In [ ]:
```python
import pandas as pd
from datetime import datetime
import numpy as np

# Population
df1 = pd.read_csv("./Afghanistan_Population.csv",usecols=[0,1,2,3],encoding='la
tin1', sep=',',quotechar='"', index_col=None, header=0)
df1

# IED
df2 = pd.read_csv("./Afghanistan_IED.csv",usecols=[0,1,2],encoding='latin1', se
p=',',quotechar='"', index_col=None, header=0)
df2
```

In [ ]:
```python
df1_radius = df1["TOTAL"]*(218)-557
```

In [ ]:
```python
df1["Area"] = df1_radius
```

In [ ]:
```python
df1["Radius"] = np.sqrt((df1["Area"]/3.141592653))
```

In [ ]:
```python
df1["Nbr_Of_IED"] = np.zeros(len(df1["Radius"]))
```

In [ ]:
```python
from math import sin, cos, sqrt, atan2, radians

def isInside(lat1,lon1,radius,lat2,lon2):
    R = 6373.0 #earth

    dlon = lon2 - lon1
    dlat = lat2 - lat1

    a = sin(dlat / 2)**2 + cos(lat1) * cos(lat2) * sin(dlon / 2)**2
    c = 2 * atan2(sqrt(a), sqrt(1 - a))

    distance = R * c

    if(distance <= radius):
        return 1;
    else:
        return 0;
```

```
In [ ]: lat1 = 0;
        lat2 = 0;
        lon1 = 0;
        lon2 = 0;
        rad = 0;
        nbr_of_ied = 0;

        array = np.zeros(len(df1["NAME"]))

        for i in range(len(df1["NAME"])):
            lat1 = df1["Latitude"][i];
            lon1 = df1["Longitude"][i];
            rad = df1["Radius"][i];
            nbr_of_ied = 0;

            for j in range(len(df2["YEAR"])):

                lat2 = df2["Latitude"][j];
                lon2 = df2["Longitude"][j];

                if(isInside(lat1,lon1,rad,lat2,lon2) == 1):
                    nbr_of_ied += 1;


            array[i] = nbr_of_ied
```

```
In [ ]: df1["Nbr_Of_IED"] = array
```

```
In [ ]: df1["IED_by_capita"] = df1["Nbr_Of_IED"]/df1["TOTAL"]
```

```
In [ ]: df1.loc[df1['IED_by_capita'].idxmax()]
```

```
In [ ]: df1["IED_by_capita"] = df1["IED_by_capita"]/0.0282407
```

```
In [ ]: df1["IED_by_capita"] = np.round(df1["IED_by_capita"],4)
```

In [24]: df1

Out[24]:

	NAME	TOTAL	Latitude	Longitude	Area	Radius	Nbr_Of_IED	IED_b
0	Khash	38882.0	28.085328	60.767922	8475719.0	1642.530106	18.0	0.0164
1	Anardara	28441.0	32.885044	61.140320	6199581.0	1404.773264	514.0	0.6399
2	Kohsan	55562.0	34.653915	61.201502	12111959.0	1963.506122	261.0	0.1663
3	Lash-e-Juwayn	28561.0	31.828782	61.233559	6225741.0	1407.733963	94.0	0.1165
4	Shibkoh	23881.0	32.131993	61.280200	5205501.0	1287.230528	40.0	0.0593
5	Ghoryan	90940.0	34.341415	61.501926	19824363.0	2512.029206	661.0	0.2574
6	Gulran	96124.0	35.210885	61.607058	20954475.0	2582.637519	31.0	0.0114
7	Zindajan	58322.0	34.345559	61.741490	12713639.0	2011.685111	366.0	0.2222
8	Zaranj	58174.0	30.960662	61.852623	12681375.0	2009.130915	114.0	0.0694
9	Adraskan	54842.0	33.671608	61.981391	11954999.0	1950.742005	401.0	0.2589
10	Khak-e-Safed	30961.0	32.677851	61.981391	6748941.0	1465.692547	231.0	0.2642
11	Pushtrod	41522.0	32.480918	62.028239	9051239.0	1697.379998	201.0	0.1714
12	Chakhansur	24241.0	31.187788	62.089746	5283981.0	1296.897602	0.0	0.0000
13	Shindand	182655.0	33.307049	62.136421	39818233.0	3560.131629	1964.0	0.3807
14	Guzara	149887.0	34.046771	62.168857	32674809.0	3225.013913	1916.0	0.4526
15	Kushk-e-Kohna	46682.0	35.027775	62.168857	10176119.0	1799.766452	9.0	0.0068
16	Herat	477452.0	34.352865	62.204029	104083979.0	5755.949923	2861.0	0.2122
17	Charburjak	27001.0	30.134523	62.262663	5885661.0	1368.745441	32.0	0.0420
18	Karukh	65299.0	34.491120	62.603100	14234625.0	2128.619709	946.0	0.5130
19	Balabuluk	72963.0	32.689845	62.732388	15905377.0	2250.075275	542.0	0.2630
20	Pashtunzarghun	102364.0	34.183276	62.732388	22314795.0	2665.149125	1081.0	0.3739
21	Abkamari	75124.0	35.077911	62.873525	16376475.0	2283.154374	107.0	0.0504
22	Bakwa	36242.0	32.230825	62.920592	7900199.0	1585.784174	117.0	0.1143
23	Farsi	31322.0	33.696641	63.092771	6827639.0	1474.213347	133.0	0.1504
24	Qala-e-Naw	67658.0	34.969090	63.144304	14748887.0	2166.729458	159.0	0.0832
25	Balamurghab	99244.0	35.640348	63.309294	21634635.0	2624.217637	81.0	0.0289
26	Saghar	35402.0	33.575346	63.675056	7717079.0	1567.297846	606.0	0.6061
27	Chisht-e-Sharif	24242.0	34.340130	63.752880	5284199.0	1296.924355	66.0	0.0964
28	Purchaman	54602.0	33.179276	63.769538	11902679.0	1946.468700	1207.0	0.7828
29	Ghormach	56282.0	35.649546	63.911330	12268919.0	1976.187798	51.0	0.0321
...	...	...	...	...	...	...	...	...
239	Darwaz	27002.0	38.149728	70.907124	5885879.0	1368.770790	393.0	0.5154
240	Darwaz-e-Balla	23641.0	38.149728	70.907124	5153181.0	1280.745274	372.0	0.5572
241	Chawkay	36482.0	34.806159	70.978456	7952519.0	1591.026530	140.0	0.1359
242	Khaskunar	35762.0	34.643368	71.026005	7795559.0	1575.247123	57.0	0.0564

```
In [ ]: df1.to_csv("final1.csv", sep=',')
```