 -15.945423464265456
13 Águas Claras -48.0246025978681 -15.834096206315829
14 Ceilândia -48.20138110813726 -15.828103738415821
15 Fercal -47.88451333554014 -15.543465706614558
16 Taguatinga -48.070055131228024 -15.803703082922995
17 Núcleo Bandeirante -47.969779597697354 -15.87176799043519
18 Cruzeiro -47.93744795014466 -15.791642828462319
19 Riacho Fundo -48.0056470852028 -15.89461111939423
20 Recanto das Emas -48.14113674719831 -15.93062399773845
21 Lago Sul -47.87168719832792 -15.855756702366204
22 Lago Norte -47.848482760490384 -15.725196195703809
23 Candangolândia -47.9461043145777 -15.856199105902279
24 Riacho Fundo II -48.02571302570581 -15.92064963818009
25 Sudoeste/Octogonal -47.92681052741655 -15.796007016540765
26 Varjão -47.87959601577942 -15.709629198594715
27 SCIA -47.992175445027385 -15.777561017725212
28 Itapoã -47.743944858548566 -15.739397088011478
29 SIA -47.95567040917259 -15.77518605642809
30 Vicente Pires -48.02617001924596 -15.791605217424294
```

Viewing information about the DataFrame created from FourSquare API search results:

In [19]:
```
nearby_venues.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 930 entries, 0 to 929
Data columns (total 6 columns):
id                930 non-null object
Name              930 non-null object
Latitude          930 non-null float64
Longitude         930 non-null float64
Categorie_name    930 non-null object
ra                930 non-null object
dtypes: float64(2), object(4)
memory usage: 43.7+ KB
```

Creating a Venues Category Summary DataFrame:

In [20]:
```
Categories_df = pd.DataFrame(nearby_venues.Categorie_name.value_counts())
```

Presenting the quantitative of the top 20 categories found in the survey:

In [21]:
```
Categories_df.head(20)
```

Out[21]:

	Categorie_name
Church	43
Other Great Outdoors	43
Housing Development	39
Salon / Barbershop	35
General Entertainment	32
Factory	23
Residential Building (Apartment / Condo)	23
Farm	22
Não Informado	21
Office	18
Government Building	18
Building	16
Event Space	14
Brazilian Restaurant	13
Automotive Shop	12
Bakery	12
Food Truck	10
Miscellaneous Shop	10
Pet Store	10
Pizza Place	10

In [ ]:
```
```