Graph Assignment Python

May 23, 2021

1 5.2 Exercises: Heat Maps, Spatial Charts, and Contour Charts - Python

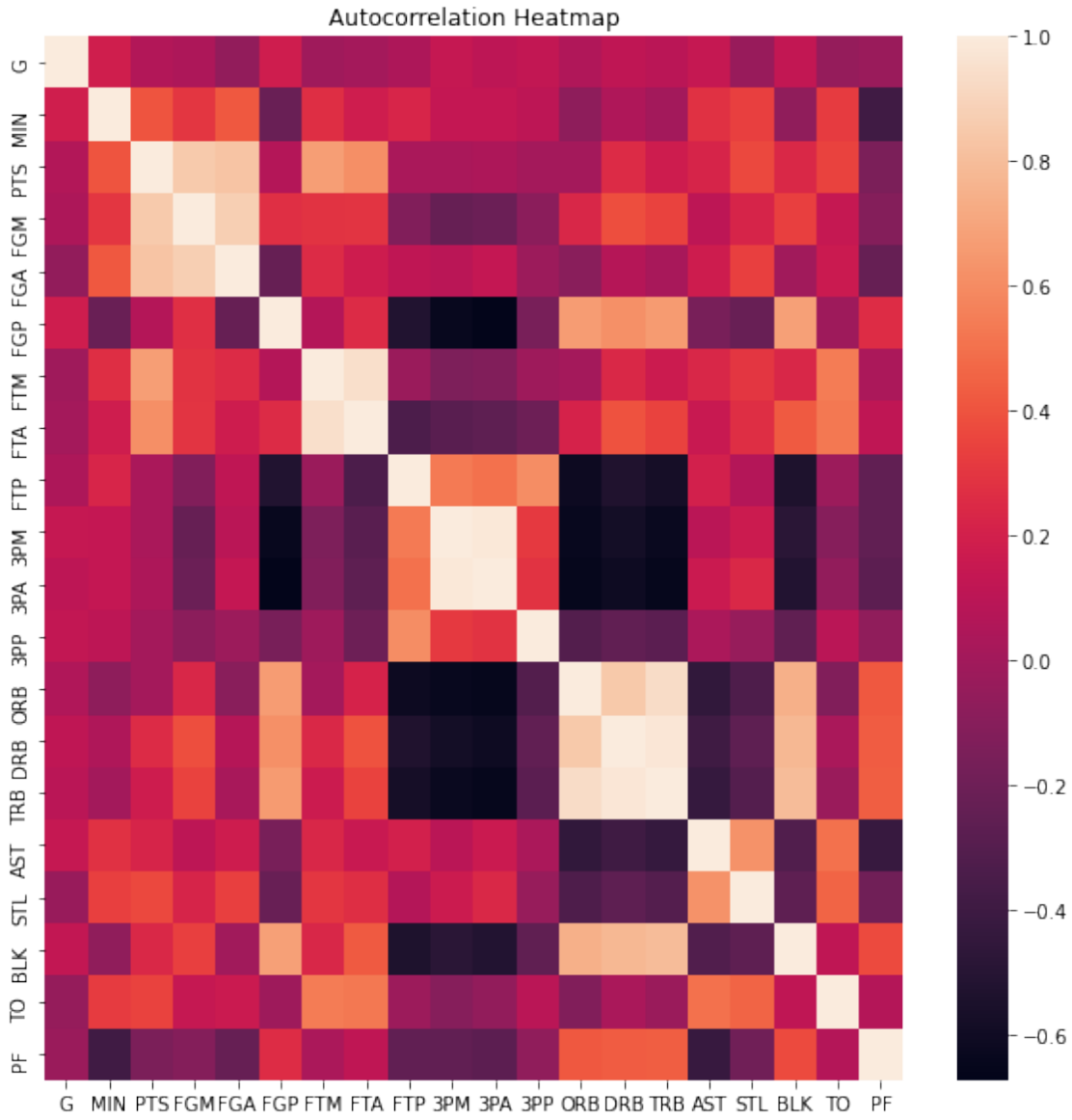
Michael Hotaling

[1]:
```
# Standard Packages
import pandas as pd
import numpy as np

# Spatial Packages
import geopandas as gpd
import geoplot as gplt
import geoplot.crs as gcrs

# Graphing
import matplotlib.pyplot as plt
import seaborn as sns

# Data Preprocessing
from sklearn.preprocessing import MinMaxScaler
```

2 Heat Maps

[2]:
```
df = pd.read_csv("ppg2008.csv")
df.columns = df.columns.str.strip()
```

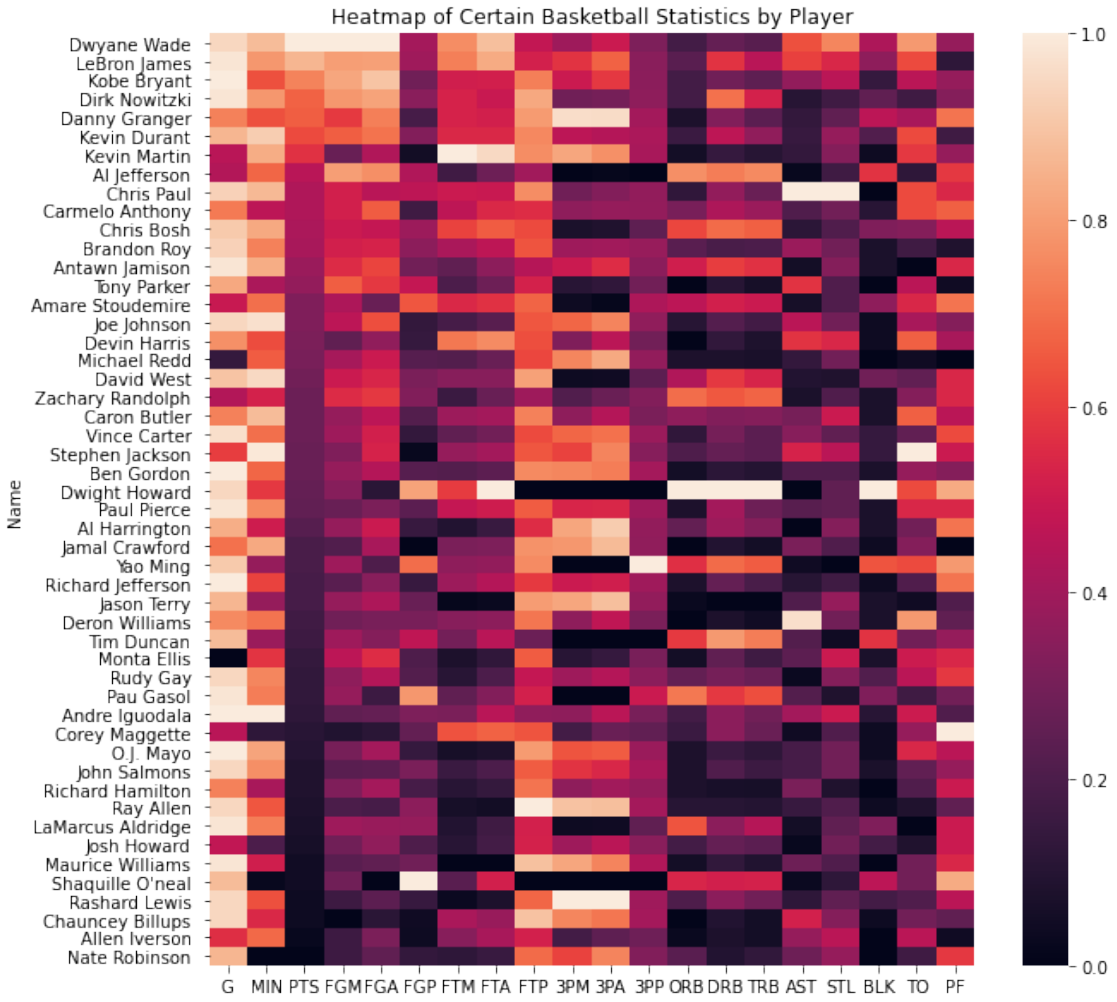
[3]:
```
fig, ax = plt.subplots(figsize =(10,10))
sns.heatmap(df.drop(['Name'], axis = 1).corr(), ax = ax)
plt.title("Autocorrelation Heatmap")
plt.show()
```



[4]:
```
df.drop(['Name'], axis = 1).corr().to_csv("basket_ball_corr.csv")
```

[5]:
```
scaler = MinMaxScaler().fit_transform(df.drop(['Name'], axis = 1))
```

[6]:
```
fig, ax = plt.subplots(figsize =(10,10))
sns.heatmap(pd.DataFrame(scaler, columns= df.columns[1:], index = df['Name']),␣
 ↪ax = ax)
plt.title("Heatmap of Certain Basketball Statistics by Player")
plt.show()
```



[7]:
```
pd.DataFrame(scaler, columns= df.columns[1:], index = df['Name']).
↪to_csv("basketball.csv")
```

[8]:
```
contiguous_usa = gpd.read_file(gplt.datasets.get_path('contiguous_usa'))
```

[9]:
```
df = pd.read_csv("costcos-geocoded.csv")
#df = df[~df['State'].isin(['Alaska','Hawaii'])]
df.head()
```

[9]:

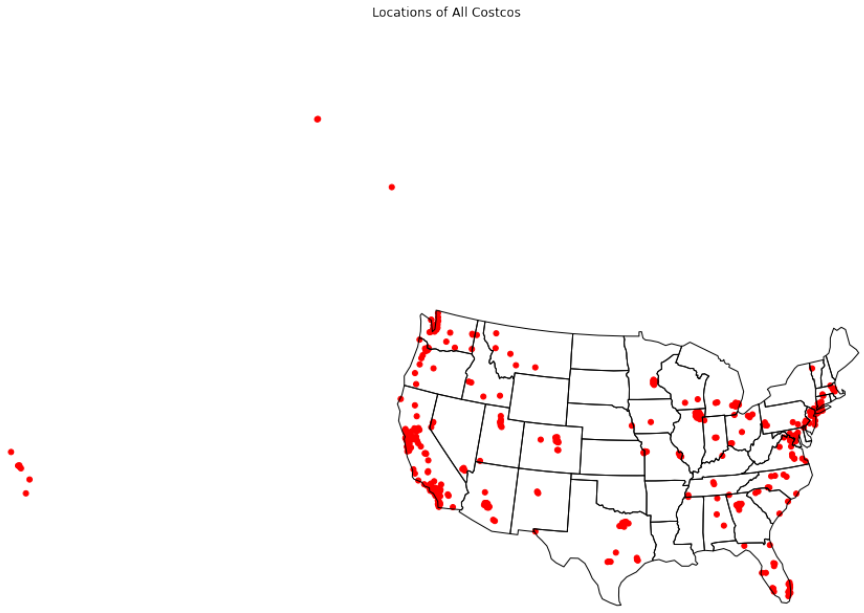
	Address	City	State	Zip Code	Latitude	\
0	1205 N. Memorial Parkway	Huntsville	Alabama	35801-5930	34.743095	
1	3650 Galleria Circle	Hoover	Alabama	35244-2346	33.377649	
2	8251 Eastchase Parkway	Montgomery	Alabama	36117	32.363889	
3	5225 Commercial Boulevard	Juneau	Alaska	99801-7210	58.359200	
4	330 West Dimond Blvd	Anchorage	Alaska	99515-1950	61.143266	

```
    Longitude
0  -86.600955
1  -86.812420
2  -86.150884
3 -134.483000
4 -149.884217
```

[10]:
```
gdf = gpd.GeoDataFrame(
    df, geometry=gpd.points_from_xy(df['Longitude'], df['Latitude']))
```

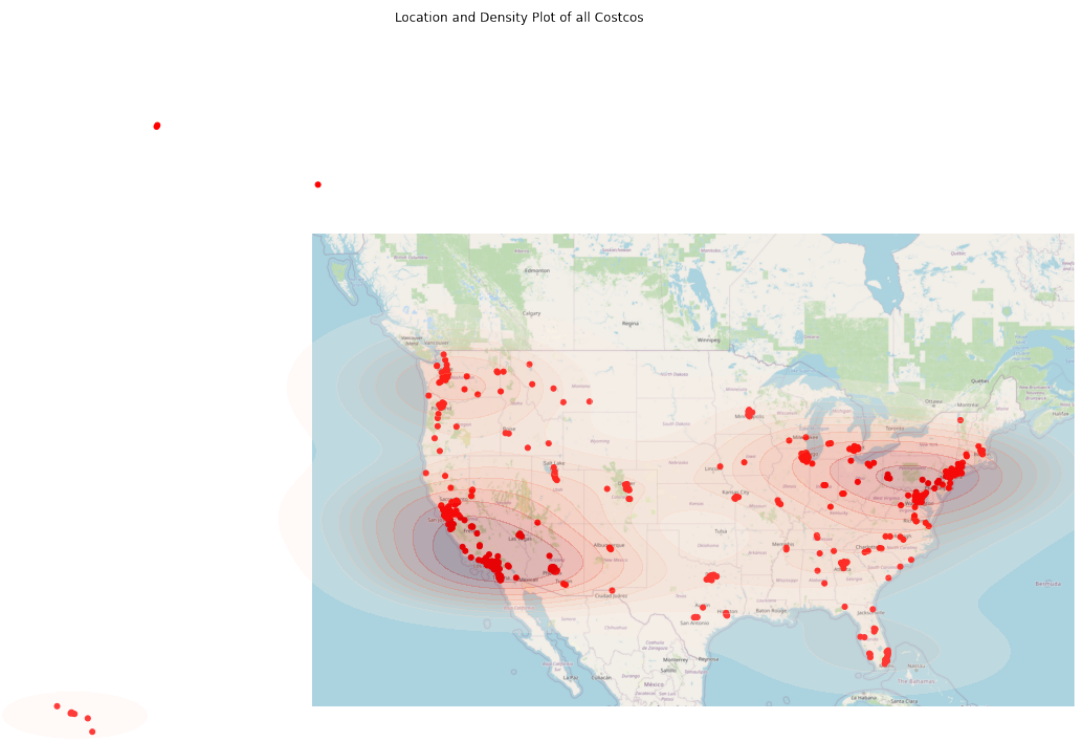
3 Spatial Charts

[11]:
```
ax = gplt.polyplot(contiguous_usa,
                   projection=gcrs.AlbersEqualArea(),
                   figsize = (19,16),
                   zorder = 2)
gplt.pointplot(gdf,
               color = 'red',
               zorder = 1,
               ax = ax)
plt.title("Locations of All Costcos")
plt.show()
```



[12]:
```
ax = gplt.webmap(df = contiguous_usa,
                 projection=gcrs.WebMercator(),
                 figsize = (19,16),
                 zorder = 2)
gplt.pointplot(df = gdf, color = 'red', zorder = 1, ax = ax)
gplt.kdeplot(df = gdf,
             cmap = 'Reds',
             thresh = 0.05,
             shade=True,
             projection=gcrs.AlbersEqualArea(),
             ax = ax,
             alpha = 0.25)
plt.title("Location and Density Plot of all Costcos")
plt.show()
```

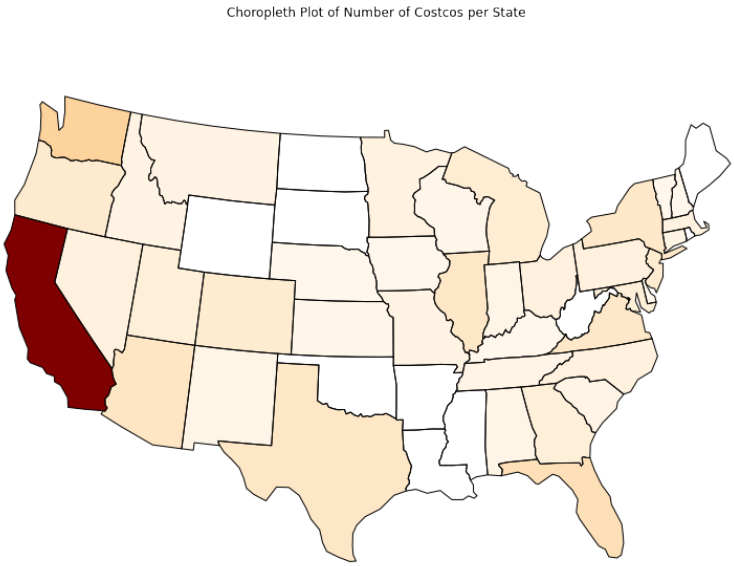
```
C:\Users\hotal\anaconda3\envs\geo_env\lib\site-
packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variable
as a keyword arg: y. From version 0.12, the only valid positional argument will
be `data`, and passing other arguments without an explicit keyword will result
in an error or misinterpretation.
  warnings.warn(
C:\Users\hotal\anaconda3\envs\geo_env\lib\site-
packages\seaborn\distributions.py:1676: UserWarning: `shade_lowest` is now
deprecated in favor of `thresh`. Setting `thresh=0.05`, but please update your
code.
  warnings.warn(msg, UserWarning)
```



[13]:
```
gdf2 = pd.DataFrame(gdf['State'].value_counts()).reset_index()
gdf2.columns = ['State','Count']
```

[14]:
```
geodata = contiguous_usa.merge(gdf2, how='outer', left_on=['state'],␣
↪right_on=['State'])
```

[15]:
```
ax = gplt.polyplot(contiguous_usa,
                   projection=gcrs.AlbersEqualArea(),
                   figsize = (19,16),
                   zorder = 2)
gplt.choropleth(geodata,
                hue = geodata['Count'],
                cmap = 'OrRd',
                projection=gcrs.WebMercator(),
                ax = ax)
plt.title("Choropleth Plot of Number of Costcos per State")
plt.show()
```



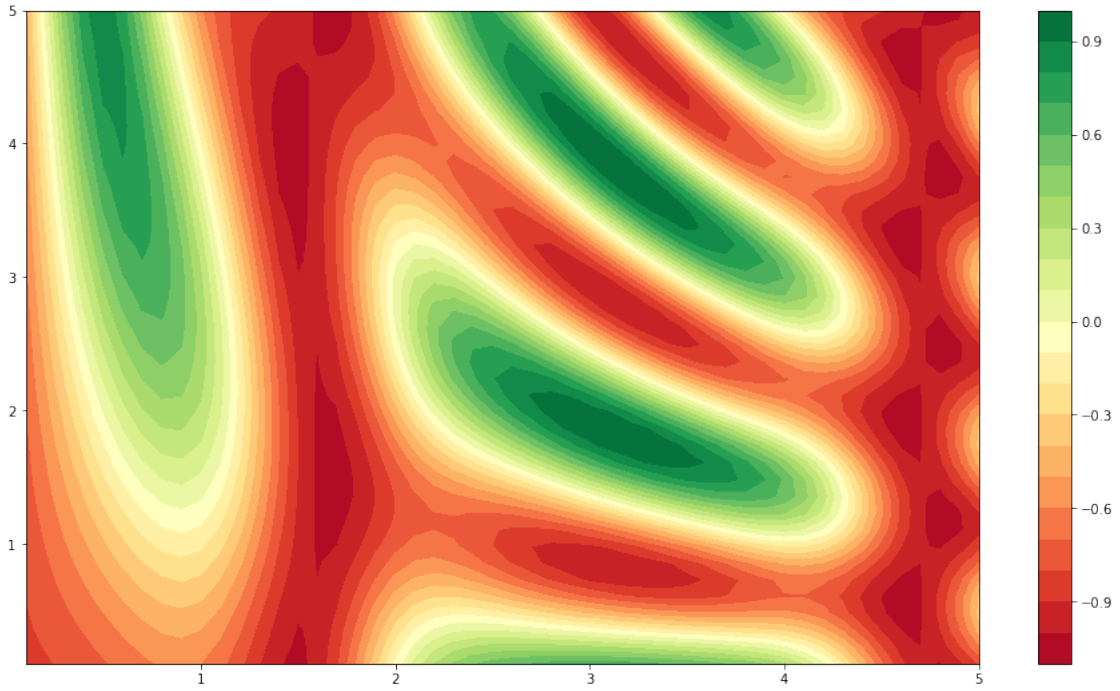
[16]:
```
gdf2 = pd.DataFrame(gdf['State'].value_counts()).reset_index()
gdf2.columns = ['State','Count']
gdf2.to_csv("costco_states.csv")
```

4 Contour Charts

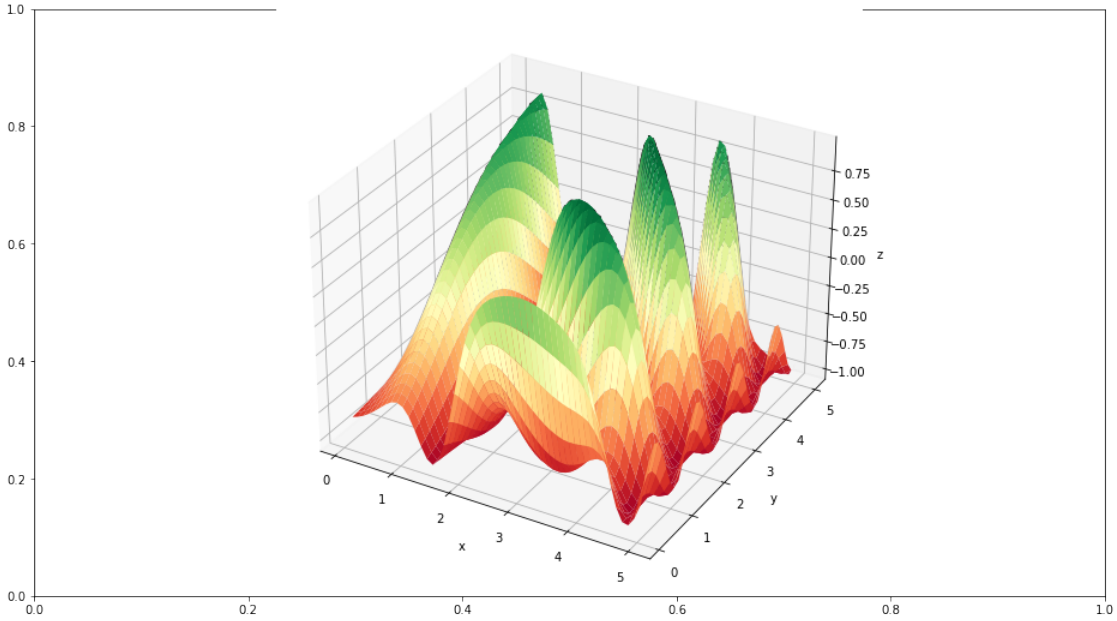
[17]:
```
def f(x, y):
    return -np.sin(x) ** 10 + np.cos(10 + y * x) * np.cos(x)
```

[18]:
```
x = np.linspace(0.1, 5, 50)
y = np.linspace(0.1, 5, 40)

X, Y = np.meshgrid(x, y)
Z = f(X, Y)
```

[19]:
```
plt.figure(figsize=(16,9))
plt.contourf(X, Y, Z, 20, cmap='RdYlGn')
plt.colorbar();
```



[20]:
```
fig, ax  = plt.subplots(figsize=(16,9))
ax = plt.axes(projection='3d')
ax.contour3D(X, Y, Z, 40, cmap='Greys')
ax.plot_surface(X, Y, Z, rstride=1, cstride=1,
                cmap='RdYlGn', edgecolor='none')
ax.set_xlabel('x')
ax.set_ylabel('y')
ax.set_zlabel('z');
```


1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
z
0
1
2
3
4
5
x
0
1
2
3
4
5
y