


```
In [1]: import numpy as np # library to handle data in a vectorized manner

import pandas as pd # library for data analysis
pd.set_option('display.max_columns', None)
pd.set_option('display.max_rows', None)

import json # library to handle JSON files

!conda install -c conda-forge geopy --yes # uncomment this line if you haven't completed the Foursquare API lab

from geopy.geocoders import Nominatim # convert an address into latitude and longitude values

import requests # library to handle requests
from pandas.io.json import json_normalize # transform JSON file into a pandas dataframe

# Matplotlib and associated plotting modules
import matplotlib.cm as cm
import matplotlib.colors as colors

# import k-means from clustering stage
from sklearn.cluster import KMeans

!conda install -c conda-forge folium=0.5.0 --yes # uncomment this line if you haven't completed the Foursquare API lab

import folium # map rendering library

print('Libraries imported.')
```

Solving environment: done

Package Plan

environment location: /opt/conda/envs/Python36

added / updated specs:

- geopy

The following packages will be downloaded:

package	build		
-----	-----		
certifi-2019.11.28	py36_0	149 KB	conda-forge
geopy-1.20.0	py_0	57 KB	conda-forge
ca-certificates-2019.11.28	hecc5488_0	145 KB	conda-forge
geographiclib-1.50	py_0	34 KB	conda-forge
openssl-1.1.1d	h516909a_0	2.1 MB	conda-forge
-----	-----		
Total:		2.5 MB	

The following NEW packages will be INSTALLED:

geographiclib:	1.50-py_0	conda-forge
geopy:	1.20.0-py_0	conda-forge

The following packages will be UPDATED:

ca-certificates:	2019.11.27-0	-->	2019.11.28-hecc5488_0	conda-forge
certifi:	2019.11.28-py36_0	-->	2019.11.28-py36_0	conda-forge

The following packages will be DOWNGRADED:

openssl:	1.1.1d-h7b6447c_3	-->	1.1.1d-h516909a_0	conda-forge
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Downloading and Extracting Packages

certifi-2019.11.28	149 KB	#####	100%
geopy-1.20.0	57 KB	#####	100%
ca-certificates-2019	145 KB	#####	100%
geographiclib-1.50	34 KB	#####	100%
openssl-1.1.1d	2.1 MB	#####	100%

Preparing transaction: done
Verifying transaction: done
Executing transaction: done
Solving environment: done

Package Plan

environment location: /opt/conda/envs/Python36

added / updated specs:
- folium=0.5.0

The following packages will be downloaded:

package	build			
-----	-----			
branca-0.3.1	py_0	25 KB	conda-forge	
vincent-0.4.4	py_1	28 KB	conda-forge	
folium-0.5.0	py_0	45 KB	conda-forge	
altair-4.0.0	py_0	606 KB	conda-forge	
-----	-----			
Total:		704 KB		

The following NEW packages will be INSTALLED:

altair: 4.0.0-py_0 conda-forge
branca: 0.3.1-py_0 conda-forge
folium: 0.5.0-py_0 conda-forge
vincent: 0.4.4-py_1 conda-forge

Downloading and Extracting Packages

branca-0.3.1	25 KB	#####	100%
vincent-0.4.4	28 KB	#####	100%
folium-0.5.0	45 KB	#####	100%
altair-4.0.0	606 KB	#####	100%

Preparing transaction: done
Verifying transaction: done
Executing transaction: done
Libraries imported.

We define the Foursquare Credentials

```
In [6]: CLIENT_ID = 'F3MJ1QJPRHR3QIUN4UFG0GCMJJM53NC2RXKOGENYKFCDTVOK' # your Foursquare ID
CLIENT_SECRET = 'ESQQJ2EZNYXRSKN30MFHEXHZHRR3WADCB5TJ2LPSL3YIHSU3' # your Foursquare Secret
VERSION = '20191216' # Foursquare API version

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

Your credentials:

CLIENT_ID: F3MJ1QJPRHR3QIUN4UFG0GCMJJM53NC2RXKOGENYKFCDTVOK

CLIENT_SECRET:ESQQJ2EZNYXRSKN30MFHEXHZHRR3WADCB5TJ2LPSL3YIHSU3

```
In [3]: !conda install -c conda-forge geopy --yes # uncomment this line if you haven't completed the Foursquare API lab
from geopy.geocoders import Nominatim # convert an address into latitude and longitude values
```

Solving environment: done

All requested packages already installed.

```
In [4]: address = 'Yaounde, Cameroon'

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

The geographical coordinate of Yaounde are 3.8689867, 11.5213344.

We get the First 50 venues within a radius of 10,000 meters in Yaounde

```
In [7]: # type your answer here
LIMIT = 100 # limit of number of venues returned by Foursquare API
radius = 10000 # define radius
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    latitude,
    longitude,
    radius,
    LIMIT)
url
```

```
Out[7]: 'https://api.foursquare.com/v2/venues/explore?&client_id=F3MJ1QJPRHR3QIUN4UFG0GCMJJM53NC2RXKOGENYKFCDTVOK&client_secret=ESQQJ2EZYXRSKN30MFHEXHZHRR3WADCB5TJ2LPSL3YIHSU3&v=20191216&ll=3.8689867,11.5213344&radius=10000&limit=100'
```

```
In [8]: results = requests.get(url).json()  
results
```

```
Out[8]: {'meta': {'code': 200, 'requestId': '5df751fc618f43001b1d79d3'},
  'response': {'suggestedFilters': {'header': 'Tap to show:',
    'filters': [{'name': 'Open now', 'key': 'openNow'}]},
    'headerLocation': 'Yaoundé',
    'headerFullLocation': 'Yaoundé',
    'headerLocationGranularity': 'city',
    'totalResults': 51,
    'suggestedBounds': {'ne': {'lat': 3.9589867900000897,
      'lng': 11.611371649081004},
      'sw': {'lat': 3.778986609999991, 'lng': 11.431297150918997}},
    'groups': [{'type': 'Recommended Places',
      'name': 'recommended',
      'items': [{'reasons': {'count': 0,
        'items': [{'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason'}]}],
      'venue': {'id': '4c26de29905a0f478e246460',
        'name': 'Boulangerie Elysee One',
        'location': {'address': '34, Avenue Merechal Foch',
          'crossStreet': '1.027',
          'lat': 3.867599651445836,
          'lng': 11.516626089682264,
          'labeledLatLngs': [{'label': 'display',
            'lat': 3.867599651445836,
            'lng': 11.516626089682264}]},
        'distance': 545,
        'cc': 'CM',
        'neighborhood': 'Centre Ville',
        'city': 'Yaoundé',
        'state': 'Central',
        'country': 'Cameroon',
        'formattedAddress': ['34, Avenue Merechal Foch (1.027)',
          'Yaoundé',
          'Cameroon']},
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        'pluralName': 'Bakeries',
        'shortName': 'Bakery',
        'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/bakery_',
          'suffix': '.png'},
        'primary': True}],
      'photos': {'count': 0, 'groups': []},
      'venuePage': {'id': '427337759'}}],
```



```
'referralId': 'e-0-4c26de29905a0f478e246460-0'},
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    'reasonName': 'globalInteractionReason' } ] },
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  'name': 'Smile',
  'location': { 'lat': 3.870628164197312,
    'lng': 11.516315118368835,
    'labeledLatLngs': [ { 'label': 'display',
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      'lng': 11.516315118368835 } ] },
  'distance': 586,
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  'state': 'Centre',
  'country': 'Cameroon',
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  'shortName': 'Bar',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/nightlife/pub_',
    'suffix': '.png' },
  'primary': True } ] },
'photos': { 'count': 0, 'groups': [ ] },
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  'location': { 'lat': 3.8582236735399014,
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```

```
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        'shortName': 'Bakery',
        'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/bakery_',
            'suffix': '.png'},
        'primary': True}],
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            'labeledLatLngs': [{ 'label': 'display',
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                'lng': 11.515490453427525}],
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            'cc': 'CM',
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            'state': 'Centre',
            'country': 'Cameroon',
            'formattedAddress': ['Yaoundé', 'Cameroon']],
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            'pluralName': 'Hotels',
            'shortName': 'Hotel',
            'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/hotel_',
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            'primary': True}],
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    { 'reasons': { 'count': 0,
        'items': [{ 'summary': 'This spot is popular',
            'type': 'general',
            'reasonName': 'globalInteractionReason'}]}},
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        'location': { 'crossStreet': 'Montée du Djeuga Palace',
```

```
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  'primary': True}],
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  'lng': 11.512341049292658,
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    'lng': 11.512341049292658}],
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  'state': 'Centre',
  'country': 'Cameroon',
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    'Yaoundé',
    'Cameroon']}]},

```

```
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  'country': 'Cameroon',
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  'pluralName': 'Bakeries',
  'shortName': 'Bakery',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/bakery_',
    'suffix': '.png' },
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  'name': 'Institut Français Du Cameroun',
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```

```
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'state': 'Centre',
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  'pluralName': 'Comedy Clubs',
  'shortName': 'Comedy Club',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/arts_entertainment/comedyclub_',
    'suffix': '.png'},
  'primary': True}],
'photos': { 'count': 0, 'groups': []}},
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    'reasonName': 'globalInteractionReason'}]}},
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      'lng': 11.519388260767082}],
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    'shortName': 'Café',
    'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/cafe_',
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    'primary': True}],
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```

```
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    'reasonName': 'globalInteractionReason' } ] },
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  'formattedAddress': [ 'Yaoundé', 'Cameroon' ] },
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  'name': 'Pain Porc Bastos',
  'location': {'lat': 3.8921847273844494,
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    'labeledLatLngs': [{ 'label': 'display',
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      'lng': 11.511578584910335 } ] },
  'distance': 2800,
  'cc': 'CM',
  'city': 'Yaoundé',
  'state': 'Centre',
  'country': 'Cameroon',
```

```
    'formattedAddress': ['Yaoundé', 'Cameroon']],
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            'suffix': '.png'},
        'primary': True}],
    'photos': { 'count': 0, 'groups': []},
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        'items': [{ 'summary': 'This spot is popular',
            'type': 'general',
            'reasonName': 'globalInteractionReason'}]}],
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        'name': 'the mask',
        'location': { 'lat': 3.8931196979137774,
            'lng': 11.508701391939935,
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                'lng': 11.508701391939935}],
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            'country': 'Cameroon',
            'formattedAddress': ['Cameroon']},
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                'suffix': '.png'},
            'primary': True}],
        'photos': { 'count': 0, 'groups': []},
        'referralId': 'e-0-535c1ad0498ebbfccae396-11'},
    { 'reasons': { 'count': 0,
        'items': [{ 'summary': 'This spot is popular',
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    'venue': { 'id': '4dd67d3ed1647fcf3e32625d',
        'name': 'Espresso House',
        'location': { 'address': 'Carrefour Bastos',
            'lat': 3.892416901887122,
            'lng': 11.511283287554665,
```

```
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  'shortName': 'Coffee Shop',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/coffeeshop_',
    'suffix': '.png'},
  'primary': True}],
'photos': { 'count': 0, 'groups': []}},
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{ 'reasons': { 'count': 0,
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    'type': 'general',
    'reasonName': 'globalInteractionReason'}]},
'venue': { 'id': '4f2e8e17e4b067066e424a6c',
  'name': 'Selecte (Etoa-Meki)',
  'location': { 'address': 'Situé au carrefour ETOA - MEKI',
    'lat': 3.8821877777037868,
    'lng': 11.523828546028488,
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    'cc': 'CM',
    'neighborhood': 'Etoa meki',
    'city': 'Yaoundé',
    'state': 'Centre',
    'country': 'Cameroon',
    'formattedAddress': ['Situé au carrefour ETOA - MEKI',
      'Yaoundé',
      'Cameroon']}],
  'categories': [{ 'id': '4bf58dd8d48988d16a941735',
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    'pluralName': 'Bakeries',
    'shortName': 'Bakery',
```



```
    'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/bakery_',
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    'suffix': '.png' },
  'primary': True } ] ],
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'state': 'Central',
'country': 'Cameroon',
'formattedAddress': ['carrefour bastos', 'Yaoundé', 'Cameroon']],
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'shortName': 'Fast Food',
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```
    'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/fastfood_',
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    'country': 'Cameroon',
    'formattedAddress': ['Cameroon']},
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      'primary': True}],
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            'lng': 11.514852094495277}]},
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          'cc': 'CM',
          'city': 'Yaoundé',
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  'shortName': 'Food & Drink',
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    'formattedAddress': ['Cameroon']}],
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  'shortName': 'Bakery',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/bakery_',
    'suffix': '.png'},
  'primary': True}],
'photos': { 'count': 0, 'groups': []}},
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  'name': 'Le Quebec snack',
  'location': { 'address': 'Titi garage',
```

```
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  'shortName': 'Bar',
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    'suffix': '.png'},
  'primary': True}],
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    'shortName': 'Bakery',
```

```
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    'primary': True]],
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      'lng': 11.510151972268686,
      'labeledLatLngs': [{'label': 'display',
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        'lng': 11.510151972268686}]},
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    'cc': 'CM',
    'city': 'Yaoundé',
    'state': 'Centre',
    'country': 'Cameroon',
    'formattedAddress': ['bastos (en face de JC)',
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      'Cameroon']},
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      'shortName': 'Gourmet',
      'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/shops/food_gourmet_',
        'suffix': '.png'},
      'primary': True}],
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    'name': 'Marché Mokolo',
    'location': {'lat': 3.874204887749205,
```

```
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  'shortName': 'Market',
  'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/shops/market_',
    'suffix': '.png'},
  'primary': True}],
'photos': {'count': 0, 'groups': []}},
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    'labeledLatLngs': [{'label': 'display',
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      'lng': 11.527527865731207}],
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    'cc': 'CM',
    'city': 'Yaoundé',
    'state': 'Centre',
    'country': 'Cameroon',
    'formattedAddress': ['Yaoundé', 'Cameroon']],
  '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}],
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    'reasonName': 'globalInteractionReason'}]}],
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    'labeledLatLngs': [{'label': 'display',
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      'lng': 11.53393849846953}]},
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  'cc': 'CM',
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  'state': 'Centre',
  'country': 'Cameroon',
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  'pluralName': 'Outdoors & Recreation',
  'shortName': 'Outdoors & Recreation',
  'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/parks_outdoors/default_',
    'suffix': '.png'},
  'primary': True}],
'photos': {'count': 0, 'groups': []}},
'referralId': 'e-0-4db4421f0cb6729b6a8ffa42-46'},
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  'name': 'Carrefour Nsam',
  'location': {'lat': 3.825236896579984,
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    'labeledLatLngs': [{'label': 'display',
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  'cc': 'CM',
  'country': 'Cameroon',
  'formattedAddress': ['Cameroon']},
```

```
'categories': [{ 'id': '4bf58dd8d48988d164941735',
  'name': 'Plaza',
  'pluralName': 'Plazas',
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  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/parks_outdoors/plaza_',
    'suffix': '.png'},
  'primary': True}],
'photos': { 'count': 0, 'groups': []},
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    'reasonName': 'globalInteractionReason'}]},
'venue': { 'id': '52da776c498ea6cf321dd216',
  'name': 'Marché Etoudi',
  'location': { 'address': 'etoudi',
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    'lng': 11.525102475900626,
    'labeledLatLngs': [{ 'label': 'display',
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      'lng': 11.525102475900626}],
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    'cc': 'CM',
    'city': 'Yaoundé',
    'state': 'Centre',
    'country': 'Cameroon',
    'formattedAddress': ['etoudi (etoudi)', 'Yaoundé', 'Cameroon']}},
'categories': [{ 'id': '4bf58dd8d48988d1f6941735',
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  'pluralName': 'Department Stores',
  'shortName': 'Department Store',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/shops/departmentstore_',
    'suffix': '.png'},
  'primary': True}],
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  'items': [{ 'summary': 'This spot is popular',
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    'reasonName': 'globalInteractionReason'}]},
'venue': { 'id': '5060b4c1e4b022844ad119e8',
  'name': 'Carrefour Tropicana',
```

```
'location': {'lat': 3.8174590496882645,
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'country': 'Cameroon',
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'name': 'Plaza',
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'shortName': 'Plaza',
'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/parks_outdoors/plaza_',
'suffix': '.png'},
'primary': True}],
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'items': [{'summary': 'This spot is popular',
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'venue': {'id': '551ec12a498e4993bd26d8df',
'name': 'carrefour Ile educative',
'location': {'address': 'Carrefour Île Éducative',
'lat': 3.926502317904165,
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'Cameroon']},
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'shortName': 'Plaza',
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```

```
        'suffix': '.png'},
        'primary': True}],
        'photos': {'count': 0, 'groups': []}},
        'referralId': 'e-0-551ec12a498e4993bd26d8df-50'}}]]]]}
```

In [9]: *# function that extracts the category of the venue*

```
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 [10]: # Let us get the Data into a Pandas Data Frame
venues = results['response']['groups'][0]['items']

yde_venues = json_normalize(venues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
yde_venues = yde_venues.loc[:, filtered_columns]

# filter the category for each row
yde_venues['venue.categories'] = yde_venues.apply(get_category_type, axis=1)

# clean columns
yde_venues.columns = [col.split(".")[1] for col in yde_venues.columns]

yde_venues.head()

```

Out[10]:

	name	categories	lat	lng
0	Boulangerie Elysee One	Bakery	3.867600	11.516626
1	Smile	Bar	3.870628	11.516315
2	Acropole	Bakery	3.858224	11.521865
3	La Falaise Hotel	Hotel	3.870417	11.515490
4	Black and White (Djeuga)	Lounge	3.871185	11.515633

```

In [11]: yde_venues['City'] = 'Yaounde'
yde_venues = yde_venues[['City', 'name', 'categories', 'lat', 'lng']] # To index the City column to the first
yde_venues.head()

```

Out[11]:

	City	name	categories	lat	lng
0	Yaounde	Boulangerie Elysee One	Bakery	3.867600	11.516626
1	Yaounde	Smile	Bar	3.870628	11.516315
2	Yaounde	Acropole	Bakery	3.858224	11.521865
3	Yaounde	La Falaise Hotel	Hotel	3.870417	11.515490
4	Yaounde	Black and White (Djeuga)	Lounge	3.871185	11.515633

Venues in Douala

```
In [12]: # We get all venues within a radius of 50000 meters in the city Douala
address = 'Douala, Cameroon'

geolocator = Nominatim(user_agent="Foursquare_agent")
location = geolocator.geocode(address)
latitude_dla = location.latitude
longitude_dla = location.longitude
print('The geographical coordinates of Douala are {}, {}'.format(latitude_dla, longitude_dla))
```

The geographical coordinates of Douala are 4.0429408, 9.706203.

```
In [13]: # type your answer here
LIMIT = 100 # limit of number of venues returned by Foursquare API
radius = 10000 # define radius
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    latitude_dla,
    longitude_dla,
    radius,
    LIMIT)
url
```

```
Out[13]: 'https://api.foursquare.com/v2/venues/explore?&client_id=F3MJ1QJPRHR3QIUN4UFG0GCMJJM53NC2RXKOGENYKFCDTVOK&client_secret=ESQQJ2EZNYXRSKN30MFHEXHZHRR3WADCB5TJ2LPSL3YIHSU3&v=20191216&ll=4.0429408,9.706203&radius=10000&limit=100'
```

```
In [14]: results = requests.get(url).json()  
results
```

```
Out[14]: {'meta': {'code': 200, 'requestId': '5df7521d216785001bfc3702'},
  'response': {'suggestedFilters': {'header': 'Tap to show:',
    'filters': [{'name': 'Open now', 'key': 'openNow'}]},
    'headerLocation': 'Douala',
    'headerFullLocation': 'Douala',
    'headerLocationGranularity': 'city',
    'totalResults': 51,
    'suggestedBounds': {'ne': {'lat': 4.13294089000009,
      'lng': 9.796259155128226},
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    'groups': [{'type': 'Recommended Places',
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      'items': [{'reasons': {'count': 0,
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          'type': 'general',
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        'location': {'address': 'Bonapriso',
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        'shortName': 'French',
        'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/french_',
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        'primary': True}],
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        'reasonName': 'globalInteractionReason'}]}],
```

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        'primary': True}],
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```



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'state': 'Littoral',
'country': 'Cameroon',
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'pluralName': 'French Restaurants',
'shortName': 'French',
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'primary': True}],
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'state': 'Littoral',
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    'Cameroon']]],
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```

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'location': {'address': 'Bonapriso',
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'lat': 4.023070257787716,
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'state': 'Littoral',
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```

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'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/icecream_',
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'primary': True}],
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{'reasons': {'count': 0,
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```

```
    'reasonName': 'globalInteractionReason'}}]],
'venue': {'id': '4ea51386e5facb29c85b5e6c',
'name': 'Boulangerie saker',
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'lat': 4.045243311898181,
'lng': 9.693265824366138,
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'lng': 9.693265824366138}]},
'distance': 1459,
'cc': 'CM',
'city': 'Douala',
'state': 'Littoral',
'country': 'Cameroon',
'formattedAddress': ['Akwa (Face immeuble PMUC)',
'Douala',
'Cameroon']},
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'pluralName': 'Bakeries',
'shortName': 'Bakery',
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'suffix': '.png'},
'primary': True}],
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'reasonName': 'globalInteractionReason'}}]],
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'name': 'Hotel Sawa Douala',
'location': {'lat': 4.034004022550721,
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'labeledLatLngs': [{'label': 'display',
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'cc': 'CM',
'city': 'Douala',
'state': 'Littoral',
'country': 'Cameroon',
```

```
'formattedAddress': ['Douala', 'Cameroon']],
'categories': [{ 'id': '4bf58dd8d48988d1fa931735',
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  'pluralName': 'Hotels',
  'shortName': 'Hotel',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/hotel_',
    'suffix': '.png'},
  'primary': True}],
'photos': { 'count': 0, 'groups': []}},
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    'reasonName': 'globalInteractionReason'}]}],
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  'location': { 'lat': 4.092292565975116,
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    'labeledLatLngs': [{ 'label': 'display',
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  'country': 'Cameroon',
  'formattedAddress': ['Cameroon']],
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  'pluralName': 'Shopping Malls',
  'shortName': 'Mall',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/shops/mall_',
    'suffix': '.png'},
  'primary': True}],
'photos': { 'count': 0, 'groups': []}},
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  'location': { 'lat': 4.051795576007091,
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```

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        'shortName': 'Department Store',
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        'primary': True}],
    'photos': { 'count': 0, 'groups': []}},
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            'reasonName': 'globalInteractionReason'}]},
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                    'lng': 9.706648467058445}],
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                'country': 'Cameroon',
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                'shortName': 'Historic Site',
                'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/arts_entertainment/historicsite_',
                    'suffix': '.png'},
                'primary': True}],
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    'country': 'Cameroon',
    'formattedAddress': ['Cameroon']},
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    'name': 'Bar',
    'pluralName': 'Bars',
    'shortName': 'Bar',
    'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/nightlife/pub_',
      'suffix': '.png'},
    'primary': True}],
  'photos': {'count': 0, 'groups': []}},
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    'type': 'general',
    'reasonName': 'globalInteractionReason'}]},
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  'name': 'Tchop et yamo',
  'location': {'address': 'Face hopital',
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    'lat': 4.091071706550489,
    'lng': 9.741236797410428,
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      'lng': 9.741236797410428}]},
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    'cc': 'CM',
    'city': 'Douala',
    'state': 'Littoral',
    'country': 'Cameroon',
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      'Cameroon']},
  'categories': [{'id': '4bf58dd8d48988d16e941735',
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```

```
    'pluralName': 'Fast Food Restaurants',
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    'primary': True}],
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      'reasonName': 'globalInteractionReason'}]}],
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    'name': 'Carrefour Ange Raphael',
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      'labeledLatLngs': [{'label': 'display',
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        'lng': 9.734815531504255}]},
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    'country': 'Cameroon',
    'formattedAddress': ['Cameroon']},
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      'shortName': 'Plaza',
      'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/parks_outdoors/plaza_',
        'suffix': '.png'},
      'primary': True}],
    'photos': {'count': 0, 'groups': []}},
    'referralId': 'e-0-528e54c311d2eb86ccadeb2d-45'},
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      'items': [{'summary': 'This spot is popular',
        'type': 'general',
        'reasonName': 'globalInteractionReason'}]}],
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        'name': 'Carrefour Ndokoti',
        'location': {'lat': 4.044210253320161,
          'lng': 9.744647635014337,
          'labeledLatLngs': [{'label': 'display',
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            'lng': 9.744647635014337}]},
          'distance': 4271,
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'country': 'Cameroon',
'formattedAddress': ['Cameroon']],
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  'pluralName': 'Plazas',
  'shortName': 'Plaza',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/parks_outdoors/plaza_',
    'suffix': '.png'},
  'primary': True}],
'photos': { 'count': 0, 'groups': []}},
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    'reasonName': 'globalInteractionReason'}]}],
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  'name': 'Saker Makepe',
  'location': { 'lat': 4.083984117058257,
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    'labeledLatLngs': [{ 'label': 'display',
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      'lng': 9.755711475568209}],
    'distance': 7148,
    'cc': 'CM',
    'country': 'Cameroon',
    'formattedAddress': ['Cameroon']],
  'categories': [{ 'id': '4bf58dd8d48988d16a941735',
    'name': 'Bakery',
    'pluralName': 'Bakeries',
    'shortName': 'Bakery',
    'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/bakery_',
      'suffix': '.png'},
    'primary': True}],
  'photos': { 'count': 0, 'groups': []}},
'referralId': 'e-0-5010f8b4e4b06b8dcab9d265-47'},
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  'items': [{ 'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]}],
'venue': { 'id': '55aa81ad498e9265d407f882',
  'name': 'Makepe Rhône Poulain',
  'location': { 'lat': 4.085243902085549,
```

```
'lng': 9.757034659369065,
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'country': 'Cameroon',
'formattedAddress': ['Cameroon']],
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  'pluralName': 'Plazas',
  'shortName': 'Plaza',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/parks_outdoors/plaza_',
    'suffix': '.png'},
  'primary': True}],
'photos': { 'count': 0, 'groups': []}},
'referralId': 'e-0-55aa81ad498e9265d407f882-48'},
{'reasons': { 'count': 0,
  'items': [{ 'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]}],
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  'name': 'MTN Business Lounge',
  'location': { 'lat': 4.010629505038713,
    'lng': 9.717017852071773,
    'labeledLatLngs': [{ 'label': 'display',
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      'lng': 9.717017852071773}],
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    'cc': 'CM',
    'country': 'Cameroon',
    'formattedAddress': ['Cameroon']],
  'categories': [{ 'id': '4bf58dd8d48988d121941735',
    'name': 'Lounge',
    'pluralName': 'Lounges',
    'shortName': 'Lounge',
    'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/nightlife/default_',
      'suffix': '.png'},
    'primary': True}],
  'photos': { 'count': 0, 'groups': []}},
'referralId': 'e-0-4d98e3f661a3a1cde8d4d842-49'},
{'reasons': { 'count': 0,
  'items': [{ 'summary': 'This spot is popular',
```

```

        'type': 'general',
        'reasonName': 'globalInteractionReason']]],
    'venue': {'id': '534a5f8211d2f606d50ddff3',
              'name': 'Boulangerie du Rail',
              'location': {'address': 'Bonaberi',
                           'lat': 4.0946112383732185,
                           'lng': 9.647155698217817,
                           'labeledLatLngs': [{'label': 'display',
                                                  'lat': 4.0946112383732185,
                                                  'lng': 9.647155698217817}]},
              'distance': 8721,
              'cc': 'CM',
              'city': 'Douala',
              'state': 'Littoral',
              'country': 'Cameroon',
              'formattedAddress': ['Bonaberi', 'Douala', 'Cameroon']},
    'categories': [{'id': '4bf58dd8d48988d16a941735',
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                     'pluralName': 'Bakeries',
                     'shortName': 'Bakery',
                     'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/bakery_',
                              'suffix': '.png'},
                     'primary': True}],
    'photos': {'count': 0, 'groups': []}],
    'referralId': 'e-0-534a5f8211d2f606d50ddff3-50'}]]]]}

```

In [15]: *# function that extracts the category of the venue*

```

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 [16]: # Let us get the Data into a Pandas Data Frame
venues = results['response']['groups'][0]['items']

dla_venues = json_normalize(venues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
dla_venues = dla_venues.loc[:, filtered_columns]

# filter the category for each row
dla_venues['venue.categories'] = dla_venues.apply(get_category_type, axis=1)

# clean columns
dla_venues.columns = [col.split(".")[1] for col in dla_venues.columns]

dla_venues.head()

```

Out[16]:

	name	categories	lat	lng
0	bistro latin	French Restaurant	4.025423	9.699855
1	Black & White	Lounge	4.042449	9.690882
2	L'Olympia	Nightclub	4.045374	9.687997
3	La Pizzeria	Pizza Place	4.024981	9.694013
4	Zepol	Bakery	4.052977	9.697380

```
In [17]: dla_venues['City'] = 'Douala'
dla_venues = dla_venues[['City', 'name', 'categories', 'lat', 'lng']] # To index the City column to the first
dla_venues.head()
```

Out[17]:

	City	name	categories	lat	lng
0	Douala	bistro latin	French Restaurant	4.025423	9.699855
1	Douala	Black & White	Lounge	4.042449	9.690882
2	Douala	L'Olympia	Nightclub	4.045374	9.687997
3	Douala	La Pizzeria	Pizza Place	4.024981	9.694013
4	Douala	Zepol	Bakery	4.052977	9.697380

```
In [19]: pd1 = pd.concat([yde_venues, dla_venues], ignore_index = True)
pd1.head()
```

Out[19]:

	City	name	categories	lat	lng
0	Yaounde	Boulangerie Elysee One	Bakery	3.867600	11.516626
1	Yaounde	Smile	Bar	3.870628	11.516315
2	Yaounde	Acropole	Bakery	3.858224	11.521865
3	Yaounde	La Falaise Hotel	Hotel	3.870417	11.515490
4	Yaounde	Black and White (Djeuga)	Lounge	3.871185	11.515633

Venues in Bamenda

```
In [20]: # We get all vebues within a radius of 50000 meters in the city Bamenda
address = 'Bamenda, Cameroon'

geolocator = Nominatim(user_agent="Foursquare_agent")
location = geolocator.geocode(address)
latitude_bda = location.latitude
longitude_bda = location.longitude
print('The geograpical coordinates of Bamenda are {}, {}'.format(latitude_bda, longitude_bda))
```

The geograpical coordinates of Bamenda are 5.9614117, 10.1516505.

```
In [21]: # type your answer here
LIMIT = 100 # limit of number of venues returned by Foursquare API
radius = 10000 # define radius
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    latitude_bda,
    longitude_bda,
    radius,
    LIMIT)
url
```

```
Out[21]: 'https://api.foursquare.com/v2/venues/explore?&client_id=F3MJ1QJPRHR3QIUN4UFG0GCMJJM53NC2RXKOGENYKFCDTVOK&client_secret=ESQQJ2EZNYXRSKN30MFHEXHZHRR3WADCB5TJ2LPSL3YIHSU3&v=20191216&ll=5.9614117,10.1516505&radius=10000&limit=100'
```

```
In [22]: results = requests.get(url).json()  
results
```

```
Out[22]: {'meta': {'code': 200, 'requestId': '5df7527c9fcb92001b98218b'},
  'response': {'headerLocation': 'Current map view',
    'headerFullLocation': 'Current map view',
    'headerLocationGranularity': 'unknown',
    'totalResults': 4,
    'suggestedBounds': {'ne': {'lat': 6.05141179000009,
      'lng': 10.241970996548208},
      'sw': {'lat': 5.871411609999991, 'lng': 10.061330003451793}},
    'groups': [{ 'type': 'Recommended Places',
      'name': 'recommended',
      'items': [{ 'reasons': { 'count': 0,
        'items': [{ 'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason' } ] } ] },
      'venue': { 'id': '51331ca3e4b01d3a721b4b6e',
        'name': 'Amour Mezam Bamenda',
        'location': { 'address': 'Amour Mezam',
          'lat': 5.9581912360882745,
          'lng': 10.15119747258585,
          'labeledLatLngs': [{ 'label': 'display',
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            'lng': 10.15119747258585 } ] },
          'distance': 361,
          'cc': 'CM',
          'city': 'Bamenda',
          'state': 'North-West',
          'country': 'Cameroon',
          'formattedAddress': [ 'Amour Mezam', 'Bamenda', 'Cameroon' ] },
          'categories': [{ 'id': '4bf58dd8d48988d1fe931735',
            'name': 'Bus Station',
            'pluralName': 'Bus Stations',
            'shortName': 'Bus Station',
            'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/busstation_',
              'suffix': '.png' },
            'primary': True } ] },
          'photos': { 'count': 0, 'groups': [ ] },
          'referralId': 'e-0-51331ca3e4b01d3a721b4b6e-0' },
      { 'reasons': { 'count': 0,
        'items': [{ 'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason' } ] },
      'venue': { 'id': '570a0e5c498e543118245596',
        'name': 'Mondial Hotel',
```



```
'location': {'address': 'New Layout',
'crossStreet': 'Veterinary Junction',
'lat': 5.957181521955538,
'lng': 10.160382240236656,
'labeledLatLngs': [{'label': 'display',
'lat': 5.957181521955538,
'lng': 10.160382240236656}]},
'distance': 1075,
'postalCode': '0000',
'cc': 'CM',
'city': 'Bamenda',
'state': 'North-West',
'country': 'Cameroon',
'formattedAddress': ['New Layout (Veterinary Junction)',
'Bamenda 0000',
'Cameroon']},
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'name': 'Hotel',
'pluralName': 'Hotels',
'shortName': 'Hotel',
'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/hotel_',
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'primary': True}],
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'items': [{'summary': 'This spot is popular',
'type': 'general',
'reasonName': 'globalInteractionReason'}]}},
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'lng': 10.166279812997564}]},
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'cc': 'CM',
'city': 'Bamenda',
'state': 'North-West',
'country': 'Cameroon',
```

```
'formattedAddress': ['T-Jonction (Commercial Avenue)',  
  'Bamenda',  
  'Cameroon']]],  
'categories': [{ 'id': '4bf58dd8d48988d1fa931735',  
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  'pluralName': 'Hotels',  
  'shortName': 'Hotel',  
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/hotel_',  
    'suffix': '.png'},  
  'primary': True}],  
'photos': { 'count': 0, 'groups': []}},  
'referralId': 'e-0-5132992ee4b0a08cd3353f98-2'},  
{ 'reasons': { 'count': 0,  
  'items': [{ 'summary': 'This spot is popular',  
    'type': 'general',  
    'reasonName': 'globalInteractionReason' } ]},  
'venue': { 'id': '5131ea47e4b0eacbc207853c',  
  'name': 'Saddle Hill Ranch',  
  'location': { 'address': 'Bafut',  
    'lat': 5.963373289367703,  
    'lng': 10.166334523306691,  
    'labeledLatLngs': [{ 'label': 'display',  
      'lat': 5.963373289367703,  
      'lng': 10.166334523306691 } ]},  
  'distance': 1640,  
  'cc': 'CM',  
  'city': 'Bamenda',  
  'state': 'North-West',  
  'country': 'Cameroon',  
  'formattedAddress': [ 'Bafut', 'Bamenda', 'Cameroon' ]},  
'categories': [{ 'id': '4bf58dd8d48988d1fa931735',  
  'name': 'Hotel',  
  'pluralName': 'Hotels',  
  'shortName': 'Hotel',  
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/hotel_',  
    'suffix': '.png'},  
  'primary': True}],  
'photos': { 'count': 0, 'groups': []}},  
'referralId': 'e-0-5131ea47e4b0eacbc207853c-3' } ] ] ] ] }
```

```
In [23]: # function that extracts the category of the venue
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 [24]: # Let us get the Data into a Pandas Data Frame
venues = results['response']['groups'][0]['items']

bda_venues = json_normalize(venues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
bda_venues = bda_venues.loc[:, filtered_columns]

# filter the category for each row
bda_venues['venue.categories'] = bda_venues.apply(get_category_type, axis=1)

# clean columns
bda_venues.columns = [col.split(".")[1] for col in bda_venues.columns]

bda_venues.head()
```

Out[24]:

	name	categories	lat	lng
0	Amour Mezam Bamenda	Bus Station	5.958191	10.151197
1	Mondial Hotel	Hotel	5.957182	10.160382
2	BONANJO	Hotel	5.963420	10.166280
3	Saddle Hill Ranch	Hotel	5.963373	10.166335

```
In [25]: bda_venues['City'] = 'Bamenda'
bda_venues = bda_venues[['City', 'name', 'categories', 'lat', 'lng']] # To index the City column to the first
bda_venues.head()
```

```
Out[25]:
```

	City	name	categories	lat	lng
0	Bamenda	Amour Mezam Bamenda	Bus Station	5.958191	10.151197
1	Bamenda	Mondial Hotel	Hotel	5.957182	10.160382
2	Bamenda	BONANJO	Hotel	5.963420	10.166280
3	Bamenda	Saddle Hill Ranch	Hotel	5.963373	10.166335

```
In [29]: pd2 = pd.concat([pd1, bda_venues], ignore_index = True)
pd2.tail()
```

```
Out[29]:
```

	City	name	categories	lat	lng
101	Douala	Boulangerie du Rail	Bakery	4.094611	9.647156
102	Bamenda	Amour Mezam Bamenda	Bus Station	5.958191	10.151197
103	Bamenda	Mondial Hotel	Hotel	5.957182	10.160382
104	Bamenda	BONANJO	Hotel	5.963420	10.166280
105	Bamenda	Saddle Hill Ranch	Hotel	5.963373	10.166335

Venues in Bafoussam

```
In [30]: # We get all vebues within a radius of 50000 meters in the city Bafoussam
address = 'Bafoussam, Cameroon'

geolocator = Nominatim(user_agent="Foursquare_agent")
location = geolocator.geocode(address)
latitude_baf = location.latitude
longitude_baf = location.longitude
print('The geograpical coordinates of Bafoussam are {}, {}'.format(latitude_baf, longitude_baf))
```

The geograpical coordinates of Bafoussam are 5.4758083, 10.4215565.

```
In [31]: # type your answer here
LIMIT = 100 # limit of number of venues returned by Foursquare API
radius = 10000 # define radius
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    latitude_baf,
    longitude_baf,
    radius,
    LIMIT)
url
```

```
Out[31]: 'https://api.foursquare.com/v2/venues/explore?&client_id=F3MJ1QJPRHR3QIUN4UFG0GCMJJM53NC2RXK0GENYKFCDTVOK&client_secret=ESQJ2EZYXRSKN30MFHEXHZHRR3WADCB5TJ2LPSL3YIHSU3&v=20191216&ll=5.4758083,10.4215565&radius=10000&limit=100'
```

```
In [32]: results = requests.get(url).json()  
results
```

```
Out[32]: {'meta': {'code': 200, 'requestId': '5df752a8b4b684001bc273d8'},
  'response': {'headerLocation': 'Current map view',
    'headerFullLocation': 'Current map view',
    'headerLocationGranularity': 'unknown',
    'totalResults': 7,
    'suggestedBounds': {'ne': {'lat': 5.56580839000009,
      'lng': 10.511800370388636},
      'sw': {'lat': 5.385808209999991, 'lng': 10.331312629611363}},
    'groups': [{ 'type': 'Recommended Places',
      'name': 'recommended',
      'items': [{ 'reasons': { 'count': 0,
        'items': [{ 'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason' } ] } },
      'venue': { 'id': '57005205498e478113218dd5',
        'name': 'Wifi',
        'location': { 'lat': 5.476875916739307,
          'lng': 10.41910950241889,
          'labeledLatLngs': [{ 'label': 'display',
            'lat': 5.476875916739307,
            'lng': 10.41910950241889 } ] },
        'distance': 296,
        'cc': 'CM',
        'city': 'Bafoussam',
        'state': 'West',
        'country': 'Cameroon',
        'formattedAddress': [ 'Bafoussam', 'Cameroon' ] },
      'categories': [{ 'id': '4bf58dd8d48988d116941735',
        'name': 'Bar',
        'pluralName': 'Bars',
        'shortName': 'Bar',
        'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/nightlife/pub_',
          'suffix': '.png' },
        'primary': True } ],
      'photos': { 'count': 0, 'groups': [ ] },
      'referralId': 'e-0-57005205498e478113218dd5-0' },
    { 'reasons': { 'count': 0,
      'items': [{ 'summary': 'This spot is popular',
        'type': 'general',
        'reasonName': 'globalInteractionReason' } ] },
      'venue': { 'id': '50bb085de4b0ecc0b03e01a5',
        'name': 'Talotel',
        'location': { 'lat': 5.476569599121991,
```

```
'lng': 10.417063061793232,
'labeledLatLngs': [{'label': 'display',
  'lat': 5.476569599121991,
  'lng': 10.417063061793232}],
'distance': 505,
'cc': 'CM',
'country': 'Cameroon',
'formattedAddress': ['Cameroon']],
'categories': [{'id': '4bf58dd8d48988d12f951735',
  'name': 'Resort',
  'pluralName': 'Resorts',
  'shortName': 'Resort',
  'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/resort_',
    'suffix': '.png'},
  'primary': True}],
'photos': {'count': 0, 'groups': []}},
'referralId': 'e-0-50bb085de4b0ecc0b03e01a5-1'},
{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]}],
'venue': {'id': '5961303bb1ec1325293e53f7',
  'name': 'Bouvick',
  'location': {'crossStreet': 'Gabon Bar',
    'lat': 5.4649696,
    'lng': 10.421075,
    'labeledLatLngs': [{'label': 'display',
      'lat': 5.4649696,
      'lng': 10.421075}],
    'distance': 1207,
    'cc': 'CM',
    'city': 'Bafoussam',
    'state': 'West',
    'country': 'Cameroon',
    'formattedAddress': ['Gabon Bar', 'Bafoussam', 'Cameroon']],
  'categories': [{'id': '4bf58dd8d48988d1c7941735',
    'name': 'Snack Place',
    'pluralName': 'Snack Places',
    'shortName': 'Snacks',
    'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/snacks_',
      'suffix': '.png'},
    'primary': True}],
  'photos': {'count': 0, 'groups': []}},
```



```
'referralId': 'e-0-5961303bb1ec1325293e53f7-2'},
{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]}],
'venuue': {'id': '52b19e0e498e385e171c94f5',
  'name': 'Sim',
  'location': {'lat': 5.464574104912574,
    'lng': 10.424181690258118,
    'labeledLatLngs': [{'label': 'display',
      'lat': 5.464574104912574,
      'lng': 10.424181690258118}]},
  'distance': 1283,
  'cc': 'CM',
  'country': 'Cameroon',
  'formattedAddress': ['Cameroon']},
'categories': [{'id': '4bf58dd8d48988d1fd941735',
  'name': 'Shopping Mall',
  'pluralName': 'Shopping Malls',
  'shortName': 'Mall',
  'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/shops/mall_',
    'suffix': '.png'},
  'primary': True}],
'photos': {'count': 0, 'groups': []}},
'referralId': 'e-0-52b19e0e498e385e171c94f5-3'},
{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]}],
'venuue': {'id': '5247ca27498ea6845117b32a',
  'name': 'General Voyages OUEST',
  'location': {'lat': 5.454042317899038,
    'lng': 10.426439759698411,
    'labeledLatLngs': [{'label': 'display',
      'lat': 5.454042317899038,
      'lng': 10.426439759698411}]},
  'distance': 2482,
  'cc': 'CM',
  'country': 'Cameroon',
  'formattedAddress': ['Cameroon']},
'categories': [{'id': '4bf58dd8d48988d1fe931735',
  'name': 'Bus Station',
  'pluralName': 'Bus Stations',
```

```
    'shortName': 'Bus Station',
    'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/busstation_',
            'suffix': '.png'},
    'primary': True}],
  'photos': {'count': 0, 'groups': []}},
  'referralId': 'e-0-5247ca27498ea6845117b32a-4'},
  {'reasons': {'count': 0,
    'items': [{'summary': 'This spot is popular',
      'type': 'general',
      'reasonName': 'globalInteractionReason'}]}],
  'venue': {'id': '51693986e4b0683f59de7fcf',
    'name': 'Supermarché SIM',
    'location': {'lat': 5.495441717881361,
      'lng': 10.398795277183128,
      'labeledLatLngs': [{'label': 'display',
        'lat': 5.495441717881361,
        'lng': 10.398795277183128}]},
    'distance': 3337,
    'cc': 'CM',
    'country': 'Cameroon',
    'formattedAddress': ['Cameroon']},
    'categories': [{'id': '4d954b0ea243a5684a65b473',
      'name': 'Convenience Store',
      'pluralName': 'Convenience Stores',
      'shortName': 'Convenience Store',
      'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/shops/conveniencestore_',
        'suffix': '.png'},
      'primary': True}],
    'photos': {'count': 0, 'groups': []}},
    'referralId': 'e-0-51693986e4b0683f59de7fcf-5'},
    {'reasons': {'count': 0,
      'items': [{'summary': 'This spot is popular',
        'type': 'general',
        'reasonName': 'globalInteractionReason'}]}],
      'venue': {'id': '56152d16498ed599ccd63155',
        'name': 'Chenang Superlicious Corner',
        'location': {'address': 'Pantai Chenang',
          'lat': 5.44000244140625,
          'lng': 10.492722511291504,
          'labeledLatLngs': [{'label': 'display',
            'lat': 5.44000244140625,
            'lng': 10.492722511291504}]},
          'distance': 8836,
```

```

'postalCode': '07000',
'cc': 'CM',
'city': 'Langkawi',
'state': 'Kedah',
'country': 'Cameroon',
'formattedAddress': ['Pantai Chenang', 'Langkawi 07000', 'Cameroon']],
'categories': [{ 'id': '4bf58dd8d48988d142941735',
'name': 'Asian Restaurant',
'pluralName': 'Asian Restaurants',
'shortName': 'Asian',
'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/asian_',
'suffix': '.png'},
'primary': True}],
'photos': { 'count': 0, 'groups': []}},
'referralId': 'e-0-56152d16498ed599ccd63155-6'}}]]]]}

```

In [33]: *# function that extracts the category of the venue*

```

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 [34]: # Let us get the Data into a Pandas Data Frame
venues = results['response']['groups'][0]['items']

baf_venues = json_normalize(venues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
baf_venues = baf_venues.loc[:, filtered_columns]

# filter the category for each row
baf_venues['venue.categories'] = baf_venues.apply(get_category_type, axis=1)

# clean columns
baf_venues.columns = [col.split(".")[1] for col in baf_venues.columns]

baf_venues.head(50)

```

Out[34]:

	name	categories	lat	lng
0	Wifi	Bar	5.476876	10.419110
1	Talotel	Resort	5.476570	10.417063
2	Bouvick	Snack Place	5.464970	10.421075
3	Sim	Shopping Mall	5.464574	10.424182
4	General Voyages OUEST	Bus Station	5.454042	10.426440
5	Supermarché SIM	Convenience Store	5.495442	10.398795
6	Chenang Superlicious Corner	Asian Restaurant	5.440002	10.492723

```
In [37]: baf_venues['City'] = 'Bafoussam'
baf_venues = baf_venues[['City', 'name', 'categories', 'lat', 'lng']] # To index the City column to the first
baf_venues.head()
```

Out[37]:

	City	name	categories	lat	lng
0	Bafoussam	Wifi	Bar	5.476876	10.419110
1	Bafoussam	Talotel	Resort	5.476570	10.417063
2	Bafoussam	Bouvick	Snack Place	5.464970	10.421075
3	Bafoussam	Sim	Shopping Mall	5.464574	10.424182
4	Bafoussam	General Voyages OUEST	Bus Station	5.454042	10.426440

```
In [39]: pd3 = pd.concat([pd2, baf_venues], ignore_index = True)
pd3.tail(10)
```

Out[39]:

	City	name	categories	lat	lng
103	Bamenda	Mondial Hotel	Hotel	5.957182	10.160382
104	Bamenda	BONANJO	Hotel	5.963420	10.166280
105	Bamenda	Saddle Hill Ranch	Hotel	5.963373	10.166335
106	Bafoussam	Wifi	Bar	5.476876	10.419110
107	Bafoussam	Talotel	Resort	5.476570	10.417063
108	Bafoussam	Bouvick	Snack Place	5.464970	10.421075
109	Bafoussam	Sim	Shopping Mall	5.464574	10.424182
110	Bafoussam	General Voyages OUEST	Bus Station	5.454042	10.426440
111	Bafoussam	Supermarché SIM	Convenience Store	5.495442	10.398795
112	Bafoussam	Chenang Superlicious Corner	Asian Restaurant	5.440002	10.492723

Venues in Buea

```
In [40]: # We get all venues within a radius of 50000 meters in the city Bafoussam
address = 'Buea, Cameroon'

geolocator = Nominatim(user_agent="Foursquare_agent")
location = geolocator.geocode(address)
latitude_buea = location.latitude
longitude_buea = location.longitude
print('The geographical coordinates of Buea are {}, {}'.format(latitude_buea, longitude_buea))
```

The geographical coordinates of Buea are 4.1567995, 9.2315519.

```
In [41]: # type your answer here
LIMIT = 100 # limit of number of venues returned by Foursquare API
radius = 10000 # define radius
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    latitude_buea,
    longitude_buea,
    radius,
    LIMIT)
url
```

```
Out[41]: 'https://api.foursquare.com/v2/venues/explore?&client_id=F3MJ1QJPRHR3QIUN4UFG0GCMJJM53NC2RXKOGENYKFCDTVOK&client_secret=ESQQJ2EZNXYXRSKN30MFHEXHZHRR3WADCB5TJ2LPSL3YIHSU3&v=20191216&ll=4.1567995,9.2315519&radius=10000&limit=100'
```

```
In [42]: results = requests.get(url).json()  
results
```

```
Out[42]: {'meta': {'code': 200, 'requestId': '5df7532cc546f3001b3d3afc'},
  'response': {'headerLocation': 'Buea',
    'headerFullLocation': 'Buea',
    'headerLocationGranularity': 'city',
    'totalResults': 5,
    'suggestedBounds': {'ne': {'lat': 4.24679959000009,
      'lng': 9.321620883680826},
      'sw': {'lat': 4.066799409999991, 'lng': 9.141482916319173}},
    'groups': [{'type': 'Recommended Places',
      'name': 'recommended',
      'items': [{'reasons': {'count': 0,
        'items': [{'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason'}]}],
      'venue': {'id': '52fbb1e2498e527b8a5d1b22',
        'name': 'Njeiforbi',
        'location': {'lat': 4.152301298798181,
          'lng': 9.24191703261057,
          'labeledLatLngs': [{'label': 'display',
            'lat': 4.152301298798181,
            'lng': 9.24191703261057}]},
        'distance': 1255,
        'cc': 'CM',
        'country': 'Cameroon',
        'formattedAddress': ['Cameroon']},
      'categories': [{'id': '4bf58dd8d48988d16a941735',
        'name': 'Bakery',
        'pluralName': 'Bakeries',
        'shortName': 'Bakery',
        'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/bakery_',
          'suffix': '.png'},
        'primary': True}],
      'photos': {'count': 0, 'groups': []}},
      'referralId': 'e-0-52fbb1e2498e527b8a5d1b22-0'},
    {'reasons': {'count': 0,
      'items': [{'summary': 'This spot is popular',
        'type': 'general',
        'reasonName': 'globalInteractionReason'}]}],
      'venue': {'id': '5336fe5e498e5cc1a95ebc72',
        'name': 'Buea Mountain Hotel',
        'location': {'lat': 4.1501870488213255,
          'lng': 9.228887260217583,
          'labeledLatLngs': [{'label': 'display',
```



```
    'lat': 4.1501870488213255,
    'lng': 9.228887260217583}],
    'distance': 793,
    'postalCode': '10020',
    'cc': 'CM',
    'city': 'Buea',
    'state': 'South-West',
    'country': 'Cameroon',
    'formattedAddress': ['Buea 10020', 'Cameroon']],
    'categories': [{ 'id': '4bf58dd8d48988d1fa931735',
        'name': 'Hotel',
        'pluralName': 'Hotels',
        'shortName': 'Hotel',
        'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/hotel_',
            'suffix': '.png'},
        'primary': True}],
    'photos': { 'count': 0, 'groups': []}},
    'referralId': 'e-0-5336fe5e498e5cc1a95ebc72-1'},
    { 'reasons': { 'count': 0,
        'items': [{ 'summary': 'This spot is popular',
            'type': 'general',
            'reasonName': 'globalInteractionReason' } ]},
        'venue': { 'id': '52f73e9011d2ba07c2c74245',
            'name': 'CheckPoint',
            'location': { 'lat': 4.158752510451527,
                'lng': 9.2796275449127,
                'labeledLatLngs': [{ 'label': 'display',
                    'lat': 4.158752510451527,
                    'lng': 9.2796275449127 } ]},
                'distance': 5342,
                'cc': 'CM',
                'country': 'Cameroon',
                'formattedAddress': ['Cameroon']},
                'categories': [{ 'id': '4bf58dd8d48988d164941735',
                    'name': 'Plaza',
                    'pluralName': 'Plazas',
                    'shortName': 'Plaza',
                    'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/parks_outdoors/plaza_',
                        'suffix': '.png'},
                    'primary': True}],
                    'photos': { 'count': 0, 'groups': []}},
                    'referralId': 'e-0-52f73e9011d2ba07c2c74245-2'},
                    { 'reasons': { 'count': 0,
```

```
'items': [{ 'summary': 'This spot is popular',
  'type': 'general',
  'reasonName': 'globalInteractionReason' } ] ],
'venuue': { 'id': '51f3f228498ea64a73dbadb8',
  'name': 'Bonga Juice',
  'location': { 'lat': 4.155431578091336,
    'lng': 9.28884810032225,
    'labeledLatLngs': [ { 'label': 'display',
      'lat': 4.155431578091336,
      'lng': 9.28884810032225 } ] ],
    'distance': 6363,
    'cc': 'CM',
    'country': 'Cameroon',
    'formattedAddress': [ 'Cameroon' ] ],
'categories': [ { 'id': '4bf58dd8d48988d112941735',
  'name': 'Juice Bar',
  'pluralName': 'Juice Bars',
  'shortName': 'Juice Bar',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/juicebar_',
    'suffix': '.png' },
    'primary': True } ] ],
'photos': { 'count': 0, 'groups': [ ] },
'referralId': 'e-0-51f3f228498ea64a73dbadb8-3' },
{ 'reasons': { 'count': 0,
  'items': [ { 'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason' } ] ],
'venuue': { 'id': '588736db5e789667a7b3bf43',
  'name': 'mont Cameroun',
  'location': { 'lat': 4.217369,
    'lng': 9.1727295,
    'labeledLatLngs': [ { 'label': 'display',
      'lat': 4.217369,
      'lng': 9.1727295 } ] ],
    'distance': 9386,
    'cc': 'CM',
    'state': 'Southwest',
    'country': 'Cameroon',
    'formattedAddress': [ 'Cameroon' ] ],
'categories': [ { 'id': '4eb1d4d54b900d56c88a45fc',
  'name': 'Mountain',
  'pluralName': 'Mountains',
  'shortName': 'Mountain',
```

```
        'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/parks_outdoors/mountain_',
                  'suffix': '.png'},
        'primary': True}],
    'photos': {'count': 0, 'groups': []}},
    'referralId': 'e-0-588736db5e789667a7b3bf43-4'}}]]]]}
```

In [43]: *# function that extracts the category of the venue*

```
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 [45]: # Let us get the Data into a Pandas Data Frame
venues = results['response']['groups'][0]['items']

buea_venues = json_normalize(venues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
buea_venues = buea_venues.loc[:, filtered_columns]

# filter the category for each row
buea_venues['venue.categories'] = buea_venues.apply(get_category_type, axis=1)

# clean columns
buea_venues.columns = [col.split(".")[1] for col in buea_venues.columns]

buea_venues.head()

```

Out[45]:

	name	categories	lat	lng
0	Njeiforbi	Bakery	4.152301	9.241917
1	Buea Mountain Hotel	Hotel	4.150187	9.228887
2	CheckPoint	Plaza	4.158753	9.279628
3	Bonga Juice	Juice Bar	4.155432	9.288848
4	mont Cameroun	Mountain	4.217369	9.172730

```

In [46]: buea_venues.head(10)

```

Out[46]:

	name	categories	lat	lng
0	Njeiforbi	Bakery	4.152301	9.241917
1	Buea Mountain Hotel	Hotel	4.150187	9.228887
2	CheckPoint	Plaza	4.158753	9.279628
3	Bonga Juice	Juice Bar	4.155432	9.288848
4	mont Cameroun	Mountain	4.217369	9.172730

```
In [47]: buea_venues['City'] = 'Buea'
buea_venues = buea_venues[['City', 'name', 'categories', 'lat', 'lng']]
buea_venues
```

Out[47]:

	City	name	categories	lat	lng
0	Buea	Njeiforbi	Bakery	4.152301	9.241917
1	Buea	Buea Mountain Hotel	Hotel	4.150187	9.228887
2	Buea	CheckPoint	Plaza	4.158753	9.279628
3	Buea	Bonga Juice	Juice Bar	4.155432	9.288848
4	Buea	mont Cameroun	Mountain	4.217369	9.172730

```
In [49]: pd4 = pd.concat([pd3, buea_venues], ignore_index = True)
pd4.tail(20)
```

Out[49]:

	City	name	categories	lat	lng
98	Douala	Saker Makepe	Bakery	4.083984	9.755711
99	Douala	Makepe Rhône Poulain	Plaza	4.085244	9.757035
100	Douala	MTN Business Lounge	Lounge	4.010630	9.717018
101	Douala	Boulangerie du Rail	Bakery	4.094611	9.647156
102	Bamenda	Amour Mezam Bamenda	Bus Station	5.958191	10.151197
103	Bamenda	Mondial Hotel	Hotel	5.957182	10.160382
104	Bamenda	BONANJO	Hotel	5.963420	10.166280
105	Bamenda	Saddle Hill Ranch	Hotel	5.963373	10.166335
106	Bafoussam	Wifi	Bar	5.476876	10.419110
107	Bafoussam	Talotel	Resort	5.476570	10.417063
108	Bafoussam	Bouwick	Snack Place	5.464970	10.421075
109	Bafoussam	Sim	Shopping Mall	5.464574	10.424182
110	Bafoussam	General Voyages OUEST	Bus Station	5.454042	10.426440
111	Bafoussam	Supermarché SIM	Convenience Store	5.495442	10.398795
112	Bafoussam	Chenang Superlicious Corner	Asian Restaurant	5.440002	10.492723
113	Buea	Njeiforbi	Bakery	4.152301	9.241917
114	Buea	Buea Mountain Hotel	Hotel	4.150187	9.228887
115	Buea	CheckPoint	Plaza	4.158753	9.279628
116	Buea	Bonga Juice	Juice Bar	4.155432	9.288848
117	Buea	mont Cameroun	Mountain	4.217369	9.172730

Venues in Bertoua

```
In [51]: # We get all venues within a radius of 50000 meters in the city Bertoua
address = 'Bertoua, Cameroon'

geolocator = Nominatim(user_agent="Foursquare_agent")
location = geolocator.geocode(address)
latitude_bert = location.latitude
longitude_bert = location.longitude
print('The geographical coordinates of Bertoua are {}, {}'.format(latitude_bert, longitude_bert))
```

The geographical coordinates of Bertoua are 4.5777265, 13.6844409.

```
In [52]: # type your answer here
LIMIT = 100 # limit of number of venues returned by Foursquare API
radius = 10000 # define radius
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    latitude_bert,
    longitude_bert,
    radius,
    LIMIT)
url
```

```
Out[52]: 'https://api.foursquare.com/v2/venues/explore?&client_id=F3MJ1QJPRHR3QIUN4UFG0GCMJJM53NC2RXKOGENYKFCDTVOK&client_secret=ESQQJ2EZYXRSKN30MFHEXHZHRR3WADCB5TJ2LPSL3YIHSU3&v=20191216&ll=4.5777265,13.6844409&radius=10000&limit=100'
```

```
In [53]: results = requests.get(url).json()  
results
```



```
Out[53]: {'meta': {'code': 200, 'requestId': '5df7561b7828ae001b5a221f'},
  'response': {'warning': {'text': "There aren't a lot of results near you. Try something more general, reset
your filters, or expand the search area."},
  'headerLocation': 'Current map view',
  'headerFullLocation': 'Current map view',
  'headerLocationGranularity': 'unknown',
  'totalResults': 3,
  'suggestedBounds': {'ne': {'lat': 4.66772659000009,
    'lng': 13.774560432632466},
    'sw': {'lat': 4.487726409999991, 'lng': 13.594321367367534}},
  'groups': [{'type': 'Recommended Places',
    'name': 'recommended',
    'items': [{'reasons': {'count': 0,
      'items': [{'summary': 'This spot is popular',
        'type': 'general',
        'reasonName': 'globalInteractionReason'}]}],
    'venue': {'id': '58f67981eacf457f8e1c5d31',
      'name': 'Selfie',
      'location': {'address': 'North 1',
        'crossStreet': 'Derrière Ecobank',
        'lat': 4.5759444,
        'lng': 13.683056,
        'labeledLatLngs': [{'label': 'display',
          'lat': 4.5759444,
          'lng': 13.683056}],
        'distance': 250,
        'postalCode': '237',
        'cc': 'CM',
        'city': 'Bertoua',
        'state': 'E',
        'country': 'Cameroon',
        'formattedAddress': ['North 1 (Derrière Ecobank)',
          'Bertoua 237',
          'Cameroon']}],
      'categories': [{'id': '4bf58dd8d48988d116941735',
        'name': 'Bar',
        'pluralName': 'Bars',
        'shortName': 'Bar',
        'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/nightlife/pub_',
          'suffix': '.png'},
        'primary': True}],
      'photos': {'count': 0, 'groups': []}},
    'referralId': 'e-0-58f67981eacf457f8e1c5d31-0'},
```

```
{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]},
'venue': {'id': '5be8c6cb9ef8ef002cc2a241',
  'name': 'Danay Express (Bertoua)',
  'location': {'lat': 4.575273,
    'lng': 13.676042,
    'labeledLatLngs': [{'label': 'display',
      'lat': 4.575273,
      'lng': 13.676042}]},
  'distance': 971,
  'cc': 'CM',
  'city': 'Bertoua',
  'state': 'E',
  'country': 'Cameroon',
  'formattedAddress': ['Bertoua', 'Cameroon']},
'categories': [{'id': '4bf58dd8d48988d1fe931735',
  'name': 'Bus Station',
  'pluralName': 'Bus Stations',
  'shortName': 'Bus Station',
  'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/busstation_',
    'suffix': '.png'},
  'primary': True}],
'photos': {'count': 0, 'groups': []}},
'referralId': 'e-0-5be8c6cb9ef8ef002cc2a241-1'},
{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]},
'venue': {'id': '5302578f11d2e934db340a97',
  'name': 'Hotel Mansa',
  'location': {'lat': 4.588496649893505,
    'lng': 13.682984670605851,
    'labeledLatLngs': [{'label': 'display',
      'lat': 4.588496649893505,
      'lng': 13.682984670605851}]},
  'distance': 1209,
  'cc': 'CM',
  'country': 'Cameroon',
  'formattedAddress': ['Cameroon']},
'categories': [{'id': '4bf58dd8d48988d12f951735',
  'name': 'Resort',
```

```
    'pluralName': 'Resorts',
    'shortName': 'Resort',
    'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/resort_',
             'suffix': '.png'},
    'primary': True}],
    'photos': {'count': 0, 'groups': []}},
    'referralId': 'e-0-5302578f11d2e934db340a97-2'}}]]]]}
```

In [54]: *# function that extracts the category of the venue*

```
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 [55]: # Let us get the Data into a Pandas Data Frame
venues = results['response']['groups'][0]['items']

bert_venues = json_normalize(venues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
bert_venues = bert_venues.loc[:, filtered_columns]

# filter the category for each row
bert_venues['venue.categories'] = bert_venues.apply(get_category_type, axis=1)

# clean columns
bert_venues.columns = [col.split(".")[1] for col in bert_venues.columns]

bert_venues.head()

```

Out[55]:

	name	categories	lat	lng
0	Selfie	Bar	4.575944	13.683056
1	Danay Express (Bertoua)	Bus Station	4.575273	13.676042
2	Hotel Mansa	Resort	4.588497	13.682985

```

In [56]: bert_venues['City'] = 'Bertoua'
bert_venues = bert_venues[['City', 'name', 'categories', 'lat', 'lng']]
bert_venues

```

Out[56]:

	City	name	categories	lat	lng
0	Bertoua	Selfie	Bar	4.575944	13.683056
1	Bertoua	Danay Express (Bertoua)	Bus Station	4.575273	13.676042
2	Bertoua	Hotel Mansa	Resort	4.588497	13.682985

```
In [57]: pd5 = pd.concat([pd4,bert_venues], ignore_index = True)
pd5.tail()
```

Out[57]:

	City	name	categories	lat	lng
116	Buea	Bonga Juice	Juice Bar	4.155432	9.288848
117	Buea	mont Cameroun	Mountain	4.217369	9.172730
118	Bertoua	Selfie	Bar	4.575944	13.683056
119	Bertoua	Danay Express (Bertoua)	Bus Station	4.575273	13.676042
120	Bertoua	Hotel Mansa	Resort	4.588497	13.682985

Venues in Maroua

```
In [58]: # We get all venues within a radius of 50000 meters in the city Maroua
address = 'Maroua, Cameroon'

geolocator = Nominatim(user_agent="Foursquare_agent")
location = geolocator.geocode(address)
latitude_Mar = location.latitude
longitude_Mar = location.longitude
print('The geographical coordinates of Maroua are {}, {}'.format(latitude_Mar, longitude_Mar))
```

The geographical coordinates of Maroua are 10.7183422, 14.4117466304721.

```
In [62]: # type your answer here
LIMIT = 100 # limit of number of venues returned by Foursquare API
radius = 20000 # define radius
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    latitude_Mar,
    longitude_Mar,
    radius,
    LIMIT)
url
```

```
Out[62]: 'https://api.foursquare.com/v2/venues/explore?&client_id=F3MJ1QJPRHR3QIUN4UFG0GCMJJM53NC2RXKOGENYKFCDTVOK&client_secret=ESQQJ2EZNXYRSKN30MFHEXHZHRR3WADCB5TJ2LPSL3YIHSU3&v=20191216&ll=10.7183422,14.4117466304721&radius=20000&limit=100'
```

```
In [63]: results = requests.get(url).json()  
results
```

```
Out[63]: {'meta': {'code': 200, 'requestId': '5df758c195feaf001b5659f7'},
  'response': {'warning': {'text': "There aren't a lot of results near you. Try something more general, reset
your filters, or expand the search area."},
  'headerLocation': 'Current map view',
  'headerFullLocation': 'Current map view',
  'headerLocationGranularity': 'unknown',
  'totalResults': 2,
  'suggestedBounds': {'ne': {'lat': 10.89834238000018,
    'lng': 14.594600932146895},
    'sw': {'lat': 10.53834201999982, 'lng': 14.228892328797306}},
  'groups': [{'type': 'Recommended Places',
    'name': 'recommended',
    'items': [{'reasons': {'count': 0,
      'items': [{'summary': 'This spot is popular',
        'type': 'general',
        'reasonName': 'globalInteractionReason'}]}],
    'venue': {'id': '4fa2c7bae4b018dc46531f73',
      'name': 'Relais Porte Mayo',
      'location': {'lat': 10.594411912832152,
        'lng': 14.318916163604428,
        'labeledLatLngs': [{'label': 'display',
          'lat': 10.594411912832152,
          'lng': 14.318916163604428}]},
      'distance': 17130,
      'cc': 'CM',
      'country': 'Cameroon',
      'formattedAddress': ['Cameroon']},
    'categories': [{'id': '4bf58dd8d48988d1fa931735',
      'name': 'Hotel',
      'pluralName': 'Hotels',
      'shortName': 'Hotel',
      'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/hotel_',
        'suffix': '.png'},
      'primary': True}],
    'photos': {'count': 0, 'groups': []}],
  'referralId': 'e-0-4fa2c7bae4b018dc46531f73-0'},
  {'reasons': {'count': 0,
    'items': [{'summary': 'This spot is popular',
      'type': 'general',
      'reasonName': 'globalInteractionReason'}]}],
  'venue': {'id': '5243b5c1498e402cf3f87945',
    'name': 'Mizao',
    'location': {'address': 'Maroua',
```



```

'lat': 10.599504149171883,
'lng': 14.310929463237658,
'labeledLatLngs': [{'label': 'display',
  'lat': 10.599504149171883,
  'lng': 14.310929463237658}],
'distance': 17223,
'cc': 'CM',
'city': 'Maroua',
'state': 'Far North',
'country': 'Cameroon',
'formattedAddress': ['Maroua', 'Maroua', 'Cameroon']],
'categories': [{'id': '4bf58dd8d48988d1fa931735',
  'name': 'Hotel',
  'pluralName': 'Hotels',
  'shortName': 'Hotel',
  'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/hotel_',
    'suffix': '.png'},
  'primary': True}],
'photos': {'count': 0, 'groups': []}},
'referralId': 'e-0-5243b5c1498e402cf3f87945-1'}}]]]]}

```

```

In [64]: 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 [66]: # Let us get the Data into a Pandas Data Frame
venues = results['response']['groups'][0]['items']

Mar_venues = json_normalize(venues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
Mar_venues = Mar_venues.loc[:, filtered_columns]

# filter the category for each row
Mar_venues['venue.categories'] = Mar_venues.apply(get_category_type, axis=1)

# clean columns
Mar_venues.columns = [col.split(".")[1] for col in Mar_venues.columns]

Mar_venues.head()

```

Out[66]:

	name	categories	lat	lng
0	Relais Porte Mayo	Hotel	10.594412	14.318916
1	Mizao	Hotel	10.599504	14.310929

```

In [67]: Mar_venues['City'] = 'Maroua'
Mar_venues = Mar_venues[['City', 'name', 'categories', 'lat', 'lng']]
Mar_venues

```

Out[67]:

	City	name	categories	lat	lng
0	Maroua	Relais Porte Mayo	Hotel	10.594412	14.318916
1	Maroua	Mizao	Hotel	10.599504	14.310929

```
In [68]: pd6 = pd.concat([pd5,Mar_venues], ignore_index = True)
pd6.tail()
```

Out[68]:

	City	name	categories	lat	lng
118	Bertoua	Selfie	Bar	4.575944	13.683056
119	Bertoua	Danay Express (Bertoua)	Bus Station	4.575273	13.676042
120	Bertoua	Hotel Mansa	Resort	4.588497	13.682985
121	Maroua	Relais Porte Mayo	Hotel	10.594412	14.318916
122	Maroua	Mizao	Hotel	10.599504	14.310929

Venues in Garoua

```
In [70]: # We get all venues within a radius of 50000 meters in the city Garoua
address = 'Garoua, Cameroon'

geolocator = Nominatim(user_agent="Foursquare_agent")
location = geolocator.geocode(address)
latitude_Gar = location.latitude
longitude_Gar = location.longitude
print('The geographical coordinates of Garoua are {}, {}'.format(latitude_Gar, longitude_Gar))
```

The geographical coordinates of Garoua are 9.3070698, 13.3934527.

```
In [75]: # type your answer here
LIMIT = 100 # limit of number of venues returned by Foursquare API
radius = 10000 # define radius
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    latitude_Gar,
    longitude_Gar,
    radius,
    LIMIT)
url
```

```
Out[75]: 'https://api.foursquare.com/v2/venues/explore?&client_id=F3MJ1QJPRHR3QIUN4UFG0GCMJJM53NC2RXKOGENYKFCDTVOK&client_secret=ESQQJ2EZNYXRSKN30MFHEXHZHRR3WADCB5TJ2LPSL3YIHSU3&v=20191216&ll=9.3070698,13.3934527&radius=10000&limit=100'
```

```
In [76]: results = requests.get(url).json()  
results
```

```
Out[76]: {'meta': {'code': 200, 'requestId': '5df75c199fcb92001bb9c622'},
  'response': {'warning': {'text': "There aren't a lot of results near you. Try something more general, reset
your filters, or expand the search area."},
  'headerLocation': 'Garoua',
  'headerFullLocation': 'Garoua',
  'headerLocationGranularity': 'city',
  'totalResults': 3,
  'suggestedBounds': {'ne': {'lat': 9.397069890000092,
    'lng': 13.484483094733449},
    'sw': {'lat': 9.217069709999991, 'lng': 13.30242230526655}},
  'groups': [{'type': 'Recommended Places',
    'name': 'recommended',
    'items': [{'reasons': {'count': 0,
      'items': [{'summary': 'This spot is popular',
        'type': 'general',
        'reasonName': 'globalInteractionReason'}]}],
    'venue': {'id': '55cdd790498e52a1e03af239',
      'name': 'Fast Food',
      'location': {'address': 'Carrefour RDPC',
        'crossStreet': 'Face Bicec',
        'lat': 9.300113677978516,
        'lng': 13.391561508178711,
        'labeledLatLngs': [{'label': 'display',
          'lat': 9.300113677978516,
          'lng': 13.391561508178711}]},
        'distance': 801,
        'cc': 'CM',
        'city': 'Garoua',
        'state': 'North',
        'country': 'Cameroon',
        'formattedAddress': ['Carrefour RDPC (Face Bicec)',
          'Garoua',
          'Cameroon']}],
    'categories': [{'id': '4bf58dd8d48988d16e941735',
      'name': 'Fast Food Restaurant',
      'pluralName': 'Fast Food Restaurants',
      'shortName': 'Fast Food',
      'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/fastfood_',
        'suffix': '.png'},
      'primary': True}],
    'photos': {'count': 0, 'groups': []}},
  'referralId': 'e-0-55cdd790498e52a1e03af239-0'},
  {'reasons': {'count': 0,
```

```
'items': [{ 'summary': 'This spot is popular',
  'type': 'general',
  'reasonName': 'globalInteractionReason' } ] ],
'venuue': { 'id': '4dc2dd6b7d8b686fa486fc51',
  'name': 'Hotel La Benoue',
  'location': { 'lat': 9.316910555579161,
    'lng': 13.396656064945741,
    'labeledLatLngs': [ { 'label': 'display',
      'lat': 9.316910555579161,
      'lng': 13.396656064945741 } ] ],
    'distance': 1150,
    'cc': 'CM',
    'city': 'Garoua',
    'state': 'North',
    'country': 'Cameroon',
    'formattedAddress': [ 'Garoua', 'Cameroon' ] ],
'categories': [ { 'id': '4bf58dd8d48988d1fa931735',
  'name': 'Hotel',
  'pluralName': 'Hotels',
  'shortName': 'Hotel',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/hotel_',
    'suffix': '.png' },
    'primary': True } ] ],
'photos': { 'count': 0, 'groups': [ ] },
'referralId': 'e-0-4dc2dd6b7d8b686fa486fc51-1' },
{ 'reasons': { 'count': 0,
  'items': [ { 'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason' } ] ],
'venuue': { 'id': '4dc2c012d1643ed27a562275',
  'name': 'Aeroporto International Garoua',
  'location': { 'lat': 9.324633111485655,
    'lng': 13.37912943428692,
    'labeledLatLngs': [ { 'label': 'display',
      'lat': 9.324633111485655,
      'lng': 13.37912943428692 } ] ],
    'distance': 2509,
    'cc': 'CM',
    'city': 'Garoua',
    'state': 'North',
    'country': 'Cameroon',
    'formattedAddress': [ 'Garoua', 'Cameroon' ] ],
'categories': [ { 'id': '4bf58dd8d48988d1ed931735',
```

```
    'name': 'Airport',
    'pluralName': 'Airports',
    'shortName': 'Airport',
    'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/airport_',
             'suffix': '.png'},
    'primary': True}],
    'photos': {'count': 0, 'groups': []}},
    'referralId': 'e-0-4dc2c012d1643ed27a562275-2'}}]]]]}
```

```
In [77]: 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 [78]: # Let us get the Data into a Pandas Data Frame
venues = results['response']['groups'][0]['items']

Gar_venues = json_normalize(venues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
Gar_venues = Gar_venues.loc[:, filtered_columns]

# filter the category for each row
Gar_venues['venue.categories'] = Gar_venues.apply(get_category_type, axis=1)

# clean columns
Gar_venues.columns = [col.split(".")[1] for col in Gar_venues.columns]

Gar_venues.head()

```

Out[78]:

	name	categories	lat	lng
0	Fast Food	Fast Food Restaurant	9.300114	13.391562
1	Hotel La Benoue	Hotel	9.316911	13.396656
2	Aeroport International Garoua	Airport	9.324633	13.379129

```
In [79]: Gar_venues['City'] = 'Garoua'
Gar_venues = Gar_venues[['City', 'name', 'categories', 'lat', 'lng']]
pd7 = pd.concat([pd6, Gar_venues], ignore_index = True)
pd7.tail(10)
```

Out[79]:

	City	name	categories	lat	lng
116	Buea	Bonga Juice	Juice Bar	4.155432	9.288848
117	Buea	mont Cameroun	Mountain	4.217369	9.172730
118	Bertoua	Selfie	Bar	4.575944	13.683056
119	Bertoua	Danay Express (Bertoua)	Bus Station	4.575273	13.676042
120	Bertoua	Hotel Mansa	Resort	4.588497	13.682985
121	Maroua	Relais Porte Mayo	Hotel	10.594412	14.318916
122	Maroua	Mizao	Hotel	10.599504	14.310929
123	Garoua	Fast Food	Fast Food Restaurant	9.300114	13.391562
124	Garoua	Hotel La Benoue	Hotel	9.316911	13.396656
125	Garoua	Aéroport International Garoua	Airport	9.324633	13.379129

Venues in Ngoundere

```
In [81]: # We get all venues within a radius of 50000 meters in the city Ngoundere
address = 'Ngaoundéré, Cameroon'

geolocator = Nominatim(user_agent="Foursquare_agent")
location = geolocator.geocode(address)
latitude_ngoun = location.latitude
longitude_ngoun = location.longitude
print('The geographical coordinates of Ngaoundere are {}, {}'.format(latitude_ngoun, longitude_ngoun))
```

The geographical coordinates of Ngaoundere are 7.3211962, 13.5877302.

```
In [82]: # type your answer here
LIMIT = 100 # limit of number of venues returned by Foursquare API
radius = 10000 # define radius
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    latitude_ngoun,
    longitude_ngoun,
    radius,
    LIMIT)
url
```

```
Out[82]: 'https://api.foursquare.com/v2/venues/explore?&client_id=F3MJ1QJPRHR3QIUN4UFG0GCMJJM53NC2RXKOGENYKFCDTVOK&client_secret=ESQQJ2EZYXRSKN30MFHEXHZHRR3WADCB5TJ2LPSL3YIHSU3&v=20191216&ll=7.3211962,13.5877302&radius=10000&limit=100'
```

```
In [83]: results = requests.get(url).json()  
results
```

```
Out[83]: {'meta': {'code': 200, 'requestId': '5df75e14618f43001b47d0ba'},
  'response': {'headerLocation': 'Ngaoundéré',
    'headerFullLocation': 'Ngaoundéré',
    'headerLocationGranularity': 'city',
    'totalResults': 4,
    'suggestedBounds': {'ne': {'lat': 7.41119629000009,
      'lng': 13.678300636977047},
      'sw': {'lat': 7.231196109999991, 'lng': 13.497159763022951}},
    'groups': [{ 'type': 'Recommended Places',
      'name': 'recommended',
      'items': [{ 'reasons': { 'count': 0,
        'items': [{ 'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason' } ] } },
      'venue': { 'id': '54524e54498eca01262fbb28',
        'name': 'SUPER KILICHI',
        'location': { 'lat': 7.326729,
          'lng': 13.591301,
          'labeledLatLngs': [{ 'label': 'display',
            'lat': 7.326729,
            'lng': 13.591301 } ] },
        'distance': 731,
        'cc': 'CM',
        'city': 'Ngaoundéré',
        'state': 'Adamaoua',
        'country': 'Cameroon',
        'formattedAddress': [ 'Ngaoundéré', 'Cameroon' ] },
      'categories': [{ 'id': '4bf58dd8d48988d1cc941735',
        'name': 'Steakhouse',
        'pluralName': 'Steakhouses',
        'shortName': 'Steakhouse',
        'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/steakhouse_',
          'suffix': '.png' },
        'primary': True } ],
      'photos': { 'count': 0, 'groups': [ ] },
      'referralId': 'e-0-54524e54498eca01262fbb28-0' },
    { 'reasons': { 'count': 0,
      'items': [{ 'summary': 'This spot is popular',
        'type': 'general',
        'reasonName': 'globalInteractionReason' } ] },
      'venue': { 'id': '56df4c77cd105b56d556691a',
        'name': 'Plazza',
        'location': { 'lat': 7.321634,
```

```
'lng': 13.580221,
'labeledLatLngs': [{'label': 'display',
  'lat': 7.321634,
  'lng': 13.580221}],
'distance': 830,
'cc': 'CM',
'country': 'Cameroon',
'formattedAddress': ['Cameroon']],
'categories': [{'id': '4bf58dd8d48988d1cc941735',
  'name': 'Steakhouse',
  'pluralName': 'Steakhouses',
  'shortName': 'Steakhouse',
  'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/steakhouse_',
    'suffix': '.png'},
  'primary': True}],
'photos': {'count': 0, 'groups': []}},
'referralId': 'e-0-56df4c77cd105b56d556691a-1'},
{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]}],
'venue': {'id': '5ba158bbab42d9002c58fb7d',
  'name': 'Chez Polo',
  'location': {'lat': 7.3263316,
    'lng': 13.581482,
    'labeledLatLngs': [{'label': 'display',
      'lat': 7.3263316,
      'lng': 13.581482}],
    'distance': 895,
    'cc': 'CM',
    'city': 'Ngaoundéré',
    'state': 'Adamaoua',
    'country': 'Cameroon',
    'formattedAddress': ['Ngaoundéré', 'Cameroon']],
  'categories': [{'id': '4bf58dd8d48988d116941735',
    'name': 'Bar',
    'pluralName': 'Bars',
    'shortName': 'Bar',
    'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/nightlife/pub_',
      'suffix': '.png'},
    'primary': True}],
  'photos': {'count': 0, 'groups': []}},
'referralId': 'e-0-5ba158bbab42d9002c58fb7d-2'},
```

```
{
  'reasons': {
    'count': 0,
    'items': [
      {
        'summary': 'This spot is popular',
        'type': 'general',
        'reasonName': 'globalInteractionReason'
      }
    ]
  },
  'venue': {
    'id': '544e2c91498eead34f24e552',
    'name': 'Aéroport de Ngaoundere',
    'location': {
      'lat': 7.371792611834227,
      'lng': 13.566302005672423,
      'labeledLatLngs': [
        {
          'label': 'display',
          'lat': 7.371792611834227,
          'lng': 13.566302005672423
        }
      ]
    },
    'distance': 6109,
    'cc': 'CM',
    'city': 'Ngaoundéré',
    'state': 'Adamaoua',
    'country': 'Cameroon',
    'formattedAddress': [
      'Ngaoundéré', 'Cameroon'
    ]
  },
  'categories': [
    {
      'id': '4bf58dd8d48988d1ed931735',
      'name': 'Airport',
      'pluralName': 'Airports',
      'shortName': 'Airport',
      'icon': {
        'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/airport_',
        'suffix': '.png'
      },
      'primary': True
    }
  ],
  'photos': {
    'count': 0,
    'groups': []
  },
  'referralId': 'e-0-544e2c91498eead34f24e552-3'
}]}
```

```
In [84]: 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 [85]: # Let us get the Data into a Pandas Data Frame
venues = results['response']['groups'][0]['items']

ngaoun_venues = json_normalize(venues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
ngaoun_venues = ngaoun_venues.loc[:, filtered_columns]

# filter the category for each row
ngaoun_venues['venue.categories'] = ngaoun_venues.apply(get_category_type, axis=1)

# clean columns
ngaoun_venues.columns = [col.split(".")[1] for col in ngaoun_venues.columns]

ngaoun_venues.head()

```

Out[85]:

	name	categories	lat	lng
0	SUPER KILICHI	Steakhouse	7.326729	13.591301
1	Plazza	Steakhouse	7.321634	13.580221
2	Chez Polo	Bar	7.326332	13.581482
3	Aéroport de Ngaoundere	Airport	7.371793	13.566302


```
In [86]: ngaoun_venues['City'] = 'Ngaoundere'
ngaoun_venues = ngaoun_venues[['City', 'name', 'categories', 'lat', 'lng']]
pd8 = pd.concat([pd7, ngaoun_venues], ignore_index = True)
pd8.tail(10)
```

Out[86]:

	City	name	categories	lat	lng
120	Bertoua	Hotel Mansa	Resort	4.588497	13.682985
121	Maroua	Relais Porte Mayo	Hotel	10.594412	14.318916
122	Maroua	Mizao	Hotel	10.599504	14.310929
123	Garoua	Fast Food	Fast Food Restaurant	9.300114	13.391562
124	Garoua	Hotel La Benoue	Hotel	9.316911	13.396656
125	Garoua	Aéroport International Garoua	Airport	9.324633	13.379129
126	Ngaoundere	SUPER KILICHI	Steakhouse	7.326729	13.591301
127	Ngaoundere	Plazza	Steakhouse	7.321634	13.580221
128	Ngaoundere	Chez Polo	Bar	7.326332	13.581482
129	Ngaoundere	Aéroport de Ngaoundere	Airport	7.371793	13.566302

Venues in Ebolowa

```
In [87]: # We get all venues within a radius of 50000 meters in the city Ebolowa
address = 'Ebolowa, Cameroon'

geolocator = Nominatim(user_agent="Foursquare_agent")
location = geolocator.geocode(address)
latitude_ebl = location.latitude
longitude_ebl = location.longitude
print('The geographical coordinates of Ebolowa are {}, {}'.format(latitude_ebl, longitude_ebl))
```

The geographical coordinates of Ebolowa are 2.919441, 11.151682.

```
In [88]: # type your answer here
LIMIT = 100 # limit of number of venues returned by Foursquare API
radius = 10000 # define radius
url = 'https://api.foursquare.com/v2/venues/explore?&client_id={}&client_secret={}&v={}&ll={},{}&radius={}&limit={}'.format(
    CLIENT_ID,
    CLIENT_SECRET,
    VERSION,
    latitude_ebl,
    longitude_ebl,
    radius,
    LIMIT)
url
```

```
Out[88]: 'https://api.foursquare.com/v2/venues/explore?&client_id=F3MJ1QJPRHR3QIUN4UFG0GCMJJM53NC2RXKOGENYKFCDTVOK&client_secret=ESQQJ2EZYXRSKN30MFHEXHZHRR3WADCB5TJ2LPSL3YIHSU3&v=20191216&ll=2.919441,11.151682&radius=10000&limit=100'
```

```
In [89]: results = requests.get(url).json()  
results
```

```
Out[89]: {'meta': {'code': 200, 'requestId': '5df75fc077af03216ff598d3'},
  'response': {'headerLocation': 'Ébolowa',
    'headerFullLocation': 'Ébolowa',
    'headerLocationGranularity': 'city',
    'totalResults': 5,
    'suggestedBounds': {'ne': {'lat': 3.00944109000009,
      'lng': 11.241630791098682},
      'sw': {'lat': 2.829440909999991, 'lng': 11.061733208901316}},
    'groups': [{ 'type': 'Recommended Places',
      'name': 'recommended',
      'items': [{ 'reasons': { 'count': 0,
        'items': [{ 'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason' } ] } ],
      'venue': { 'id': '50efd2a3e4b06592cb7670ef',
        'name': 'Déli',
        'location': { 'lat': 2.919291699133977,
          'lng': 11.15149757927875,
          'labeledLatLngs': [{ 'label': 'display',
            'lat': 2.919291699133977,
            'lng': 11.15149757927875 } ],
          'distance': 26,
          'cc': 'CM',
          'city': 'Ébolowa',
          'state': 'South',
          'country': 'Cameroon',
          'formattedAddress': [ 'Ébolowa', 'Cameroon' ] },
        'categories': [{ 'id': '4bf58dd8d48988d16a941735',
          'name': 'Bakery',
          'pluralName': 'Bakeries',
          'shortName': 'Bakery',
          'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/food/bakery_',
            'suffix': '.png' },
          'primary': True } ],
        'photos': { 'count': 0, 'groups': [ ] },
        'referralId': 'e-0-50efd2a3e4b06592cb7670ef-0' },
      { 'reasons': { 'count': 0,
        'items': [{ 'summary': 'This spot is popular',
          'type': 'general',
          'reasonName': 'globalInteractionReason' } ] },
      'venue': { 'id': '51f4210c498ed909fa10b13e',
        'name': 'Pharmacie de la Mvila',
        'location': { 'lat': 2.91881,
```

```
'lng': 11.152,
'labeledLatLngs': [{ 'label': 'display',
  'lat': 2.91881,
  'lng': 11.152}],
'distance': 78,
'cc': 'CM',
'city': 'Ébolowa',
'state': 'South',
'country': 'Cameroon',
'formattedAddress': ['Ébolowa', 'Cameroon']],
'categories': [{ 'id': '4bf58dd8d48988d10f951735',
  'name': 'Pharmacy',
  'pluralName': 'Pharmacies',
  'shortName': 'Pharmacy',
  'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/shops/pharmacy_',
    'suffix': '.png'},
  'primary': True}],
'photos': { 'count': 0, 'groups': []}},
'referralId': 'e-0-51f4210c498ed909fa10b13e-1'},
{'reasons': { 'count': 0,
  'items': [{ 'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]},
'venue': { 'id': '519071f3498eb8a7bd5a2958',
  'name': 'Hotel Florence',
  'location': { 'lat': 2.9330626754298197,
    'lng': 11.164293258211645,
    'labeledLatLngs': [{ 'label': 'display',
      'lat': 2.9330626754298197,
      'lng': 11.164293258211645}],
    'distance': 2065,
    'cc': 'CM',
    'country': 'Cameroon',
    'formattedAddress': ['Cameroon']},
  'categories': [{ 'id': '4bf58dd8d48988d1fa931735',
    'name': 'Hotel',
    'pluralName': 'Hotels',
    'shortName': 'Hotel',
    'icon': { 'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/hotel_',
      'suffix': '.png'},
    'primary': True}],
  'photos': { 'count': 0, 'groups': []}},
'referralId': 'e-0-519071f3498eb8a7bd5a2958-2'},
```

```
{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]},
'venue': {'id': '5a98834c3abcaf1d352ab4e8',
  'name': 'Hotel Le Relais',
  'location': {'lat': 2.897222,
    'lng': 11.152048,
    'labeledLatLngs': [{'label': 'display',
      'lat': 2.897222,
      'lng': 11.152048}]},
  'distance': 2473,
  'cc': 'CM',
  'city': 'Ébolowa',
  'state': 'South',
  'country': 'Cameroon',
  'formattedAddress': ['Ébolowa', 'Cameroon']},
'categories': [{'id': '4bf58dd8d48988d1fa931735',
  'name': 'Hotel',
  'pluralName': 'Hotels',
  'shortName': 'Hotel',
  'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/travel/hotel_',
    'suffix': '.png'},
  'primary': True}],
'photos': {'count': 0, 'groups': []}},
'referralId': 'e-0-5a98834c3abcaf1d352ab4e8-3'},
{'reasons': {'count': 0,
  'items': [{'summary': 'This spot is popular',
    'type': 'general',
    'reasonName': 'globalInteractionReason'}]},
'venue': {'id': '53d57240498e255a4024c5c0',
  'name': 'le Dinard',
  'location': {'lat': 2.8594325145178447,
    'lng': 11.136796224665355,
    'labeledLatLngs': [{'label': 'display',
      'lat': 2.8594325145178447,
      'lng': 11.136796224665355}]},
  'distance': 6882,
  'cc': 'CM',
  'country': 'Cameroon',
  'formattedAddress': ['Cameroon']},
'categories': [{'id': '4bf58dd8d48988d11b941735',
  'name': 'Pub',
```

```
    'pluralName': 'Pubs',  
    'shortName': 'Pub',  
    'icon': {'prefix': 'https://ss3.4sqi.net/img/categories_v2/nightlife/pub_',  
             'suffix': '.png'},  
    'primary': True}],  
    'photos': {'count': 0, 'groups': []}},  
    'referralId': 'e-0-53d57240498e255a4024c5c0-4'}}]]]]}
```

```
In [90]: 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 [91]: # Let us get the Data into a Pandas Data Frame
venues = results['response']['groups'][0]['items']

ebl_venues = json_normalize(venues) # flatten JSON

# filter columns
filtered_columns = ['venue.name', 'venue.categories', 'venue.location.lat', 'venue.location.lng']
ebl_venues = ebl_venues.loc[:, filtered_columns]

# filter the category for each row
ebl_venues['venue.categories'] = ebl_venues.apply(get_category_type, axis=1)

# clean columns
ebl_venues.columns = [col.split(".")[1] for col in ebl_venues.columns]

ebl_venues.head()

```

Out[91]:

	name	categories	lat	lng
0	Déli	Bakery	2.919292	11.151498
1	Pharmacie de la Mvila	Pharmacy	2.918810	11.152000
2	Hotel Florence	Hotel	2.933063	11.164293
3	Hotel Le Relais	Hotel	2.897222	11.152048
4	le Dinard	Pub	2.859433	11.136796


```
In [92]: ebl_venues['City'] = 'Ebolowa'
ebl_venues = ebl_venues[['City', 'name', 'categories', 'lat', 'lng']]
cmr_venues_data = pd.concat([pd8, ebl_venues], ignore_index = True)
cmr_venues_data.tail(10)
```

Out[92]:

	City	name	categories	lat	lng
125	Garoua	Aeroport International Garoua	Airport	9.324633	13.379129
126	Ngaoundere	SUPER KILICHI	Steakhouse	7.326729	13.591301
127	Ngaoundere	Plazza	Steakhouse	7.321634	13.580221
128	Ngaoundere	Chez Polo	Bar	7.326332	13.581482
129	Ngaoundere	Aeroport de Ngaoundere	Airport	7.371793	13.566302
130	Ebolowa	Déli	Bakery	2.919292	11.151498
131	Ebolowa	Pharmacie de la Mvila	Pharmacy	2.918810	11.152000
132	Ebolowa	Hotel Florence	Hotel	2.933063	11.164293
133	Ebolowa	Hotel Le Relais	Hotel	2.897222	11.152048
134	Ebolowa	le Dinard	Pub	2.859433	11.136796

At tis point we have collected all the relevant data and combined in one dataset named 'cmr_venues_data'. The next task is to get the most frequent venue overall and the most frequent per city

```
In [93]: # We check the frequency of the different categories of venues  
cmr_venues_data.groupby('categories').count()
```

Out[93]:

	City	name	lat	lng
categories				
African Restaurant	4	4	4	4
Airport	2	2	2	2
Arepa Restaurant	1	1	1	1
Asian Restaurant	1	1	1	1
Athletics & Sports	1	1	1	1
BBQ Joint	1	1	1	1
Bakery	16	16	16	16
Bar	7	7	7	7
Beer Garden	1	1	1	1
Big Box Store	2	2	2	2
Bus Station	3	3	3	3
Café	2	2	2	2
Casino	1	1	1	1
Cocktail Bar	1	1	1	1
Coffee Shop	1	1	1	1
Comedy Club	1	1	1	1
Convenience Store	1	1	1	1
Department Store	4	4	4	4
Diner	3	3	3	3
Fast Food Restaurant	4	4	4	4
Food & Drink Shop	1	1	1	1
Food Court	1	1	1	1
French Restaurant	2	2	2	2
Gourmet Shop	1	1	1	1
Halal Restaurant	1	1	1	1

	City	name	lat	lng
categories				
Historic Site	1	1	1	1
Hotel	16	16	16	16
Ice Cream Shop	4	4	4	4
Indian Restaurant	1	1	1	1
Italian Restaurant	1	1	1	1
Juice Bar	1	1	1	1
Lounge	6	6	6	6
Market	1	1	1	1
Mediterranean Restaurant	1	1	1	1
Mountain	1	1	1	1
Nightclub	4	4	4	4
Outdoors & Recreation	1	1	1	1
Pharmacy	2	2	2	2
Piano Bar	1	1	1	1
Pizza Place	2	2	2	2
Plaza	7	7	7	7
Pub	3	3	3	3
Resort	2	2	2	2
Restaurant	6	6	6	6
Shopping Mall	4	4	4	4
Snack Place	1	1	1	1
Steakhouse	3	3	3	3
Supermarket	1	1	1	1
Tennis Court	1	1	1	1
Turkish Restaurant	1	1	1	1

```
In [94]: # We get the number of unique categories
print('There are {} uniques categories.'.format(len(cmr_venues_data['categories'].unique())))
```

There are 50 uniques categories.

We Analyze each city as per the different categories in the city, using one hot encoding

```
In [96]: # We use OneHotEncoding and analyze each city
# one hot encoding
cameroon_onehot = pd.get_dummies(cmr_venues_data[['categories']], prefix="", prefix_sep="")

# add City column back to dataframe
cameroon_onehot['City'] = cmr_venues_data['City']

# move City column to the first column
fixed_columns = [cameroon_onehot.columns[-1]] + list(cameroon_onehot.columns[:-1])
cameroon_onehot = cameroon_onehot[fixed_columns]

cameroon_onehot
```

Out[96]:

[illegible]

[illegible]

	City	African Restaurant	Airport	Arepa Restaurant	Asian Restaurant	Athletics & Sports	BBQ Joint	Bakery	Bar	Beer Garden	Big Box Store	Bus Station	Café	Casino	Co
50	Yaounde	0	0	0	0	0	0	0	0	0	0	0	0	0	
51	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
52	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
53	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
54	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
55	Douala	0	0	0	0	0	0	1	0	0	0	0	0	0	
56	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
57	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
58	Douala	0	0	0	0	0	0	0	0	0	1	0	0	0	
59	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
60	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
61	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
62	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
63	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
64	Douala	0	0	0	0	0	0	1	0	0	0	0	0	0	
65	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
66	Douala	1	0	0	0	0	0	0	0	0	0	0	0	0	
67	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
68	Douala	1	0	0	0	0	0	0	0	0	0	0	0	0	
69	Douala	0	0	1	0	0	0	0	0	0	0	0	0	0	
70	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
71	Douala	0	0	0	0	0	0	1	0	0	0	0	0	0	
72	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
73	Douala	0	0	0	0	0	0	0	0	0	0	0	0	0	
74	Douala	0	0	0	0	0	0	0	0	1	0	0	0	0	

[illegible]

[illegible]

	City	African Restaurant	Airport	Arepa Restaurant	Asian Restaurant	Athletics & Sports	BBQ Joint	Bakery	Bar	Beer Garden	Big Box Store	Bus Station	Café	Casino	Co
125	Garoua	0	1	0	0	0	0	0	0	0	0	0	0	0	
126	Ngaoundere	0	0	0	0	0	0	0	0	0	0	0	0	0	
127	Ngaoundere	0	0	0	0	0	0	0	0	0	0	0	0	0	
128	Ngaoundere	0	0	0	0	0	0	0	1	0	0	0	0	0	
129	Ngaoundere	0	1	0	0	0	0	0	0	0	0	0	0	0	
130	Ebolowa	0	0	0	0	0	0	1	0	0	0	0	0	0	
131	Ebolowa	0	0	0	0	0	0	0	0	0	0	0	0	0	
132	Ebolowa	0	0	0	0	0	0	0	0	0	0	0	0	0	
133	Ebolowa	0	0	0	0	0	0	0	0	0	0	0	0	0	
134	Ebolowa	0	0	0	0	0	0	0	0	0	0	0	0	0	

In [97]: `cameroon_onehot.shape` *#Getting the shape of the Dataset*

Out[97]: (135, 51)

We now group the rows by city and by taking the mean frequency of occurrence of each of the categories

```
In [98]: cameroon_grouped = cameroon_onehot.groupby('City').mean().reset_index()
cameroon_grouped
```

Out[98]:

	City	African Restaurant	Airport	Arepa Restaurant	Asian Restaurant	Athletics & Sports	BBQ Joint	Bakery	Bar	Beer Garden	Big Box Store	Bus Station	
0	Bafoussam	0.000000	0.000000	0.000000	0.142857	0.000000	0.000000	0.000000	0.142857	0.000000	0.000000	0.142857	0.
1	Bamenda	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.250000	0.
2	Bertoua	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.333333	0.000000	0.000000	0.333333	0.
3	Buea	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.200000	0.000000	0.000000	0.000000	0.000000	0.
4	Douala	0.039216	0.000000	0.019608	0.000000	0.019608	0.000000	0.117647	0.019608	0.019608	0.039216	0.000000	0.
5	Ebolowa	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.200000	0.000000	0.000000	0.000000	0.000000	0.
6	Garoua	0.000000	0.333333	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.
7	Maroua	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.
8	Ngaoundere	0.000000	0.250000	0.000000	0.000000	0.000000	0.000000	0.000000	0.250000	0.000000	0.000000	0.000000	0.
9	Yaounde	0.039216	0.000000	0.000000	0.000000	0.000000	0.019608	0.156863	0.058824	0.000000	0.000000	0.000000	0.

```
In [100]: cameroon_grouped.shape
```

Out[100]: (10, 51)

We now print each city with the top 5 venue categories in the city

```
In [104]: num_top_venues = 5

for City in cameroon_grouped['City']:
    print("-----"+City+"-----")
    temp = cameroon_grouped[cameroon_grouped['City'] == City].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')
```

----Bafoussam----

	venue	freq
0	Shopping Mall	0.14
1	Snack Place	0.14
2	Resort	0.14
3	Bus Station	0.14
4	Bar	0.14

----Bamenda----

	venue	freq
0	Hotel	0.75
1	Bus Station	0.25
2	African Restaurant	0.00
3	Pharmacy	0.00
4	Indian Restaurant	0.00

----Bertoua----

	venue	freq
0	Bar	0.33
1	Resort	0.33
2	Bus Station	0.33
3	African Restaurant	0.00
4	Pharmacy	0.00

----Buea----

	venue	freq
0	Juice Bar	0.2
1	Bakery	0.2
2	Mountain	0.2
3	Plaza	0.2
4	Hotel	0.2

----Douala----

	venue	freq
0	Bakery	0.12
1	Ice Cream Shop	0.08
2	Lounge	0.08
3	Restaurant	0.06
4	Plaza	0.06

----Ebolowa----

	venue	freq
0	Hotel	0.4
1	Pharmacy	0.2
2	Bakery	0.2
3	Pub	0.2
4	African Restaurant	0.0

----Garoua----

	venue	freq
0	Airport	0.33
1	Hotel	0.33
2	Fast Food Restaurant	0.33
3	Ice Cream Shop	0.00
4	Indian Restaurant	0.00

----Maroua----

	venue	freq
0	Hotel	1.0
1	Pharmacy	0.0
2	Ice Cream Shop	0.0
3	Indian Restaurant	0.0
4	Italian Restaurant	0.0

----Ngaoundere----

	venue	freq
0	Steakhouse	0.50
1	Airport	0.25
2	Bar	0.25
3	Pharmacy	0.00
4	Ice Cream Shop	0.00

----Yaounde----

	venue	freq
0	Bakery	0.16
1	Hotel	0.10
2	Plaza	0.06


```
3          Bar  0.06
4  Restaurant  0.06
```

We then create a dataframe displaying the top 5 business category in each city. But first, we write a function to sort the venues in descending order

```
In [107]: 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]
```

```

In [120]: # We then create a new dataframe and display the top 5 venues in each city
num_top_venues = 3

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

# create columns according to number of top venues
columns = ['City']
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))

# create a new dataframe
city_venues_sorted = pd.DataFrame(columns=columns)
city_venues_sorted['City'] = cameroon_grouped['City']

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

city_venues_sorted.head(12)

```

Out[120]:

	City	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue
0	Bafoussam	Snack Place	Shopping Mall	Asian Restaurant
1	Bamenda	Hotel	Bus Station	Turkish Restaurant
2	Bertoua	Bus Station	Resort	Bar
3	Buea	Mountain	Hotel	Bakery
4	Douala	Bakery	Ice Cream Shop	Lounge
5	Ebolowa	Hotel	Bakery	Pub
6	Garoua	Airport	Hotel	Fast Food Restaurant
7	Maroua	Hotel	Turkish Restaurant	Casino
8	Ngaoundere	Steakhouse	Airport	Bar
9	Yaounde	Bakery	Hotel	Bar

By handing over the data to the Chinese investors, the Data Scientists project is finished.

In []: