

# Exercise 5.2: Heat Maps, Spatial Charts, and Contour Charts

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## Plots Using Python

### Load Data

```
In [1]: # Load libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import folium # for Spatial Chart
```

```
In [2]: # Load data
costcos = pd.read_csv("costcos-geocoded.csv")
ballers = pd.read_csv("ppg2008.csv", index_col=0)
```

# Heat Map

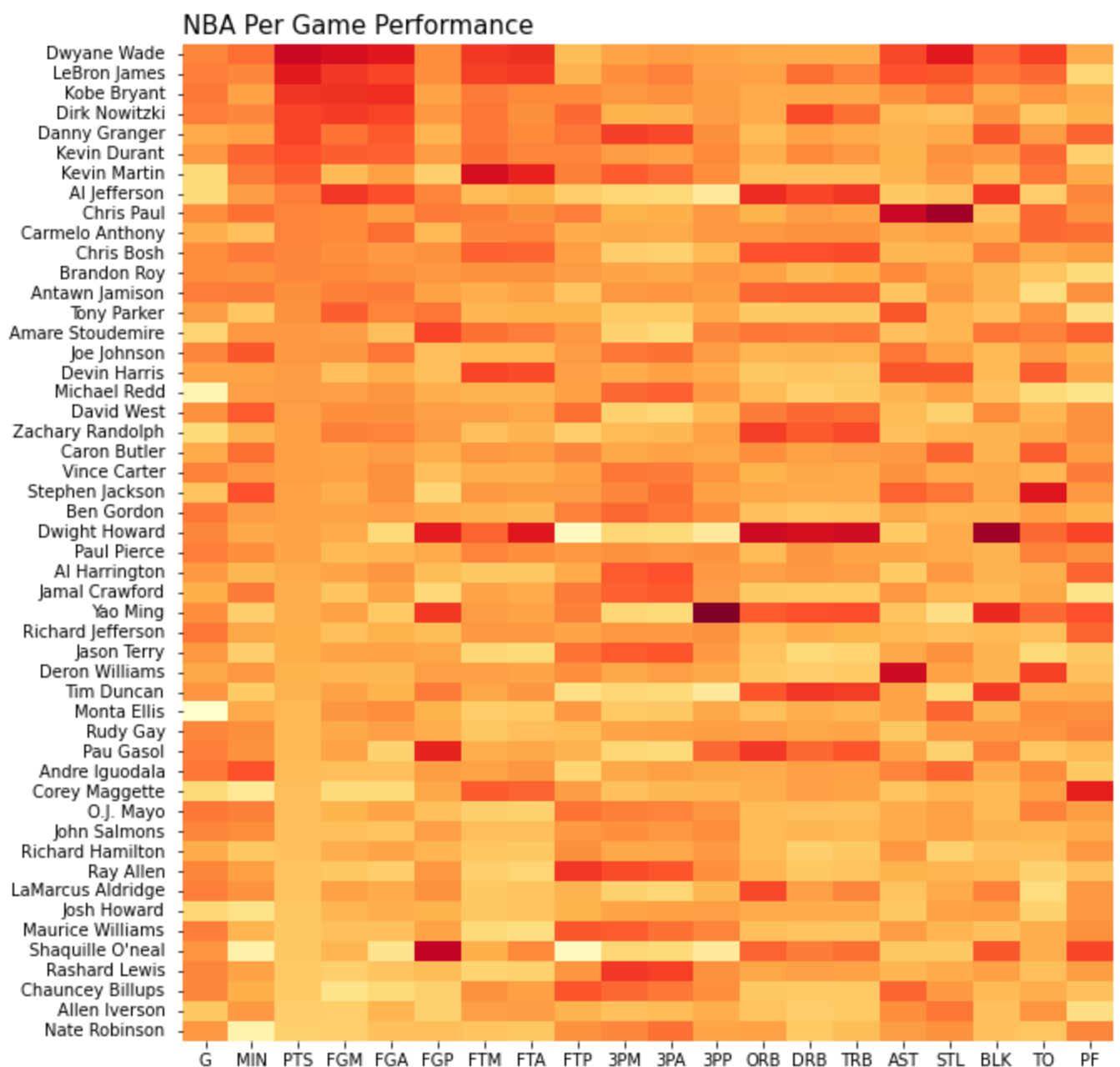
```
In [3]: # Normalize columns
baller_norm = (ballers - ballers.mean())/ballers.std()
```

```
In [4]: # Initialize the matplotlib figure
f, ax = plt.subplots(figsize=(10, 11))

# Create heatmap of normalized data
sns.heatmap(baller_norm, cmap='YlOrRd', cbar=False)

# Add chart title and labels
plt.title("NBA Per Game Performance", fontsize = 15, loc = 'left')
plt.ylabel("")

plt.show()
```



# Spatial Chart

```
In [5]: # Make empty map
m = folium.Map(location=[39.83,-98.58], # centered on US lower 48
               tiles="OpenStreetMap", zoom_start=4)

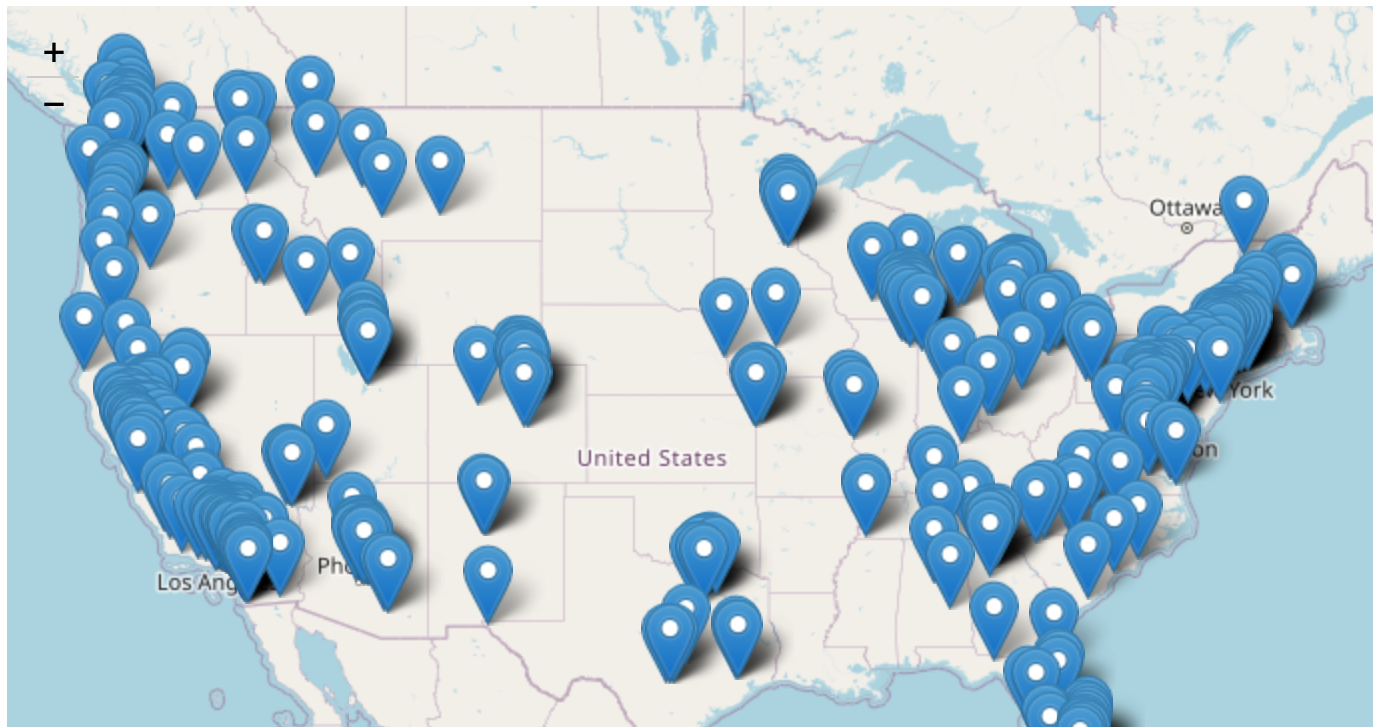
# Add markers to map
for i in range(0, len(costcos)):
    folium.Marker(
        location=[costcos.iloc[i]['Latitude'], costcos.iloc[i]['Longitude']],
        popup=costcos.iloc[i]['City'],
    ).add_to(m)

# Add title
title_html = '<h3 align="center" style="font-size:20px"><b>US Costco Locations (Lower 48)</b>'
m.get_root().html.add_child(folium.Element(title_html))

# Show map
m
```

Out[5]: Make this Notebook Trusted to load map: File -> Trust Notebook

## US Costco Locations (Lower 48)



# Contour Chart

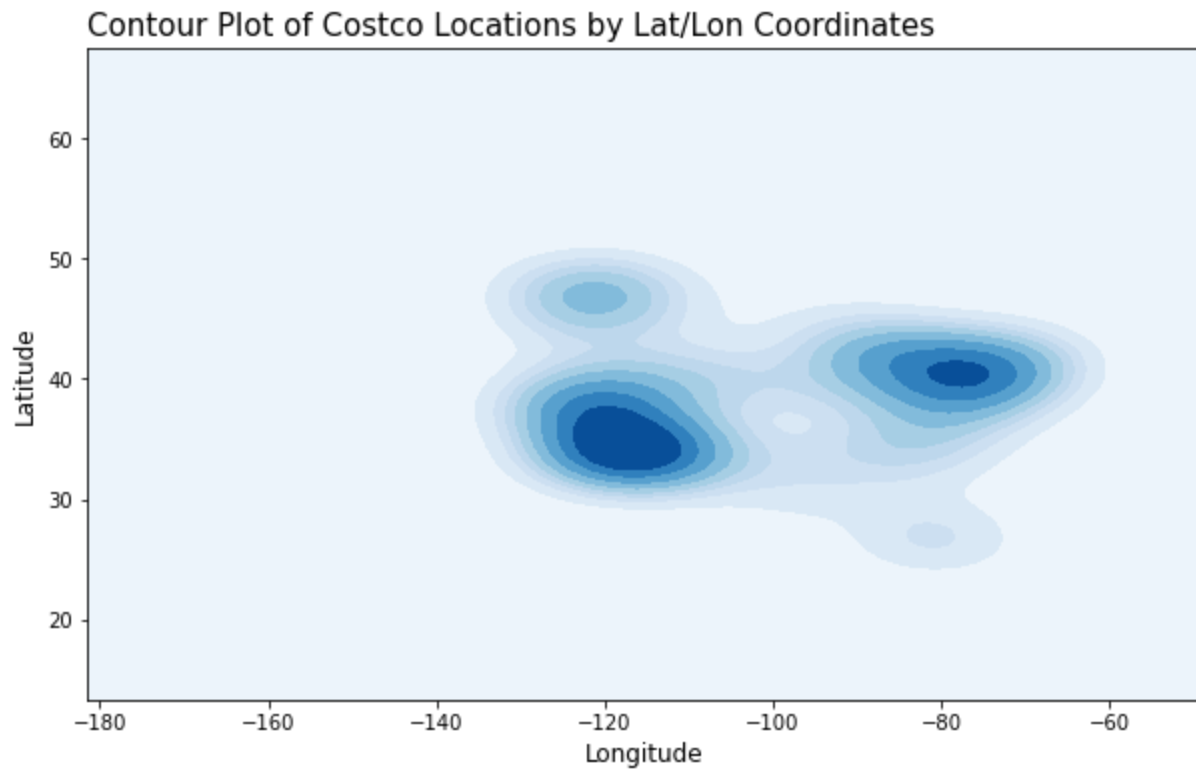
In [6]:

```
# Initialize the matplotlib figure
f, ax = plt.subplots(figsize=(10, 6))

sns.kdeplot(x=costcos.Longitude, y=costcos.Latitude,
            cmap="Blues", shade=True, thresh=0)

# Add chart title and labels
plt.title("Contour Plot of Costco Locations by Lat/Lon Coordinates",
          fontsize = 15, loc = 'left')
plt.xlabel("Longitude", fontsize = 12)
plt.ylabel("Latitude", fontsize = 12)

plt.show()
```



In [ ]:

# Exercise 5.2: Heat Maps, Spatial Charts, and Contour Charts

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2/8/2022

## Plots Using R

```
knitr::opts_chunk$set(echo = TRUE, warning = FALSE)

# Set Working Directory
setwd("C:/Users/micha/OneDrive/Documents/GitHub/DSC640/Weeks9-10/")

# Load libraries
library(ggplot2)
library(maps)
```

```
## Warning: package 'maps' was built under R version 4.1.2
```

## Load Data

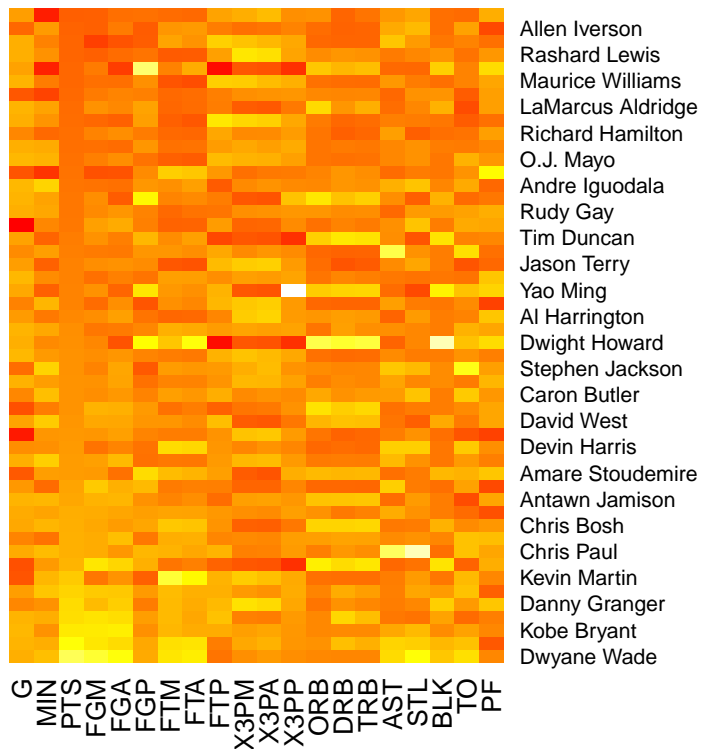
```
# Load the data
costcos <- read.csv("costcos-geocoded.csv", header = TRUE)
ballers <- read.csv("ppg2008.csv", header = TRUE, row.names = 1)
```

## Heat Map

```
# Store data as a matrix for heatmap
baller_matrix <- data.matrix(ballers)

# Make a heat map
heatmap(baller_matrix, Rowv = NA, Colv = NA,
        col = heat.colors(256), # sets colors to red / yellow
        scale = 'column', margins = c(5,10),
        main = "NBA Per Game Performance")
```

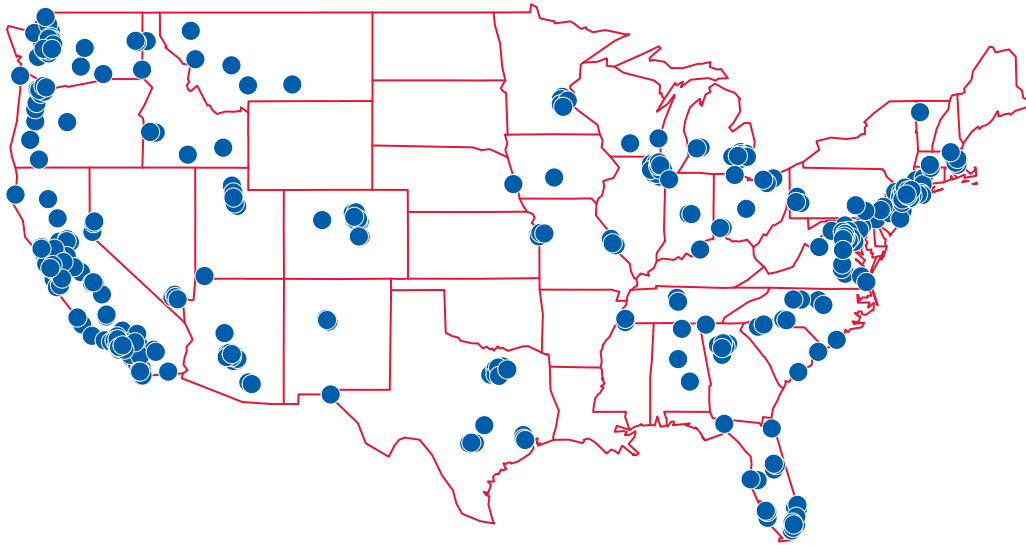
## NBA Per Game Performance



## Spatial Chart

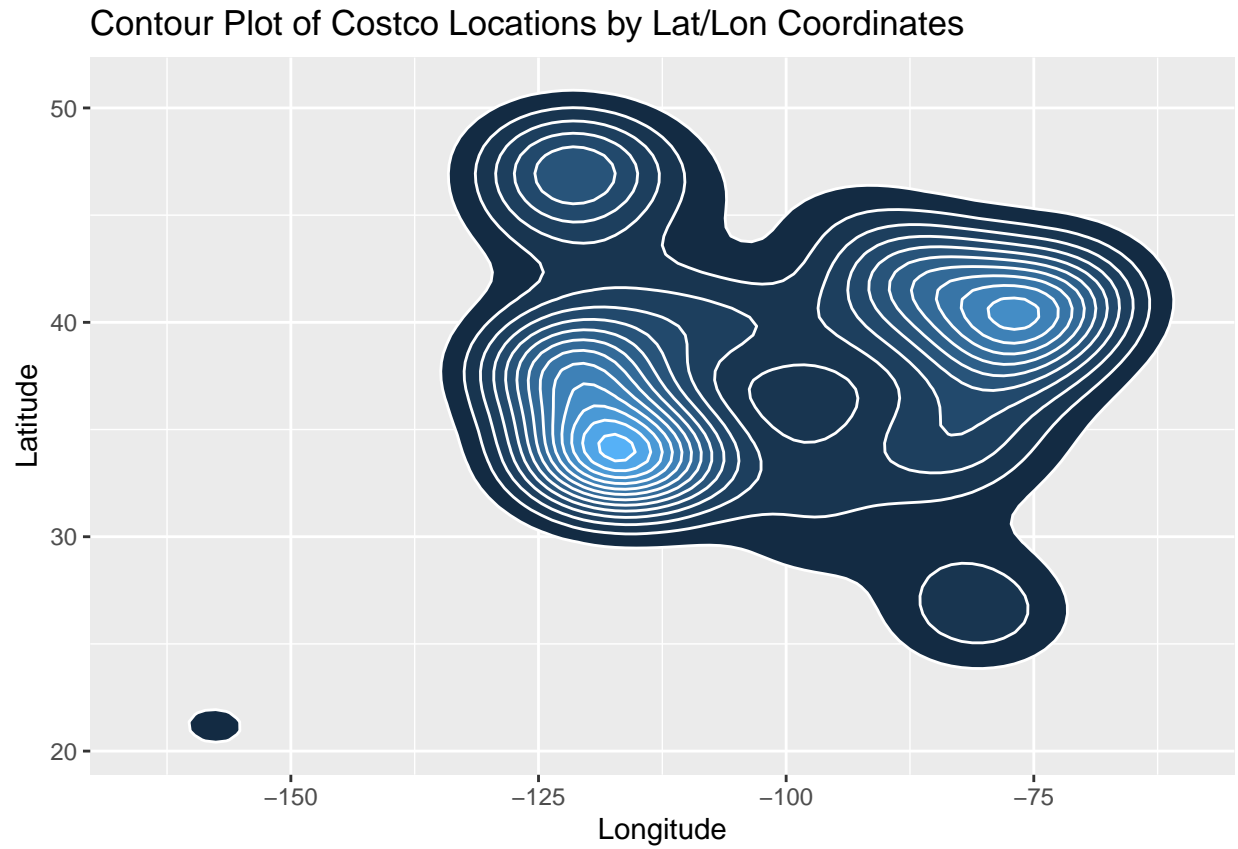
```
# Make the map
map(database = 'state',
     col = '#E31837')    # Costco red
# Add the Costcos
symbols(costcos$Longitude, costcos$Latitude,
        bg = '#005DAA', # Costco blue
        fg = '#ffffff', # white
        lwd = 0.1,
        circles = rep(1, length(costcos$Longitude)),
        inches = 0.05, # size of circles
        add = TRUE)    # add each to map instead of crating new plot
# Add title
title("US Costco Locations (Lower 48)", adj = 0)
```

### US Costco Locations (Lower 48)



## Contour Chart

```
# Plot area + contour
ggplot(costcos, aes(x=Longitude, y=Latitude)) +
  stat_density2d(aes(fill = ..level..), geom = 'polygon', color='white') +
  theme(legend.position = 'none') +
  xlim(-165, -60) +
  ggtitle("Contour Plot of Costco Locations by Lat/Lon Coordinates")
```





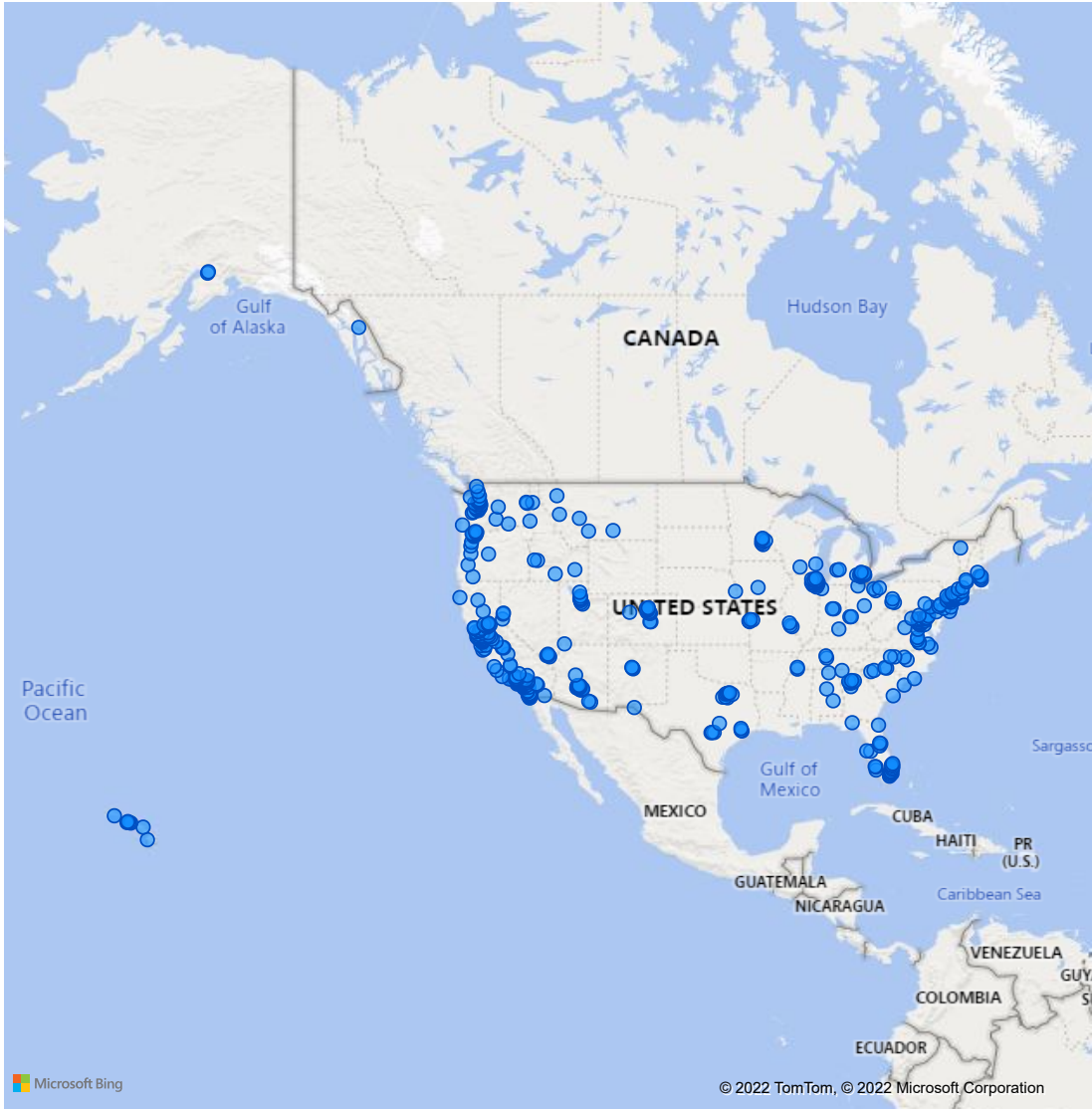
# Power BI

## Heat Map

Name	3PA	3PM	3PP	AST	BLK	DRB	FGA	FGM	FGP	FTA	FTM	FTP	G	MIN	ORB	PF	PTS
Dwyane Wade	3.50	1.10	0.32	7.50	1.30	3.90	22.00	10.80	0.49	9.80	7.50	0.77	79	38.60	1.10	2.30	30.00
LeBron James	4.70	1.60	0.34	7.20	1.10	6.30	19.90	9.70	0.49	9.40	7.30	0.78	81	37.70	1.30	1.70	28.00
Kobe Bryant	4.10	1.40	0.35	4.90	0.50	4.10	20.90	9.80	0.47	6.90	5.90	0.86	82	36.20	1.10	2.30	20.00
Dirk Nowitzki	2.10	0.80	0.36	2.40	0.80	7.30	20.00	9.60	0.48	6.70	6.00	0.89	81	37.70	1.10	2.20	20.00
Danny Granger	6.70	2.70	0.40	2.70	1.40	4.40	19.10	8.50	0.45	6.90	6.00	0.88	67	36.20	0.70	3.10	20.00
Kevin Durant	3.10	1.30	0.42	2.80	0.70	5.50	18.80	8.90	0.48	7.10	6.10	0.86	74	39.00	1.00	1.80	20.00
Kevin Martin	5.40	2.30	0.42	2.70	0.20	3.00	15.90	6.70	0.42	10.30	9.00	0.87	51	38.20	0.60	2.30	20.00
Al Jefferson	0.10	0.00	0.00	1.60	1.70	7.50	19.50	9.70	0.50	5.00	3.70	0.74	50	36.60	3.40	2.80	20.00
Carmelo Anthony	2.60	1.00	0.37	3.40	0.40	5.20	18.30	8.10	0.44	7.10	5.60	0.79	66	34.50	1.60	3.00	20.00
Chris Paul	2.30	0.80	0.36	11.00	0.10	4.70	16.10	8.10	0.50	6.70	5.80	0.87	78	38.50	0.90	2.70	20.00
Chris Bosh	0.60	0.20	0.25	2.50	1.00	7.20	16.40	8.00	0.49	8.00	6.50	0.82	77	38.10	2.80	2.50	20.00
Brandon Roy	2.80	1.10	0.38	5.10	0.30	3.40	16.90	8.10	0.48	6.50	5.30	0.82	78	37.20	1.30	1.60	20.00
Antawn Jamison	3.90	1.40	0.35	1.90	0.30	6.50	17.80	8.30	0.47	5.60	4.20	0.75	81	38.20	2.40	2.70	20.00
Tony Parker	0.90	0.30	0.29	6.90	0.10	2.70	17.50	8.90	0.51	5.00	3.90	0.78	72	34.10	0.40	1.50	20.00
Amare Stoudemire	0.10	0.10	0.43	2.00	1.10	5.90	14.10	7.60	0.54	7.30	6.10	0.84	53	36.80	2.20	3.10	20.00
Joe Johnson	5.20	1.90	0.36	5.80	0.20	3.60	18.00	7.80	0.44	4.60	3.80	0.83	79	39.50	0.80	2.20	20.00
Devin Harris	3.20	0.90	0.29	6.90	0.20	2.90	15.10	6.60	0.44	8.80	7.20	0.82	69	36.10	0.40	2.40	20.00
Michael Redd	5.80	2.10	0.37	2.70	0.10	2.50	16.60	7.50	0.46	4.90	4.00	0.81	33	36.40	0.70	1.40	20.00
David West	0.30	0.10	0.24	2.30	0.90	6.40	17.00	8.00	0.47	5.50	4.80	0.88	76	39.30	2.10	2.70	20.00
Caron Butler	3.10	1.00	0.31	4.30	0.30	4.40	16.20	7.30	0.45	6.00	5.10	0.86	67	38.60	1.80	2.50	20.00
Vince Carter	4.90	1.90	0.39	4.70	0.50	4.20	16.80	7.40	0.44	5.10	4.20	0.82	80	36.80	0.90	2.90	20.00
Zachary Randolph	1.90	0.60	0.33	2.10	0.30	6.90	17.50	8.30	0.48	4.90	3.60	0.73	50	35.10	3.10	2.70	20.00
Ben Gordon	5.10	2.10	0.41	3.40	0.30	2.80	16.00	7.30	0.46	4.70	4.00	0.86	82	36.60	0.60	2.20	20.00
Stephen Jackson	5.20	1.70	0.34	6.50	0.50	3.90	16.90	7.00	0.41	6.00	5.00	0.83	59	39.70	1.20	2.60	20.00
Dwight Howard	0.00	0.00	0.00	1.40	2.90	9.60	12.40	7.10	0.57	10.70	6.40	0.59	79	35.70	4.30	3.40	20.00
Paul Pierce	3.80	1.50	0.39	3.60	0.30	5.00	14.60	6.70	0.46	6.80	5.70	0.83	81	37.40	0.70	2.70	20.00
Al Harrington	6.40	2.30	0.36	1.40	0.30	4.90	16.60	7.30	0.44	4.00	3.20	0.79	73	34.90	1.40	3.10	20.00
Jamal Crawford	6.10	2.20	0.36	4.40	0.20	2.60	15.70	6.40	0.41	5.30	4.60	0.87	65	38.10	0.40	1.40	19.00
Yao Ming	0.00	0.00	1.00	1.80	1.90	7.20	13.40	7.40	0.55	5.70	4.90	0.87	77	33.60	2.60	3.30	19.00
Jason Terry	6.20	2.30	0.37	3.40	0.30	1.90	15.80	7.30	0.46	3.00	2.70	0.88	74	33.60	0.50	1.90	19.00
Richard Jefferson	3.60	1.40	0.40	2.40	0.20	3.90	14.90	6.50	0.44	6.30	5.10	0.81	82	35.90	0.70	3.10	19.00
Deron Williams	3.30	1.00	0.31	10.70	0.30	2.50	14.50	6.80	0.47	5.60	4.80	0.85	68	36.90	0.40	2.00	19.00
Tim Duncan	0.00	0.00	0.00	3.50	1.70	8.00	14.80	7.40	0.50	6.40	4.50	0.69	75	33.70	2.70	2.30	19.00
Monta Ellis	1.00	0.30	0.31	3.70	0.30	3.80	17.20	7.80	0.45	3.80	3.10	0.83	25	35.60	0.60	2.70	19.00
Pau Gasol	0.00	0.00	0.50	3.50	1.00	6.40	12.90	7.30	0.57	5.40	4.20	0.78	81	37.10	3.20	2.10	18.00
Rudy Gay	3.10	1.10	0.35	1.70	0.70	4.20	16.00	7.20	0.45	4.40	3.30	0.77	79	37.30	1.40	2.80	18.00
Andre Iguodala	3.20	1.00	0.31	5.30	0.40	4.60	14.00	6.60	0.47	6.40	4.60	0.72	82	39.80	1.10	1.90	18.00
Corey Maggette	1.90	0.50	0.25	1.80	0.20	4.60	12.40	5.70	0.46	8.10	6.70	0.82	51	31.10	1.00	3.80	18.00
O.J. Mayo	4.60	1.80	0.38	3.20	0.20	3.10	15.60	6.90	0.44	3.40	3.00	0.88	82	38.00	0.70	2.50	18.00
John Salmons	3.80	1.60	0.42	3.20	0.30	3.50	13.80	6.50	0.47	4.40	3.60	0.83	79	37.50	0.70	2.30	18.00
Richard Hamilton	2.80	1.00	0.37	4.40	0.10	2.40	15.60	7.00	0.45	3.90	3.30	0.85	67	34.00	0.70	2.60	18.00
Ray Allen	6.20	2.50	0.41	2.80	0.20	2.70	13.20	6.30	0.48	3.20	3.00	0.95	79	36.30	0.80	2.00	18.00
LaMarcus Aldridge	0.30	0.10	0.25	1.90	1.00	4.60	15.30	7.40	0.48	4.10	3.20	0.78	81	37.10	2.90	2.60	18.00
Josh Howard	3.20	1.10	0.35	1.60	0.60	3.90	15.10	6.80	0.45	4.20	3.30	0.78	52	31.90	1.10	2.60	18.00
Maurice Williams	5.20	2.30	0.44	4.10	0.10	2.90	13.90	6.50	0.47	2.80	2.60	0.91	81	35.00	0.60	2.70	17.00
Shaquille O'neal	0.00	0.00	0.00	1.70	1.40	5.90	11.20	6.80	0.61	6.90	4.10	0.60	75	30.10	2.50	3.40	17.00
Chauncey Billups	5.00	2.10	0.41	6.40	0.20	2.60	12.40	5.20	0.42	5.80	5.30	0.91	79	35.30	0.40	2.00	17.00
Rashard Lewis	7.00	2.80	0.40	2.60	0.60	4.60	13.80	6.10	0.44	3.40	2.80	0.84	79	36.20	1.20	2.50	17.00
Allen Iverson	1.70	0.50	0.28	5.00	0.10	2.50	14.60	6.10	0.42	6.10	4.80	0.78	57	36.70	0.50	1.50	17.00
Nate Robinson	5.20	1.70	0.33	4.10	0.10	2.60	13.90	6.10	0.44	4.00	3.40	0.84	74	29.90	1.30	2.80	17.00
Total	161.20	59.50	17.00	192.90	29.90	225.70	796.90	373.20	23.50	292.90	236.80	40.81	3542	1,814.40	67.90	123.20	1,043.00

# Spatial Chart

US Costco Locations



# Funnel Chart

States with 5 or More Costco Stores

