DSC640_NSalisbury_Week_9-10

November 3, 2020

```python
[1]: import numpy as np
     import pandas as pd
     import geopandas as gpd
     import matplotlib.pyplot as plt
     import mapclassify as mc
     from shapely.geometry import Point, Polygon
     import seaborn as sns
```

```python
[2]: costco = pd.read_csv('costcos-geocoded.csv')
```

```python
[3]: costco
```

```
[3]:                       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
     ..                         …            …            …          …          …
     412              19610 SE 1st St    Vancouver   Washington       98607  45.621299
     413           10990 Harbor Hill Dr  Gig Harbor   Washington       98335  47.357748
     414        27520 Covington Way SE    Covington   Washington       98042  47.354838
     415              2150 Deming Way    Middleton    Wisconsin  53562-5507  43.100195
     416        950 Port Washington Rd      Grafton    Wisconsin  53024-9201  43.324691

          Longitude
     0    -86.600955
     1    -86.812420
     2    -86.150884
     3   -134.483000
     4   -149.884217
     ..           …
     412 -122.459135
     413 -122.603888
     414 -122.121185
     415  -89.522751
     416  -87.921615
```

```
[417 rows x 6 columns]
```

```python
[4]: geometry = [Point(xy) for xy in zip(costco["Latitude"],costco["Longitude"])]
     geometry[:3]
```

```
[4]: [<shapely.geometry.point.Point at 0x7f2bafa11460>,
      <shapely.geometry.point.Point at 0x7f2bafa117c0>,
      <shapely.geometry.point.Point at 0x7f2bafa11820>]
```

```python
[5]: map_nation = gpd.read_file('cb_2018_us_state_20m.shp')
```

```python
[6]: crs = {'init':'epsg:4326'}
```

```python
[7]: geo_costco = gpd.GeoDataFrame(costco, crs=crs,geometry = geometry)
```

/opt/conda/lib/python3.8/site-packages/pyproj/crs/crs.py:53: FutureWarning:
'+init=<authority>:<code>' syntax is deprecated. '<authority>:<code>' is the
preferred initialization method. When making the change, be mindful of axis
order changes: https://pyproj4.github.io/pyproj/stable/gotchas.html#axis-order-
changes-in-proj-6
  return _prepare_from_string(" ".join(pjargs))

```python
[8]: geo_costco
```

```
[8]:                          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
     ..                         ...          ...         ...         ...        ...
     412            19610 SE 1st St    Vancouver  Washington       98607  45.621299
     413         10990 Harbor Hill Dr  Gig Harbor  Washington       98335  47.357748
     414      27520 Covington Way SE    Covington  Washington       98042  47.354838
     415            2150 Deming Way    Middleton   Wisconsin  53562-5507  43.100195
     416       950 Port Washington Rd      Grafton   Wisconsin  53024-9201  43.324691

           Longitude                     geometry
     0     -86.600955   POINT (34.743 -86.601)
     1     -86.812420   POINT (33.378 -86.812)
     2     -86.150884   POINT (32.364 -86.151)
     3    -134.483000   POINT (58.359 -134.483)
     4    -149.884217   POINT (61.143 -149.884)
     ..          ...                        ...
     412  -122.459135   POINT (45.621 -122.459)
     413  -122.603888   POINT (47.358 -122.604)
```

```
414 -122.121185   POINT (47.355 -122.121)
415  -89.522751    POINT (43.100 -89.523)
416  -87.921615    POINT (43.325 -87.922)

[417 rows x 7 columns]
```

```
[9]: fig,ax = plt.subplots(figsize = (15,15))
     ax.set_xlim(-175,-50)
     ax.set_ylim(0,100)
     map_nation.plot(ax = ax,alpha=0.3,color='grey', zorder=1)
     geo_costco.plot(ax = ax, markersize=30, color="red",marker = 'o',aspect=1,␣
      ↪zorder=2, label="loc")
     plt.legend()
```

```
[9]: <matplotlib.legend.Legend at 0x7f2bafa23d60>
```



```
[10]: ppg = pd.read_csv('./ppg2008.csv', index_col=0)
```

```
[11]: ppg
```

```
[11]:                     G   MIN   PTS   FGM   FGA    FGP   FTM   FTA    FTP   3PM  \
       Name
       Dwyane Wade       79  38.6  30.2  10.8  22.0  0.491   7.5   9.8  0.765   1.1
       LeBron James      81  37.7  28.4   9.7  19.9  0.489   7.3   9.4  0.780   1.6
       Kobe Bryant       82  36.2  26.8   9.8  20.9  0.467   5.9   6.9  0.856   1.4
       Dirk Nowitzki     81  37.7  25.9   9.6  20.0  0.479   6.0   6.7  0.890   0.8
       Danny Granger     67  36.2  25.8   8.5  19.1  0.447   6.0   6.9  0.878   2.7
       Kevin Durant      74  39.0  25.3   8.9  18.8  0.476   6.1   7.1  0.863   1.3
       Kevin Martin      51  38.2  24.6   6.7  15.9  0.420   9.0  10.3  0.867   2.3
       Al Jefferson      50  36.6  23.1   9.7  19.5  0.497   3.7   5.0  0.738   0.0
       Chris Paul        78  38.5  22.8   8.1  16.1  0.503   5.8   6.7  0.868   0.8
       Carmelo Anthony   66  34.5  22.8   8.1  18.3  0.443   5.6   7.1  0.793   1.0
       Chris Bosh        77  38.1  22.7   8.0  16.4  0.487   6.5   8.0  0.817   0.2
       Brandon Roy       78  37.2  22.6   8.1  16.9  0.480   5.3   6.5  0.824   1.1
       Antawn Jamison    81  38.2  22.2   8.3  17.8  0.468   4.2   5.6  0.754   1.4
       Tony Parker       72  34.1  22.0   8.9  17.5  0.506   3.9   5.0  0.782   0.3
       Amare Stoudemire  53  36.8  21.4   7.6  14.1  0.539   6.1   7.3  0.835   0.1
       Joe Johnson       79  39.5  21.4   7.8  18.0  0.437   3.8   4.6  0.826   1.9
       Devin Harris      69  36.1  21.3   6.6  15.1  0.438   7.2   8.8  0.820   0.9
       Michael Redd      33  36.4  21.2   7.5  16.6  0.455   4.0   4.9  0.814   2.1
       David West        76  39.3  21.0   8.0  17.0  0.472   4.8   5.5  0.884   0.1
       Zachary Randolph  50  35.1  20.8   8.3  17.5  0.475   3.6   4.9  0.734   0.6
       Caron Butler      67  38.6  20.8   7.3  16.2  0.453   5.1   6.0  0.858   1.0
       Vince Carter      80  36.8  20.8   7.4  16.8  0.437   4.2   5.1  0.817   1.9
       Stephen Jackson   59  39.7  20.7   7.0  16.9  0.414   5.0   6.0  0.826   1.7
       Ben Gordon        82  36.6  20.7   7.3  16.0  0.455   4.0   4.7  0.864   2.1
       Dwight Howard     79  35.7  20.6   7.1  12.4  0.572   6.4  10.7  0.594   0.0
       Paul Pierce       81  37.4  20.5   6.7  14.6  0.457   5.7   6.8  0.830   1.5
       Al Harrington     73  34.9  20.1   7.3  16.6  0.439   3.2   4.0  0.793   2.3
       Jamal Crawford    65  38.1  19.7   6.4  15.7  0.410   4.6   5.3  0.872   2.2
       Yao Ming          77  33.6  19.7   7.4  13.4  0.548   4.9   5.7  0.866   0.0
       Richard Jefferson 82  35.9  19.6   6.5  14.9  0.439   5.1   6.3  0.805   1.4
       Jason Terry       74  33.6  19.6   7.3  15.8  0.463   2.7   3.0  0.880   2.3
       Deron Williams    68  36.9  19.4   6.8  14.5  0.471   4.8   5.6  0.849   1.0
       Tim Duncan        75  33.7  19.3   7.4  14.8  0.504   4.5   6.4  0.692   0.0
       Monta Ellis       25  35.6  19.0   7.8  17.2  0.451   3.1   3.8  0.830   0.3
       Rudy Gay          79  37.3  18.9   7.2  16.0  0.453   3.3   4.4  0.767   1.1
       Pau Gasol         81  37.1  18.9   7.3  12.9  0.567   4.2   5.4  0.781   0.0
       Andre Iguodala    82  39.8  18.8   6.6  14.0  0.473   4.6   6.4  0.724   1.0
       Corey Maggette    51  31.1  18.6   5.7  12.4  0.461   6.7   8.1  0.824   0.5
       O.J. Mayo         82  38.0  18.5   6.9  15.6  0.438   3.0   3.4  0.879   1.8
       John Salmons      79  37.5  18.3   6.5  13.8  0.472   3.6   4.4  0.830   1.6
       Richard Hamilton  67  34.0  18.3   7.0  15.6  0.447   3.3   3.9  0.848   1.0
       Ray Allen         79  36.3  18.2   6.3  13.2  0.480   3.0   3.2  0.952   2.5
       LaMarcus Aldridge 81  37.1  18.1   7.4  15.3  0.484   3.2   4.1  0.781   0.1
       Josh Howard       52  31.9  18.0   6.8  15.1  0.451   3.3   4.2  0.782   1.1
       Maurice Williams  81  35.0  17.8   6.5  13.9  0.467   2.6   2.8  0.912   2.3
```

4

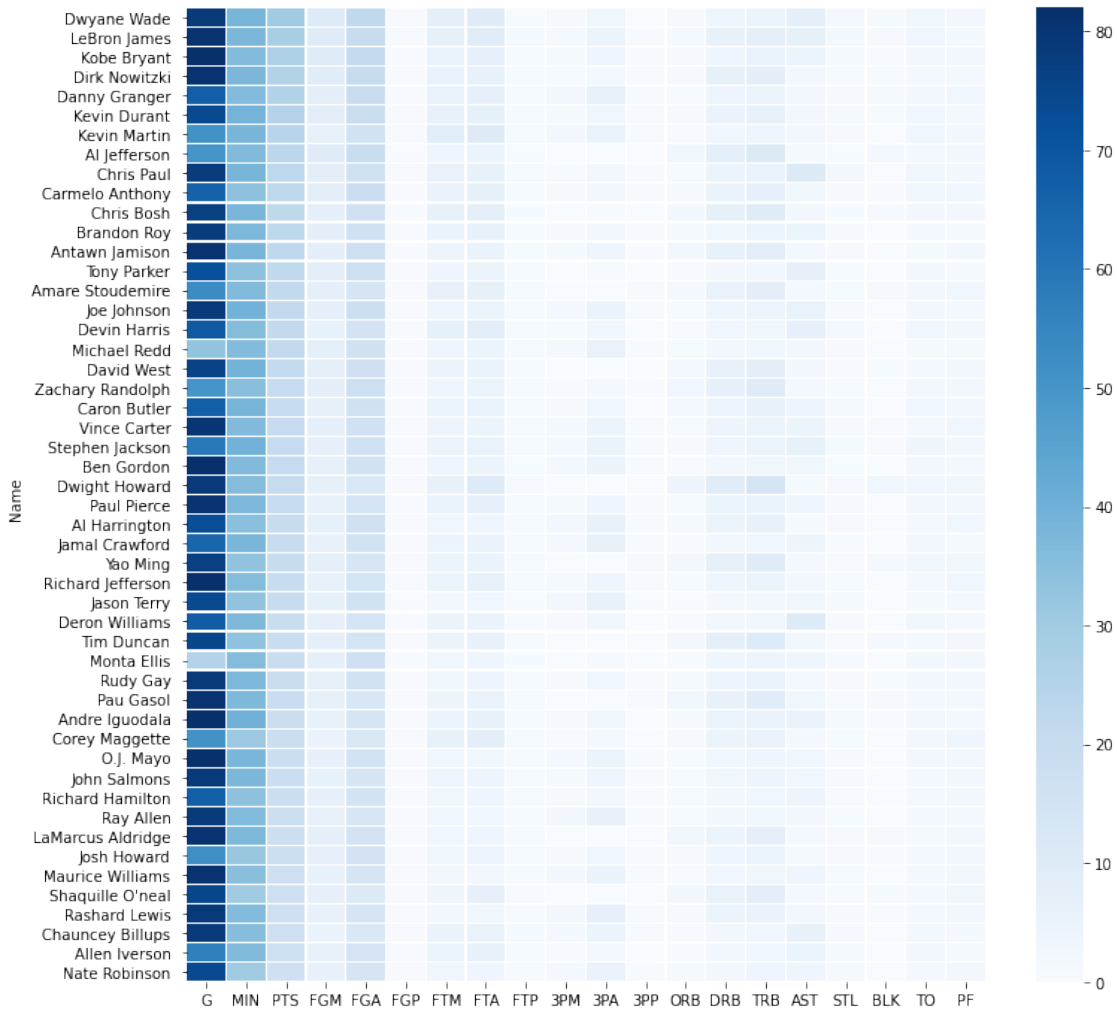```
Shaquille O'neal   75 30.1 17.8   6.8 11.2 0.609 4.1   6.9 0.595 0.0
Rashard Lewis   79 36.2 17.7   6.1 13.8 0.439 2.8   3.4 0.836 2.8
Chauncey Billups   79 35.3 17.7   5.2 12.4 0.418 5.3   5.8 0.913 2.1
Allen Iverson   57 36.7 17.5   6.1 14.6 0.417 4.8   6.1 0.781 0.5
Nate Robinson   74 29.9 17.2   6.1 13.9 0.437 3.4   4.0 0.841 1.7
```

|                   | 3PA  | 3PP   | ORB | DRB | TRB  | AST  | STL | BLK | TO  | PF  |
|-------------------|------|-------|-----|-----|------|------|-----|-----|-----|-----|
| Name              |      |       |     |     |      |      |     |     |     |     |
| Dwyane Wade       | 3.5  | 0.317 | 1.1 | 3.9 | 5.0  | 7.5  | 2.2 | 1.3 | 3.4 | 2.3 |
| LeBron James      | 4.7  | 0.344 | 1.3 | 6.3 | 7.6  | 7.2  | 1.7 | 1.1 | 3.0 | 1.7 |
| Kobe Bryant       | 4.1  | 0.351 | 1.1 | 4.1 | 5.2  | 4.9  | 1.5 | 0.5 | 2.6 | 2.3 |
| Dirk Nowitzki     | 2.1  | 0.359 | 1.1 | 7.3 | 8.4  | 2.4  | 0.8 | 0.8 | 1.9 | 2.2 |
| Danny Granger     | 6.7  | 0.404 | 0.7 | 4.4 | 5.1  | 2.7  | 1.0 | 1.4 | 2.5 | 3.1 |
| Kevin Durant      | 3.1  | 0.422 | 1.0 | 5.5 | 6.5  | 2.8  | 1.3 | 0.7 | 3.0 | 1.8 |
| Kevin Martin      | 5.4  | 0.415 | 0.6 | 3.0 | 3.6  | 2.7  | 1.2 | 0.2 | 2.9 | 2.3 |
| Al Jefferson      | 0.1  | 0.000 | 3.4 | 7.5 | 11.0 | 1.6  | 0.8 | 1.7 | 1.8 | 2.8 |
| Chris Paul        | 2.3  | 0.364 | 0.9 | 4.7 | 5.5  | 11.0 | 2.8 | 0.1 | 3.0 | 2.7 |
| Carmelo Anthony   | 2.6  | 0.371 | 1.6 | 5.2 | 6.8  | 3.4  | 1.1 | 0.4 | 3.0 | 3.0 |
| Chris Bosh        | 0.6  | 0.245 | 2.8 | 7.2 | 10.0 | 2.5  | 0.9 | 1.0 | 2.3 | 2.5 |
| Brandon Roy       | 2.8  | 0.377 | 1.3 | 3.4 | 4.7  | 5.1  | 1.1 | 0.3 | 1.9 | 1.6 |
| Antawn Jamison    | 3.9  | 0.351 | 2.4 | 6.5 | 8.9  | 1.9  | 1.2 | 0.3 | 1.5 | 2.7 |
| Tony Parker       | 0.9  | 0.292 | 0.4 | 2.7 | 3.1  | 6.9  | 0.9 | 0.1 | 2.6 | 1.5 |
| Amare Stoudemire  | 0.1  | 0.429 | 2.2 | 5.9 | 8.1  | 2.0  | 0.9 | 1.1 | 2.8 | 3.1 |
| Joe Johnson       | 5.2  | 0.360 | 0.8 | 3.6 | 4.4  | 5.8  | 1.1 | 0.2 | 2.5 | 2.2 |
| Devin Harris      | 3.2  | 0.291 | 0.4 | 2.9 | 3.3  | 6.9  | 1.7 | 0.2 | 3.1 | 2.4 |
| Michael Redd      | 5.8  | 0.366 | 0.7 | 2.5 | 3.2  | 2.7  | 1.1 | 0.1 | 1.6 | 1.4 |
| David West        | 0.3  | 0.240 | 2.1 | 6.4 | 8.5  | 2.3  | 0.6 | 0.9 | 2.1 | 2.7 |
| Zachary Randolph  | 1.9  | 0.330 | 3.1 | 6.9 | 10.1 | 2.1  | 0.9 | 0.3 | 2.3 | 2.7 |
| Caron Butler      | 3.1  | 0.310 | 1.8 | 4.4 | 6.2  | 4.3  | 1.6 | 0.3 | 3.1 | 2.5 |
| Vince Carter      | 4.9  | 0.385 | 0.9 | 4.2 | 5.1  | 4.7  | 1.0 | 0.5 | 2.1 | 2.9 |
| Stephen Jackson   | 5.2  | 0.338 | 1.2 | 3.9 | 5.1  | 6.5  | 1.5 | 0.5 | 3.9 | 2.6 |
| Ben Gordon        | 5.1  | 0.410 | 0.6 | 2.8 | 3.5  | 3.4  | 0.9 | 0.3 | 2.4 | 2.2 |
| Dwight Howard     | 0.0  | 0.000 | 4.3 | 9.6 | 13.8 | 1.4  | 1.0 | 2.9 | 3.0 | 3.4 |
| Paul Pierce       | 3.8  | 0.391 | 0.7 | 5.0 | 5.6  | 3.6  | 1.0 | 0.3 | 2.8 | 2.7 |
| Al Harrington     | 6.4  | 0.364 | 1.4 | 4.9 | 6.2  | 1.4  | 1.2 | 0.3 | 2.2 | 3.1 |
| Jamal Crawford    | 6.1  | 0.360 | 0.4 | 2.6 | 3.0  | 4.4  | 0.9 | 0.2 | 2.3 | 1.4 |
| Yao Ming          | 0.0  | 1.000 | 2.6 | 7.2 | 9.9  | 1.8  | 0.4 | 1.9 | 3.0 | 3.3 |
| Richard Jefferson | 3.6  | 0.397 | 0.7 | 3.9 | 4.6  | 2.4  | 0.8 | 0.2 | 2.0 | 3.1 |
| Jason Terry       | 6.2  | 0.366 | 0.5 | 1.9 | 2.4  | 3.4  | 1.3 | 0.3 | 1.6 | 1.9 |
| Deron Williams    | 3.3  | 0.310 | 0.4 | 2.5 | 2.9  | 10.7 | 1.1 | 0.3 | 3.4 | 2.0 |
| Tim Duncan        | 0.0  | 0.000 | 2.7 | 8.0 | 10.7 | 3.5  | 0.5 | 1.7 | 2.2 | 2.3 |
| Monta Ellis       | 1.0  | 0.308 | 0.6 | 3.8 | 4.3  | 3.7  | 1.6 | 0.3 | 2.7 | 2.7 |
| Rudy Gay          | 3.1  | 0.351 | 1.4 | 4.2 | 5.5  | 1.7  | 1.2 | 0.7 | 2.6 | 2.8 |
| Pau Gasol         | 0.0  | 0.500 | 3.2 | 6.4 | 9.6  | 3.5  | 0.6 | 1.0 | 1.9 | 2.1 |
| Andre Iguodala    | 3.2  | 0.307 | 1.1 | 4.6 | 5.7  | 5.3  | 1.6 | 0.4 | 2.7 | 1.9 |
| Corey Maggette    | 1.9  | 0.253 | 1.0 | 4.6 | 5.5  | 1.8  | 0.9 | 0.2 | 2.4 | 3.8 |
| O.J. Mayo         | 4.6  | 0.384 | 0.7 | 3.1 | 3.8  | 3.2  | 1.1 | 0.2 | 2.8 | 2.5 |

```
John Salmons        3.8  0.417  0.7  3.5  4.2  3.2  1.1  0.3  2.1  2.3
Richard Hamilton    2.8  0.368  0.7  2.4  3.1  4.4  0.6  0.1  2.0  2.6
Ray Allen           6.2  0.409  0.8  2.7  3.5  2.8  0.9  0.2  1.7  2.0
LaMarcus Aldridge   0.3  0.250  2.9  4.6  7.5  1.9  1.0  1.0  1.5  2.6
Josh Howard         3.2  0.345  1.1  3.9  5.1  1.6  1.1  0.6  1.7  2.6
Maurice Williams    5.2  0.436  0.6  2.9  3.4  4.1  0.9  0.1  2.2  2.7
Shaquille O'neal    0.0  0.000  2.5  5.9  8.4  1.7  0.7  1.4  2.2  3.4
Rashard Lewis       7.0  0.397  1.2  4.6  5.7  2.6  1.0  0.6  2.0  2.5
Chauncey Billups    5.0  0.408  0.4  2.6  3.0  6.4  1.2  0.2  2.2  2.0
Allen Iverson       1.7  0.283  0.5  2.5  3.0  5.0  1.5  0.1  2.6  1.5
Nate Robinson       5.2  0.325  1.3  2.6  3.9  4.1  1.3  0.1  1.9  2.8
```

[12]:
```python
fig, ax = plt.subplots()
fig.set_size_inches(12,12)

hm = sns.heatmap(ppg, linewidths=.2, cmap="Blues")
```

```python
[13]: bball = pd.read_csv('./ppg2008.csv', index_col=0)
```

```python
[14]: bball.head(10)
```

```
[14]:                  G   MIN   PTS   FGM   FGA    FGP   FTM   FTA    FTP  3PM  \
      Name
      Dwyane Wade     79  38.6  30.2  10.8  22.0  0.491   7.5   9.8  0.765  1.1
      LeBron James    81  37.7  28.4   9.7  19.9  0.489   7.3   9.4  0.780  1.6
      Kobe Bryant     82  36.2  26.8   9.8  20.9  0.467   5.9   6.9  0.856  1.4
      Dirk Nowitzki   81  37.7  25.9   9.6  20.0  0.479   6.0   6.7  0.890  0.8
      Danny Granger   67  36.2  25.8   8.5  19.1  0.447   6.0   6.9  0.878  2.7
      Kevin Durant    74  39.0  25.3   8.9  18.8  0.476   6.1   7.1  0.863  1.3
      Kevin Martin    51  38.2  24.6   6.7  15.9  0.420   9.0  10.3  0.867  2.3
      Al Jefferson    50  36.6  23.1   9.7  19.5  0.497   3.7   5.0  0.738  0.0
      Chris Paul      78  38.5  22.8   8.1  16.1  0.503   5.8   6.7  0.868  0.8
      Carmelo Anthony 66  34.5  22.8   8.1  18.3  0.443   5.6   7.1  0.793  1.0

                      3PA    3PP  ORB  DRB   TRB   AST  STL  BLK   TO   PF
      Name
      Dwyane Wade     3.5  0.317  1.1  3.9   5.0   7.5  2.2  1.3  3.4  2.3
      LeBron James    4.7  0.344  1.3  6.3   7.6   7.2  1.7  1.1  3.0  1.7
      Kobe Bryant     4.1  0.351  1.1  4.1   5.2   4.9  1.5  0.5  2.6  2.3
      Dirk Nowitzki   2.1  0.359  1.1  7.3   8.4   2.4  0.8  0.8  1.9  2.2
      Danny Granger   6.7  0.404  0.7  4.4   5.1   2.7  1.0  1.4  2.5  3.1
      Kevin Durant    3.1  0.422  1.0  5.5   6.5   2.8  1.3  0.7  3.0  1.8
      Kevin Martin    5.4  0.415  0.6  3.0   3.6   2.7  1.2  0.2  2.9  2.3
      Al Jefferson    0.1  0.000  3.4  7.5  11.0   1.6  0.8  1.7  1.8  2.8
      Chris Paul      2.3  0.364  0.9  4.7   5.5  11.0  2.8  0.1  3.0  2.7
      Carmelo Anthony 2.6  0.371  1.6  5.2   6.8   3.4  1.1  0.4  3.0  3.0
```
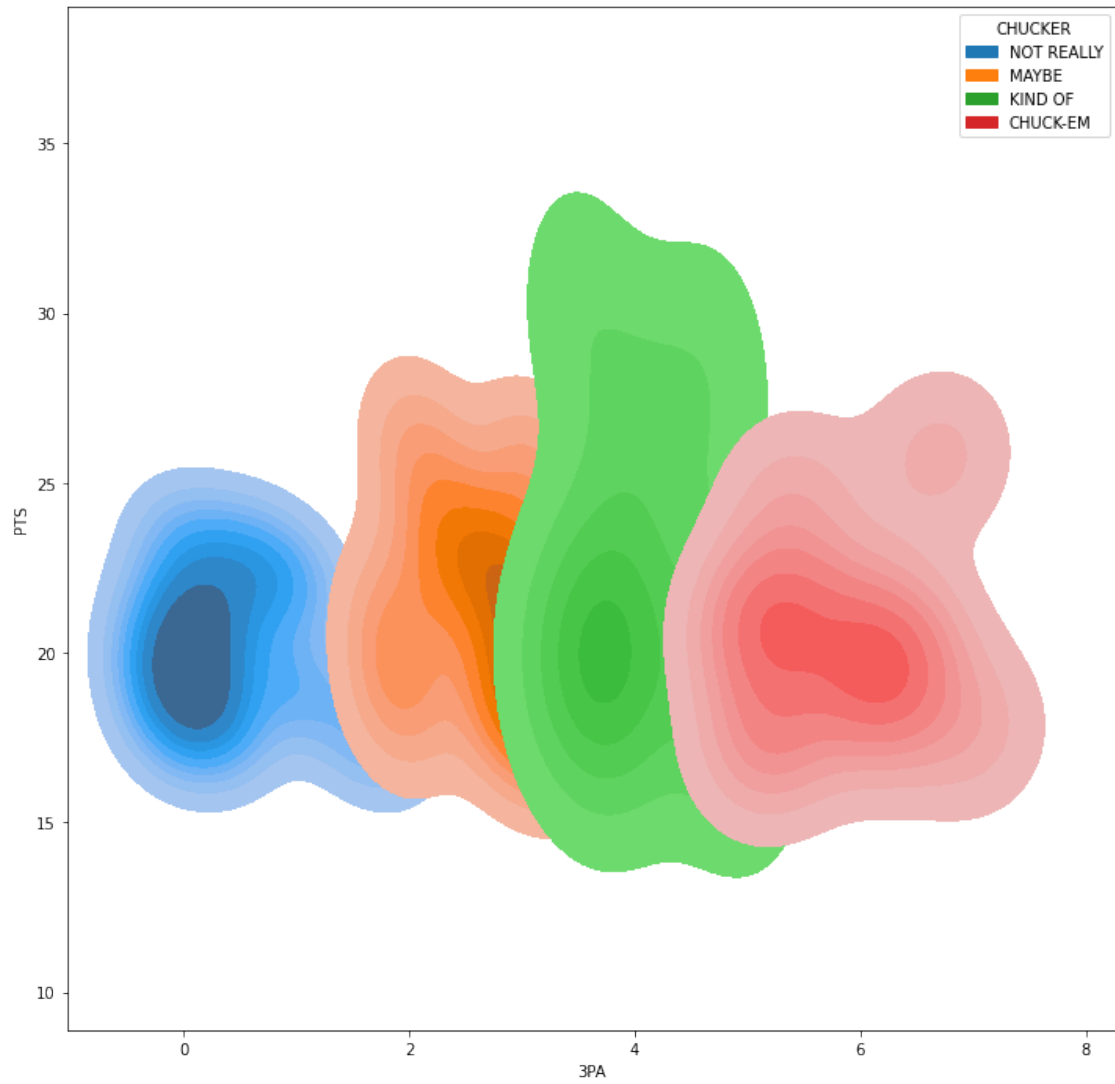
```python
[15]: bball['CHUCKER'] = pd.cut(bball['3PA'],
                        bins=[-1, 1.75, 3.2, 5.075, 7],
                        labels=['NOT REALLY','MAYBE','KIND OF',
       ↪'CHUCK-EM'])
```

```python
[16]: fig, ax = plt.subplots()
      fig.set_size_inches(12,12)

      sns.kdeplot(x="3PA",y="PTS",data=bball, hue="CHUCKER", fill=True)
```

```
[16]: <matplotlib.axes._subplots.AxesSubplot at 0x7f2b66ada160>
```

[ ]: