

Section 1: Introduction

In this section I will clearly define the idea of my choosing, where I leverage the Foursquare location data to solve the imagined business opportunity.

Background

There are many travel sites on the Internet, including [FourSquare](#), that will tell you all about places to visit, things to do, good restaurants, bars, nightclubs, breakfast places coffee shops, market places etc. But, these sites do not give information about the law and order of a place. There may be some interesting area to visit but full of criminal activities. So, visiting those places without prior information about the crime is risky for travellers. So, I have plan for this project. In this project I have analyzed important venues of different states of India and also crime rate of those states.

Project Idea

I have done this project on the data available for the country **India**.

I have analyzed the FourSquare data to get venues of a different states of India and for analyzing crime data of those states I have taken data from another website <https://data.gov.in>, maintained by Govt. of India.

Who is this solution targeted at

This solution is targeted at the cautious traveller. The want to see all the main sites of a state that they have never visited before but at the same time, for whatever reasons unknown , they want to be able to do all that they can to make sure that they stay clear of trouble i.e. is it safe to visit this venue and this restaurant at night.

Section 2: Data

Data Description

The website www.foursquare.com has been used to get the top venue information.

The **geopy** library has been used to get the latitude and longitude values of any location.

I have done this project on country India. So, I have used the website <https://data.gov.in> to get crime rate data of different states of India

Dataset URL: <https://data.gov.in/catalog/crime-india-2016>

The dataset has following structure:

State/UT (Col.2)	Total Cognizable IPC Crimes - R (Col.118)
Andhra Pradesh	206.4
Arunachal Pradesh	192
Assam	313.8
Bihar	157.4
Chhattisgarh	211.7
Goa	135.3
Gujarat	233.2
Haryana	320.6
Himachal Pradesh	188
Jammu & Kashmir	196.6
Jharkhand	120.4
Karnataka	237.2
Kerala	727.5
Madhya Pradesh	337.9
Maharashtra	217.1
Manipur	121.9

Latitude and longitude information of all states have been taken by using the geopy library and stored in data frame in the following manner:

```
count=0
rowcount=df_crime.shape[0]
print('No of States/UT in Record:',rowcount)
while (count<rowcount):
    address=df_crime.iloc[count,0]
    NoOfCrime=df_crime.iloc[count,1]
    #print('State Name is:',address)
    location = geolocator.geocode(address)
    if (location != None):
        latitude = location.latitude
        longitude = location.longitude
        print('The geograpical coordinate of {} are {}, {}'.format(address,latitude, longitude))
        df_crime_final = df_crime_final.append({'State': address,
                                                'NoOfCrime': NoOfCrime,
                                                'Latitude': latitude,
                                                'Longitude': longitude}, ignore_index=True)

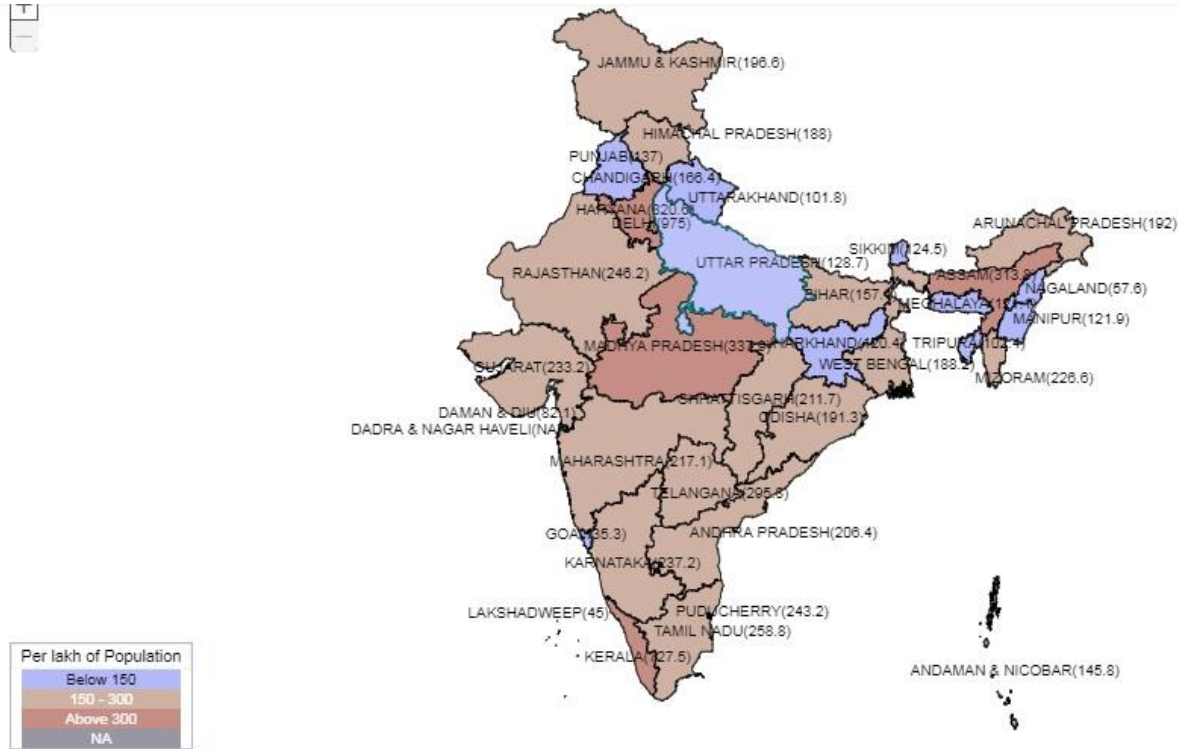
    count=count+1
```

The resultant table structure:

	State	NoOfCrime	Latitude	Longitude
0	Andhra Pradesh	206.4	15.924091	80.186381
1	Arunachal Pradesh	192.0	28.364199	94.758627
2	Assam	313.8	26.407384	93.255130
3	Bihar	157.4	25.644085	85.906508
4	Chhattisgarh	211.7	21.663736	81.840635

Section 3: Methodology

The map of India with its state information is as follows:



First, the map of India has been created by using the folium.Map() function.

Next, The CircleMarker has been used to create bubble for marking different states of India as per the crime rate. The size and colours of bubbles are based on crime rate data available in data frame.

According to number of crimes in each state I am marking different groups and marking then by separate colours.

Bubble circles with different colours and size are being created for each states as per the number of crimes.

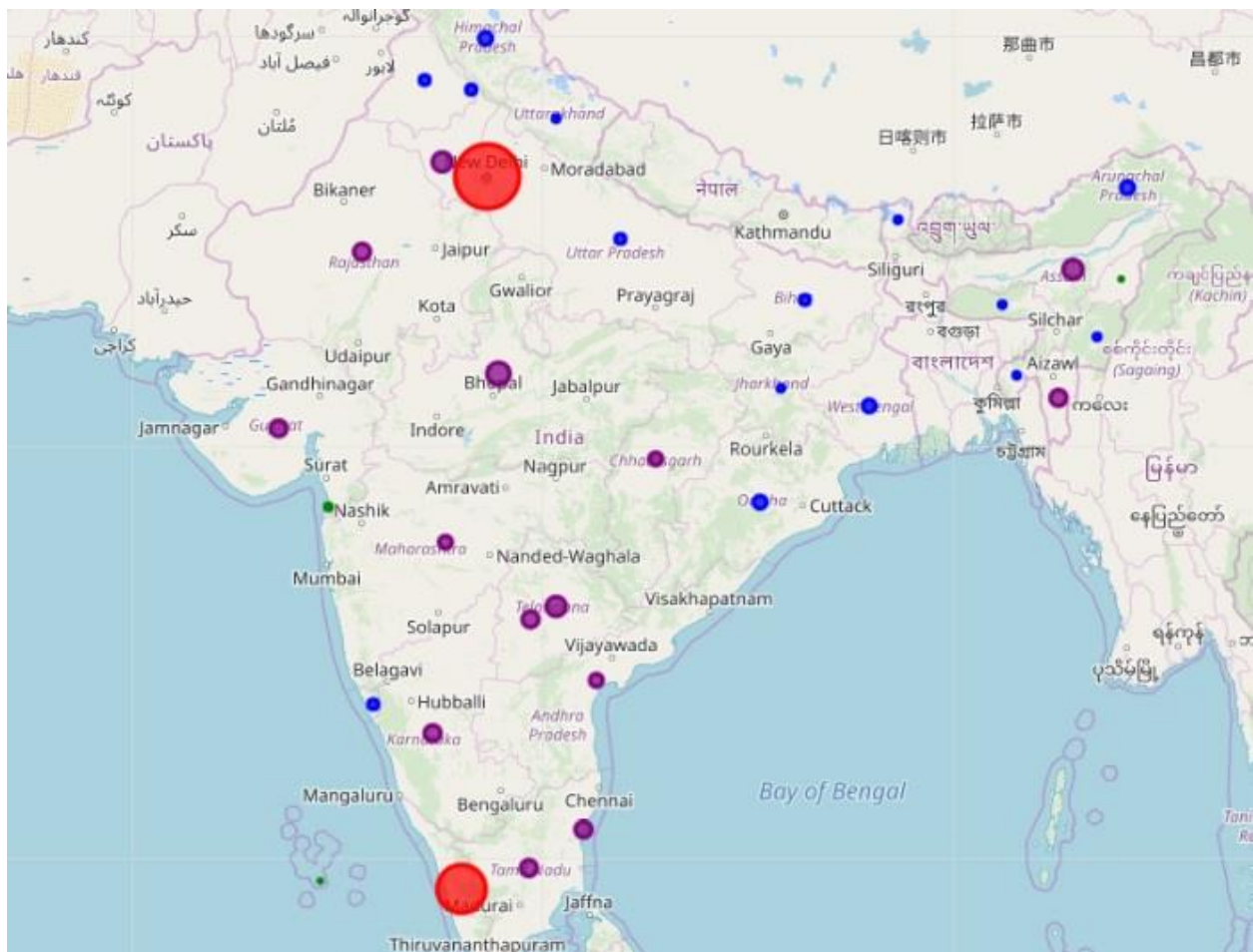
```
df_crime_final.loc[df_crime_final['NoOfCrime'] >=600, 'Colour'] = 'Red'  
df_crime_final.loc[(df_crime_final['NoOfCrime'] >=400) & (df_crime_final['NoOfCrime'] <600), 'Colour'] = 'yellow'  
df_crime_final.loc[(df_crime_final['NoOfCrime'] >=200) & (df_crime_final['NoOfCrime'] <400), 'Colour'] = 'Purple'  
df_crime_final.loc[(df_crime_final['NoOfCrime'] >=100) & (df_crime_final['NoOfCrime'] <200), 'Colour'] = 'blue'  
df_crime_final.loc[df_crime_final['NoOfCrime'] <100, 'Colour'] = 'green'
```

```
df_crime_final.head()
```

	State	NoOfCrime	Latitude	Longitude	Colour
0	Andhra Pradesh	206.4	15.924091	80.186381	Purple
1	Arunachal Pradesh	192.0	28.364199	94.758627	blue
2	Assam	313.8	26.407384	93.255130	Purple
3	Bihar	157.4	25.644085	85.906508	blue
4	Chhattisgarh	211.7	21.663736	81.840635	Purple

Following code is used to create the bubbles to mark states as per crime rate.

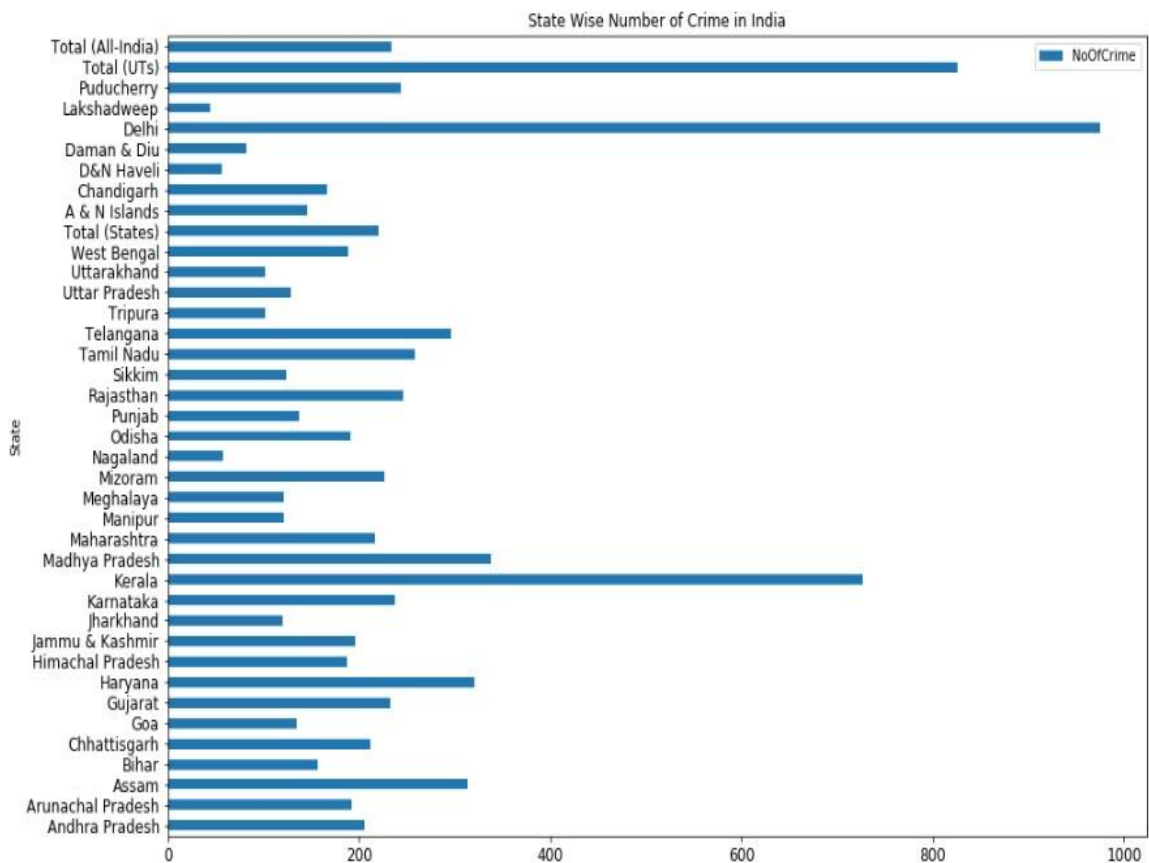
```
# create map of India using latitude and longitude values
map_india = folium.Map(location=[latitude_india, longitude_india], zoom_start=5)
# add markers to map
for lat, lng, state, crime, colour in zip(df_crime_final['Latitude'], df_crime_final['Longitude'], df_crime_final['State'], df_crime_final['CrimeRate']):
    label = '{},{},{},{}'.format(state, crime, colour)
    label = folium.Popup(label, parse_html=True)
    folium.CircleMarker(
        [lat, lng],
        radius=crime/50,
        popup=label,
        color=colour,
        fill=True,
        fill_color=colour,
        fill_opacity=0.7,
        parse_html=False).add_to(map_india)
```



Using the FourSquare.com website I have also summarized the top venues of different states.

Section 4: Result

After the crime data analysis I have prepared the bar chart to visualize and compare crime rate of different states so that taking decisions to visit particular place will be easier.



Now, tourists can go through the top venues option for those different states.

Here are the top venues for states:

State	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
Chandigarh	Café	Indian Restaurant	Fast Food Restaurant	Hotel	Bakery	Sandwich Place	Coffee Shop	Pizza Place	Ice Cream Shop	Multiplex
D&N Haveli	Supermarket	Drugstore	Café	German Restaurant	Fast Food Restaurant	Ice Cream Shop	Restaurant	Big Box Store	Doner Restaurant	Bakery
Daman & Diu	Resort	Hotel	Arcade	Indian Restaurant	Beach	Harbor / Marina	Bus Station	Men's Store	Casino	Restaurant
Delhi	Indian Restaurant	Hotel	Café	History Museum	Food & Drink Shop	Lounge	Bar	Bakery	BBQ Joint	South Indian Restaurant
Goa	Clothing Store	Train Station	Restaurant	Gastropub	Zoo	Electronics Store	Food & Drink Shop	Food	Flea Market	Fast Food Restaurant
Haryana	IT Services	Factory	Food Truck	Food Court	Food & Drink Shop	Food	Flea Market	Fast Food Restaurant	Farmers Market	Falafel Restaurant
Himachal Pradesh	Deli / Bodega	Public Art	Campground	Department Store	Factory	Food Court	Food & Drink Shop	Food	Flea Market	Fast Food Restaurant
Jharkhand	ATM	Factory	Food Truck	Food Court	Food & Drink Shop	Food	Flea Market	Fast Food Restaurant	Farmers Market	Falafel Restaurant
Karnataka	South Indian Restaurant	Snack Place	Train Station	Electronics Store	Food Court	Food & Drink Shop	Food	Flea Market	Fast Food Restaurant	Farmers Market
Lakshadweep	Boat or Ferry	Falafel Restaurant	Forest	Food Truck	Food Court	Food & Drink Shop	Food	Flea Market	Fast Food Restaurant	Farmers Market
Maharashtra	Rental Car Location	Zoo	Electronics Store	Food Court	Food & Drink Shop	Food	Flea Market	Fast Food Restaurant	Farmers Market	Falafel Restaurant
Meghalaya	ATM	Factory	Food Truck	Food Court	Food & Drink Shop	Food	Flea Market	Fast Food Restaurant	Farmers Market	Falafel Restaurant
Puducherry	Hotel	Restaurant	Indian Restaurant	Pizza Place	Coffee Shop	Café	Bakery	Italian Restaurant	Ice Cream Shop	Beach
Total (All-India)	Indian Restaurant	Pizza Place	Bakery	Ice Cream Shop	Fast Food Restaurant	Shopping Mall	Coffee Shop	Gym	Multiplex	Movie Theater
Total (States)	Boat or Ferry	Hotel	Pizza Place	Mexican Restaurant	Park	Seafood Restaurant	Sandwich Place	Donut Shop	Convenience Store	American Restaurant

States are also clustered by those venues also.

	State	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Goa	0	Clothing Store	Train Station	Restaurant	Gastropub	Zoo	Electronics Store	Food & Drink Shop	Food	Flea Market	Fast Food Restaurant
7	Total (States)	0	Boat or Ferry	Hotel	Pizza Place	Mexican Restaurant	Park	Seafood Restaurant	Sandwich Place	Donut Shop	Convenience Store	American Restaurant
8	Chandigarh	0	Café	Indian Restaurant	Fast Food Restaurant	Hotel	Bakery	Sandwich Place	Coffee Shop	Pizza Place	Ice Cream Shop	Multiplex
9	D&N Haveli	0	Supermarket	Drugstore	Café	German Restaurant	Fast Food Restaurant	Ice Cream Shop	Restaurant	Big Box Store	Doner Restaurant	Bakery
10	Daman & Diu	0	Resort	Hotel	Arcade	Indian Restaurant	Beach	Harbor / Marina	Bus Station	Men's Store	Casino	Restaurant
11	Delhi	0	Indian Restaurant	Hotel	Café	History Museum	Food & Drink Shop	Lounge	Bar	Bakery	BBQ Joint	South Indian Restaurant
13	Puducherry	0	Hotel	Restaurant	Indian Restaurant	Pizza Place	Coffee Shop	Café	Bakery	Italian Restaurant	Ice Cream Shop	Beach
14	Total (UTs)	0	Park	Café	Bar	Coffee Shop	Vegetarian / Vegan Restaurant	Cocktail Bar	Japanese Restaurant	Grocery Store	Ice Cream Shop	Vietnamese Restaurant
15	Total (All-India)	0	Indian Restaurant	Pizza Place	Bakery	Ice Cream Shop	Fast Food Restaurant	Shopping Mall	Coffee Shop	Gym	Multiplex	Movie Theater

	State	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
3	Jharkhand	1	ATM	Factory	Food Truck	Food Court	Food & Drink Shop	Food	Flea Market	Fast Food Restaurant	Farmers Market	Falafel Restaurant
6	Meghalaya	1	ATM	Factory	Food Truck	Food Court	Food & Drink Shop	Food	Flea Market	Fast Food Restaurant	Farmers Market	Falafel Restaurant

Section 5: Discussion and Conclusion

The main stakeholders, the tourists can now analyze different available options for tourists' places by not only based on unidirectional data which most of the travel sites offer.

They can consider analyzing the crime rate data also before going to visit any venue and tourist place. They can decide whether they will visit a particular tourist place or venue at night and evening or it is better to visit that at day time. They will be more cautious about their safety and belongings.

Based on these data they can plan their tour well in advance with safety measures.