

GEOG479_Midterm

November 1, 2017

```
In [84]: # Karl Roth
# Nuclear, Plasma, and Radiological Engineering
# 1828
import os
from geopandas import GeoSeries, GeoDataFrame, read_file, gpd
from matplotlib import pyplot as plt

%matplotlib inline
input_file = 'WORLD.shp'
```

0.0.1 Question 1:

```
In [85]: # Read the shape file into the variable
# and view the table to see the headers.
worldDF = gpd.read_file(input_file)

#Check that it imports properly
worldDF[:5]
```

```
Out[85]:
```

	AREA	FIPS	ISO2	ISO3	LAT	LON	NAME	POP2005	
0	44	AC	AG	ATG	17.078	-61.783	Antigua and Barbuda	83039	
1	238174	AG	DZ	DZA	28.163	2.632	Algeria	32854159	
2	8260	AJ	AZ	AZE	40.430	47.395	Azerbaijan	8352021	
3	2740	AL	AL	ALB	41.143	20.068	Albania	3153731	
4	2820	AM	AM	ARM	40.534	44.563	Armenia	3017661	

	REGION	SUBREGION	UN	geometry
0	19	29	28	(POLYGON ((-61.686668 17.02444100000014, -61.7...
1	2	15	12	POLYGON ((2.96361 36.802216, 2.981389 36.80693...
2	142	145	31	(POLYGON ((45.08332100000001 39.76804400000015...
3	150	39	8	POLYGON ((19.436214 41.021065, 19.450554 41.05...
4	142	145	51	(POLYGON ((45.57305100000013 40.63248800000008...

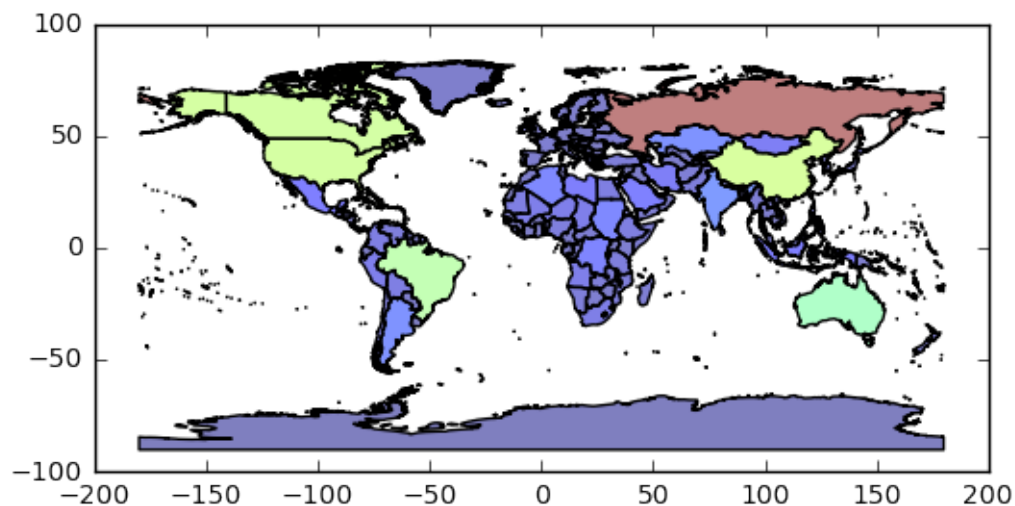
```
In [86]: # Sort the values in a descending fashion
# and display the first 5 entries
worldDF.sort_values(by="POP2005", inplace=True, ascending=False)
worldDF[:5]
```

Out[86]:	AREA	FIPS	ISO2	ISO3	LAT	LON	NAME	POP2005	\
29	932743	CH	CN	CHN	33.420	106.514	China	1312978855	
82	297319	IN	IN	IND	21.000	78.500	India	1134403141	
208	915896	US	US	USA	39.622	-98.606	United States	299846449	
224	181157	ID	ID	IDN	-0.976	114.252	Indonesia	226063044	
20	845942	BR	BR	BRA	-10.772	-53.089	Brazil	186830759	
	REGION	SUBREGION		UN					geom
29	142		30	156	(POLYGON	((110.524147 19.134441000000004, 110.			
82	142		34	356	(POLYGON	((93.912766000000015 7.028609999999995			
208	19		21	840	(POLYGON	((-75.170287999999997 19.931389000000000			
224	142		35	360	(POLYGON	((123.214706 -10.812222000000002, 123			
20	19		5	76	(POLYGON	((-48.550559999999996 -27.82139199999			

0.0.2 Question 2:

```
In [87]: # Chloropleth map based on Area
worldDF.plot(column="AREA")
```

```
Out[87]: <matplotlib.axes._subplots.AxesSubplot at 0x7fb942df0198>
```



0.0.3 Question 3:

```
In [88]: usaDF = worldDF.loc[worldDF['NAME'] == 'United States']
        usaDF
```

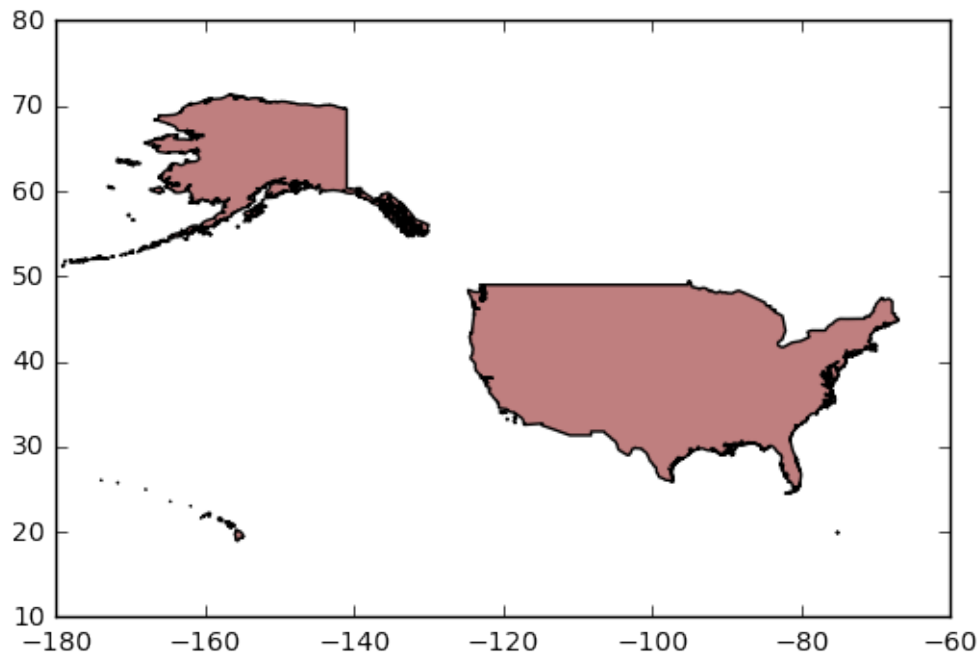
```
Out[88]:
```

	AREA	FIPS	ISO2	ISO3	LAT	LON	NAME	POP2005	REGI
208	915896	US	US	USA	39.622	-98.606	United States	299846449	
	SUBREGION		UN						geometry
208	21	840	(POLYGON	((-75.17028799999997	19.931389000000000...				

```
In [89]: #Plot the United States
fig, ax = plt.subplots()

# Reset the bounds for asthetic reasons
# This removes the Pacific Island Terretories
# This map focuses on the 50 states.
ax.set_ylim([10,80])
ax.set_xlim([-180,-60])
usaDF.plot(ax=ax)
```

```
Out[89]: <matplotlib.axes._subplots.AxesSubplot at 0x7fb938f9a320>
```



0.04 Question 4:

```
In [90]: input_file = 'us_county.shp'
countiesDF = gpd.read_file(input_file)
countiesDF[:3]
```

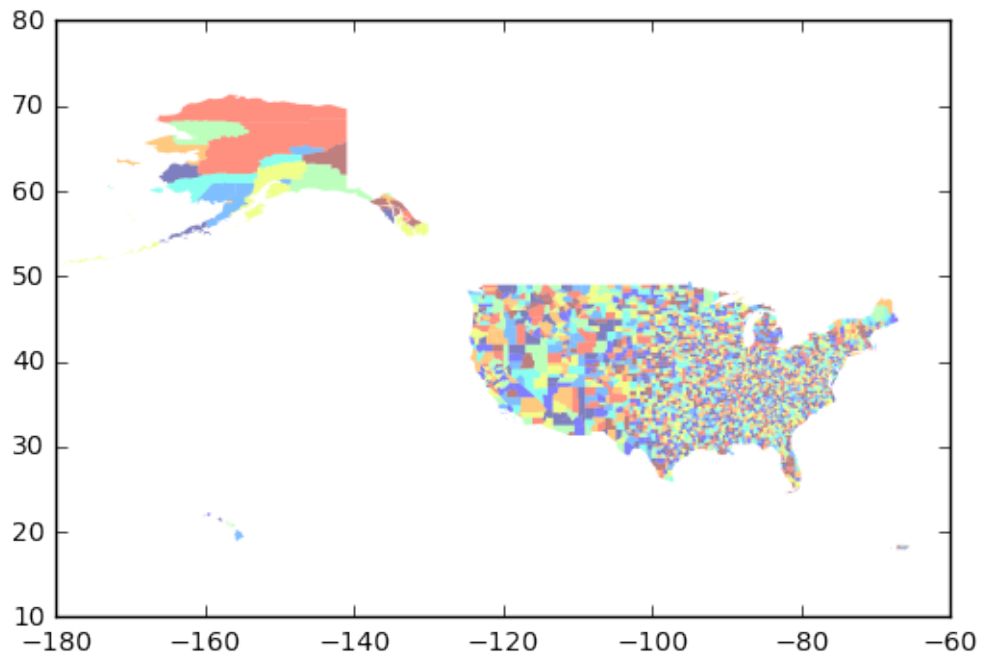
```
Out[90]:
```

	AFFGEOID	ALAND	AWATER	COUNTYFP	COUNTYNS	GEOID	LSAD	
0	05000000US39131	1140324458	9567612	131	01074078	39131	06	
1	05000000US46003	1834813753	11201379	003	01266983	46003	06	
2	05000000US55035	1652211310	18848512	035	01581077	55035	06	

	NAME	STATEFP		geometry
0	Pike	39	POLYGON	((-83.35353099999999 39.197585, -82.78...
1	Aurora	46	POLYGON	((-98.807771 43.935223, -98.331508 43...
2	Eau Claire	55	POLYGON	((-91.65045499999999 44.855951, -90.92...

```
In [91]: fig, ax = plt.subplots()
         ax.set_ylim([10,80])
         ax.set_xlim([-180,-60])
         countiesDF.plot(ax = ax,linewidth=0)

Out[91]: <matplotlib.axes._subplots.AxesSubplot at 0x7fb942b87748>
```



0.05 Question 5:

```
In [92]: # The world dataset uses WGS84
         worldDF.crs

Out[92]: {'init': 'epsg:4326'}

In [93]: # There are 246 records
         worldDF["ISO2"].count()

Out[93]: 246

In [94]: # The counties dataset uses NAD83
         countiesDF.crs

Out[94]: {'init': 'epsg:4269'}

In [95]: #There are 3220 records
         countiesDF['NAME'].count()

Out[95]: 3220
```

0.0.6 Question 6:

```
In [96]: # Reproject counties into 4326
countiesDF = countiesDF.to_crs(epsg=4326)
```

```
In [97]: # Check that reprojected properly
countiesDF.crs
```

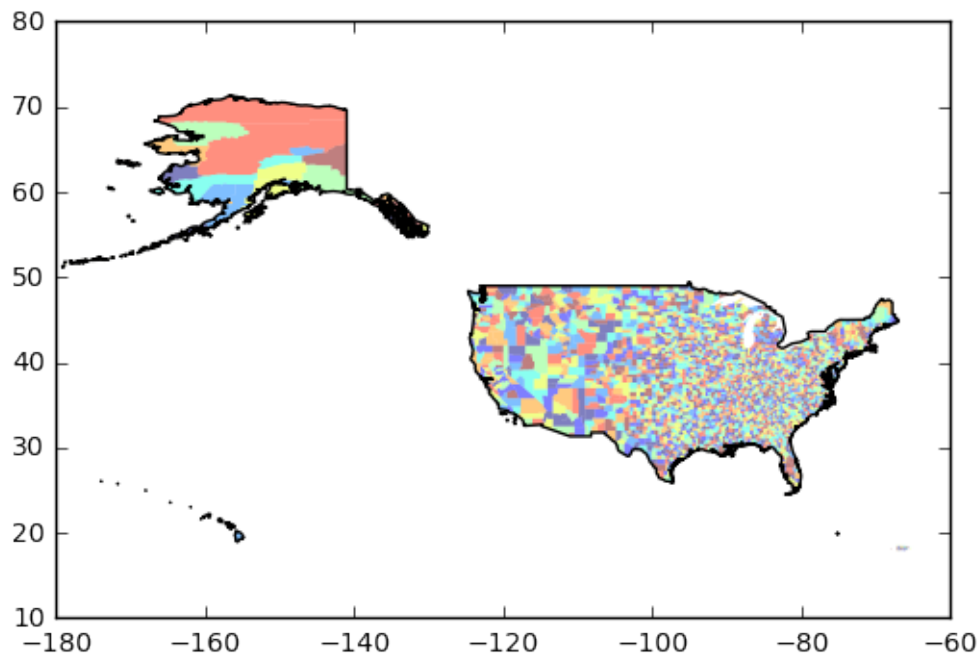
```
Out[97]: {'init': 'epsg:4326', 'no_defs': True}
```

```
In [98]: #Plotting using matplotlib objecfts
fig, ax = plt.subplots()
```

```
ax.set_ylim([10,80])
ax.set_xlim([-180,-60])
```

```
usaDF.plot(ax=ax, color='white',
           edgecolor='black')
countiesDF.plot(ax=ax, linewidth=0)
```

```
Out[98]: <matplotlib.axes._subplots.AxesSubplot at 0x7fb933b064a8>
```



0.0.7 Question 7:

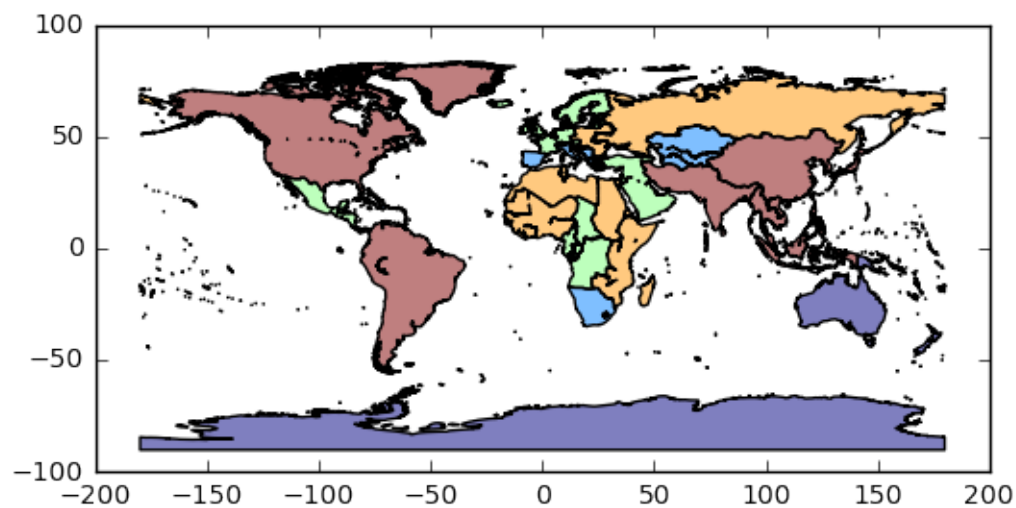
```
In [106]: subregions = worldDF[['SUBREGION', 'geometry', 'POP2005']]
result = subregions.dissolve(by='SUBREGION', aggfunc = 'sum')
result
```

```
Out[106]:
```

		geometry	POP2005
	SUBREGION		
0	(POLYGON ((-149.83197 -76.664458999999991, -149...		0
5	(POLYGON ((-67.493056999999996 -55.8291699999999...		333227518
11	(POLYGON ((-9.8922230000000001 -40.3908390000000...		219242207
13	(POLYGON ((-82.015014999999995 9.126388999999996...		137624538
14	(POLYGON ((63.466385 -19.735836000000001, 63.36...		292538884
15	(POLYGON ((37.268608000000003 20.751110000000004...		189562020
17	(POLYGON ((11.750832 -16.755279999999991, 11.77...		112505212
18	(POLYGON ((37.850830000000009 -46.9569469999999...		54899638
21	(POLYGON ((-155.00558499999999 19.3288800000000...		332244951
29	(POLYGON ((-60.923057999999991 10.7972219999999...		40379443
30	(POLYGON ((110.524147 19.134441000000004, 110.5...		1522046474
34	(POLYGON ((73.176376000000006 -0.689721999999996...		1449446587
35	(POLYGON ((123.214706 -10.812222000000002, 123...		552571494
39	(POLYGON ((-17.912780999999994 27.7716640000000...		93425671
53	(POLYGON ((158.882172 -54.711388, 158.87966900...		24407320
54	(POLYGON ((167.53442400000001 -22.6938900000000...		7819731
57	(POLYGON ((-151.78363 -11.466390999999999, -151...		335086
61	(POLYGON ((-143.482483 -27.914447999999999, -14...		645431
143	(POLYGON ((53.024993999999999 46.228599999999997...		58390758
145	(POLYGON ((53.34082800000001 12.108889000000003, ...		184530104
151	(POLYGON ((155.555817 59.321937999999999, 155.5...		297775434
154	(POLYGON ((-2.014999999999986 49.2141649999999...		96221438
155	(POLYGON ((-1.260833999999988 46.156387, -1.28...		171881635

```
In [107]: result.plot(column = 'POP2005',
                        scheme='quantiles')
```

```
Out[107]: <matplotlib.axes._subplots.AxesSubplot at 0x7fb927bb5c18>
```



```
In [ ]:
```