Exploring the Historical Districts of Istanbul to Create a Historical Travel Planner

1. Introduction

1.1 Background

Istanbul is a major city in Turkey that straddles Europe and Asia across the Bosphorus Strait. Its Old City reflects cultural influences of the many empires that once ruled here. In the Sultanahmet district, the open air , Roman-era Hippodrome was for centuries the site of chariot races, and Egyption obelisks also remain. The iconic Byzantine Hagia Sophia features a soar

1.2 Problem

Travelling to a city as historical and exciting as Istanbul can be overwhelming. Utilizing a planner can maximize valuable time, priotrize must-see historical places and plan for easier and faster traveln between attractions. This project aims to create an efficient travel planner that saves time, includes must-see attractions, and make suggestions for what to see taking into account distance, time and location.

1.3 Interest

Millions of visitors make the pilgrimage to Istanul every year to visit its historical attractions. These visitors would be interested in the results of this project for their visit to Istanbul. Even Istanbul population can find benefits for exploring their hometown or a new arrondissement with the results of our analysis using location data.

2.Data

2.1 Data Source

To Be Corrected

The data we will use in this project will be gathered from a variety of online sources using web scraping techniques such as BeautifulSoup.

The arrondissements information on this Wikipedia page. Its corresponding latitude and longitude were compiled manually using Nominatim. The top must-see Istanbul's historical attraction were found on this website as well as from Google Search, compiled with its corresponding latitude and longitude were found using Nominatim.

We will utilize a n Istanbul arrondissements geoson filr from Carto to map out the bounderies of each arronddissments and great visuals such as choropleth maps for population.The venues data was found by using the Foursquare API.

2.2 Data Cleaning

to be Corrected

The Arrondissment that was scraped from Wikipedia site was fairly clean except for the "Arrondissment (R for Right Bank, L for Left Bank)' column, so we added another column to the data set named "Arrondissment" that included just the numbered arrondissment. We changed the longitude and latitude columns from an object to a float type. We also added another two columns for each arrondissment's average longitude and latitude.

The famous histrical places data was compiled manually into a list and appended with its associated longitude and latitude. Utilizing Foursquare data, we downloaded the top 100 venues in each arrondissements within a 2000-meter distance from the arrondissements cooridnate. The resulting table contained the arrondissements number, longitude, latitude, venue, venue longitude longitude and latitude and venue category. Since each arrondissement's area is varried between 0.3 square miles to 3.3 square miles, there may be duplicates in our search result. We therefore dropped duplicate venues that appeared in our search.

The Istanbul geoson file was downlodaded to create arrondissements boundaried in our maps had its arrondissement name formatted in Turkish. Therefore , we created a new column that matched the format of the geojson and appended it wit longitude and latitude to be utilized in the visualizations.

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 requests

import json #library to handle json files

!pip install geopy
from geopy.geocoders import Nominatim # covert an adress to latitude and long

import requests # library to handle requests

from pandas.io.json import json_normalize # transform json file into a panada

# importing plotting modules
import matplotlib.cm as cm
import matplotlib.colors as colors

# importing K-Means from clustering stage
from sklearn.cluster import KMeans

!pip install folium
import folium #map rendering library

print('Libraries imported')
```

```
Requirement already satisfied: geopy in c:\programdata\anaconda3\lib\site-p
ackages (1.19.0)
Requirement already satisfied: geographiclib<2,>=1.49 in c:\programdata\ana
conda3\lib\site-packages (from geopy) (1.49)
Requirement already satisfied: folium in c:\programdata\anaconda3\lib\site-
packages (0.8.3)
Requirement already satisfied: jinja2 in c:\programdata\anaconda3\lib\site-
packages (from folium) (2.10)
Requirement already satisfied: requests in c:\programdata\anaconda3\lib\sit
e-packages (from folium) (2.21.0)
Requirement already satisfied: six in c:\programdata\anaconda3\lib\site-pac
kages (from folium) (1.12.0)
Requirement already satisfied: branca>=0.3.0 in c:\programdata\anaconda3\li
b\site-packages (from folium) (0.3.1)
Requirement already satisfied: numpy in c:\programdata\anaconda3\lib\site-p
ackages (from folium) (1.15.4)
Requirement already satisfied: MarkupSafe>=0.23 in c:\programdata\anaconda3
\lib\site-packages (from jinja2->folium) (1.1.0)
Requirement already satisfied: certifi>=2017.4.17 in c:\programdata\anacond
a3\lib\site-packages (from requests->folium) (2018.11.29)
Requirement already satisfied: urllib3<1.25,>=1.21.1 in c:\programdata\anac
onda3\lib\site-packages (from requests->folium) (1.24.1)
Requirement already satisfied: idna<2.9,>=2.5 in c:\programdata\anaconda3\l
ib\site-packages (from requests->folium) (2.8)
Requirement already satisfied: chardet<3.1.0,>=3.0.2 in c:\programdata\anac
onda3\lib\site-packages (from requests->folium) (3.0.4)
Libraries imported
```

In [2]:
```
# Blue Mosque as the main historical site and it address(from Google)
address = 'Blue Mosque, Istanbul'

geolocator = Nominatim(user_agent="Istanbul_explorer")
location = geolocator.geocode(address)
latitude = location.latitude
longitude = location.longitude
print('The Geographical coordinates of Blue Mosque are {}, {}.'.format(latitu
```

```
The Geographical coordinates of Blue Mosque are 41.0052619, 28.9768725.
```

In [3]:
```
#Foursqure Credentials and parameters
CLIENT_ID = "OLHRDU1N0XQXNQUDHDINJBDI3JOIFZRBWJ2L1T3TZHCJAWYN"
CLIENT_SECRET = "PWGBI2KUE2JIL0VNTIFFPN2EEQGA5FMGCOIWH1NGBQF51MDW"
VERSION='20180604'
LIMIT=30
radius=50000
search_query='Historic'
```

In [4]:
```
#search Foursqure
url='https://api.foursquare.com/v2/venues/search?client_id={}&client_secret={
&ll={},{}&v={}&query={}&radius={}'.format(CLIENT_ID,CLIENT_SECRET,latitude,lo
url
```

Out[4]:
```
'https://api.foursquare.com/v2/venues/search?client_id=OLHRDU1N0XQXNQUDHDIN
JBDI3JOIFZRBWJ2L1T3TZHCJAWYN&client_secret=PWGBI2KUE2JIL0VNTIFFPN2EEQGA5FMG
COIWH1NGBQF51MDW&ll=41.0052619,28.9768725&v=20180604&query=Historic&radius=
50000'
```

In [5]:
```
istanbul_data=requests.get(url).json()
istanbul_data
```

Out[5]:
```
{'meta': {'code': 200, 'requestId': '5cb800f66a60715ae10249e2'},
 'response': {'venues': [{'id': '4b732d5bf964a52011a02de3',
    'name': 'Galata Kulesi',
    'location': {'address': 'Bereketzade Mah. Büyük Hendek Cad. Galata',
     'lat': 41.02580757317179,
     'lng': 28.974153583057955,
     'distance': 2298,
     'postalCode': '34420',
     'cc': 'TR',
     'neighborhood': 'Bereketzade',
     'city': 'Beyoğlu',
     'state': 'İstanbul',
     'country': 'Türkiye',
     'formattedAddress': ['Bereketzade Mah. Büyük Hendek Cad. Galata',
      '34420 Beyoğlu',
      'Türkiye']},
    'categories': [{'id': '4deefb944765f83613cdba6e',
      'name': 'Historic Site',
      'pluralName': 'Historic Sites',
```

In [6]:
```
venues=istanbul_data['response']['venues']
df_istanbul= json_normalize(venues)
df_istanbul.head()
```

Out[6]:

	categories	hasPerk	id	location.address	location.c
0	[{'id': '4deefb944765f83613cdba6e', 'name': 'H...	False	4b732d5bf964a52011a02de3	Bereketzade Mah. Büyük Hendek Cad. Galata	T
1	[{'id': '4bf58dd8d48988d1ed941735', 'name': 'S...	False	4e870d4be5fa32b62a13643f	NaN	T
2	[{'id': '4bf58dd8d48988d162941735', 'name': 'O...	False	53c50213498ec2ff5749e896	NaN	T
3	[{'id': '4bf58dd8d48988d1ce941735', 'name': 'S...	False	4e23008e1495f18f035d9230	NaN	T
4	[{'id': '4fbc1be21983fc883593e321', 'name': 'W...	False	52c15e3b498eff91d4503a73	NaN	T

In [7]:
```
df_istanbul.columns
```

Out[7]:
```
Index(['categories', 'hasPerk', 'id', 'location.address', 'location.cc',
       'location.city', 'location.country', 'location.crossStreet',
       'location.distance', 'location.formattedAddress',
       'location.labeledLatLngs', 'location.lat', 'location.lng',
       'location.neighborhood', 'location.postalCode', 'location.state',
       'name', 'referralId', 'venuePage.id'],
      dtype='object')
```

In [8]:
```
df_istanbul_refined=df_istanbul.drop(['hasPerk','id','location.cc','location.
'location.labeledLatLngs','referralId'], axis=1)
df_istanbul_refined.columns
```

Out[8]:
```
Index(['categories', 'location.address', 'location.city',
       'location.crossStreet', 'location.distance', 'location.lat',
       'location.lng', 'location.neighborhood', 'location.postalCode',
       'location.state', 'name', 'venuePage.id'],
      dtype='object')
```

In [9]:
```
df_istanbul_refined.head(2)
```

Out[9]:

	categories	location.address	location.city	location.crossStreet	location.dist
0	[{'id': '4deefb944765f83613cdba6e', 'name': 'H...	Bereketzade Mah. Büyük Hendek Cad. Galata	Beyoğlu	NaN	
1	[{'id': '4bf58dd8d48988d1ed941735', 'name': 'S...	NaN	NaN	NaN	

In [10]:
```
df_istanbul_refined_arranged=df_istanbul_refined[['name','categories','locati
'location.city','location.distance','location.lat','location.lng',]]
df_istanbul_refined_arranged.head(2)
```

Out[10]:

	name	categories	location.address	location.city	location.distance	loc
0	Galata Kulesi	[{'id': '4deefb944765f83613cdba6e', 'name': 'H...	Bereketzade Mah. Büyük Hendek Cad. Galata	Beyoğlu	2298	4
1	Historical GedikPaşa Bath Turkish Hammam	[{'id': '4bf58dd8d48988d1ed941735', 'name': 'S...	NaN	NaN	299	4

In [11]:

```
#keep only columns that include venue name and anything is associated with lo
filtered_columns=['name','categories'] + [col for col in df_istanbul_refined_
dataframe_filtered=df_istanbul_refined_arranged.loc[:, filtered_columns]

#function that extracts the category of the venue
def get_category_type(row):
    try:
        categories_list = row['categories']
    except:
        categories_list = row['venues.categories']

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

#filter category for each row
dataframe_filtered['categories'] = df_istanbul_refined_arranged.apply(get_cat

#clean column names by keeping only last name
dataframe_filtered.columns = [column.split('.')[-1] for column in dataframe_f

dataframe_filtered
```

Out[11]:

	name	categories	address	city	distance	lat	lng
0	Galata Kulesi	Historic Site	Bereketzade Mah. Büyük Hendek Cad. Galata	Beyoğlu	2298	41.025808	28.974154
1	Historical GedikPaşa Bath Turkish Hammam	Spa	NaN	NaN	299	41.007799	28.975671
2	Historical Peninsula	Other Great Outdoors	NaN	İstanbul	591	41.006127	28.969930
3	Historical Kumkapı Restaurant	Seafood Restaurant	NaN	İstanbul	1024	41.004365	28.964739
4	Historic Hamam and Sauna	Well	NaN	NaN	7284	41.044666	29.046116
5	Historical Preffered Hotel	Housing Development	NaN	NaN	1008	41.014194	28.978896
6	Historical Preferred Hotel Old City	Hotel	Nöbethane Cad. No:30 Sirkeci Fatih	İstanbul	1011	41.014333	28.977525
7	Historical Vezneciler Turkish Bath	Spa	Bozdogan Kemeri Cad. No. 2	İstanbul	1475	41.011254	28.961208
8	Historical Flat	Residential Building (Apartment / Condo)	NaN	NaN	2232	41.025257	28.974894

	name	categories	address	city	distance	lat	lng
9	Halat by Divan	Restaurant	Rahmi M. Koç Müzesi Hasköy Caddesi No:2 Hasköy...	İstanbul	4666	41.041223	28.948326
10	Historical Martial Arts Association of İstanbu...	Martial Arts Dojo	Caferağa, Moda Cad, No. 250	İstanbul	4642	40.982603	29.023261
11	Historical Roman Arena	Football Stadium	NaN	NaN	7176	40.996810	29.061559
12	Blueway Hotel Hıstorıcal	Residential Building (Apartment / Condo)	NaN	NaN	5073	41.050282	28.986289
13	Nur Hamamı Taksim Tarihi Turk Hamamı Historica...	Bath House	Kamerhatun Mahallesi no 14	Beyoğlu	3259	41.034543	28.976319
14	Kervansaray Historical Hotel	Hotel	Kervansaray Historical Hotel Cesme	Cesme	3911	41.039996	28.983892
15	Taşhan Historical Bazaar	Shopping Mall	Laleli	İstanbul	1806	41.010798	28.956662
16	Panorama 1453 Historical Museum	History Museum	NaN	NaN	7662	41.048038	28.905389
17	Mini Historical Bazaar	Souvenir Shop	Ataköy 1. Kısım Mahallesi Rauf Orbay Caddesi N...	İstanbul	9702	40.973236	28.869480

In [12]:

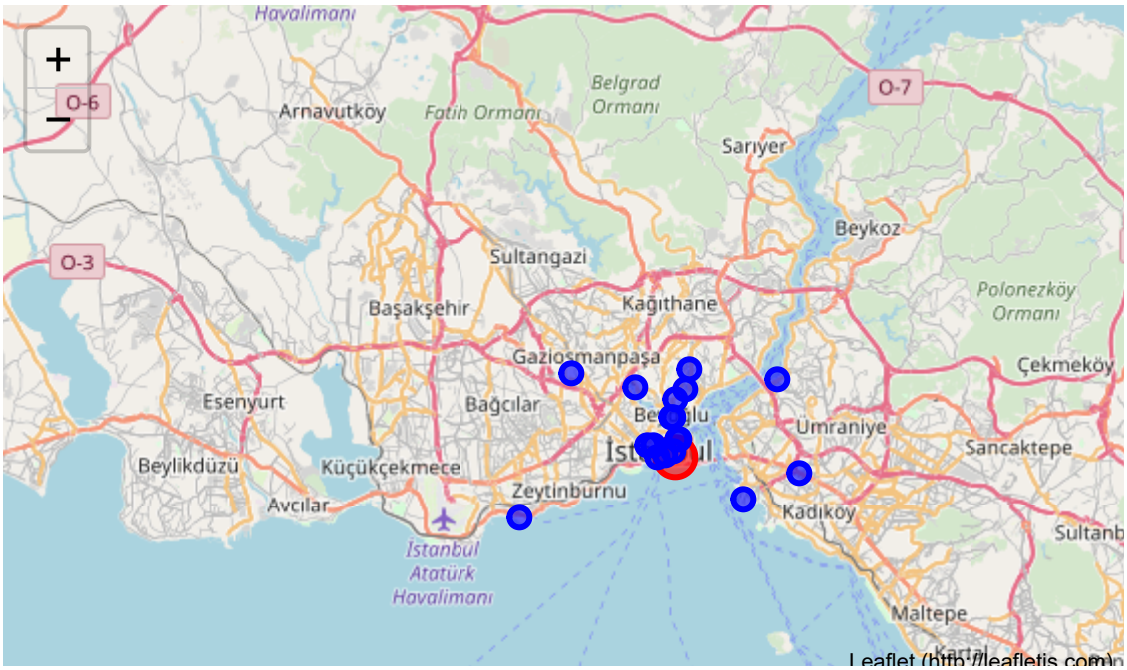
```
#generate map around Topkapi Serai
map_istanbul = folium.Map(location = [latitude, longitude], zoom_start = 11)
#display(map_istanbul)

#add a red circle marker to represent Topkapi Palace
folium.CircleMarker(
    [latitude, longitude],
    radius=10,color='red',
    popup='Blue Mosque',
    fill=True,fill_color='red',
    fill_opacity=0.6).add_to(map_istanbul)

#add the historical places as blue circle markers
for lat, lng, label in zip(dataframe_filtered.lat,dataframe_filtered.lng, dat
    folium.CircleMarker(
        [lat, lng],
        radius=5, color='blue',
        popup=label,
        fill=True, fill_color='blue',
        fill_opacity=0.6).add_to(map_istanbul)


map_istanbul
```

Out[12]:



In [ ]:

In [ ]: