DSC 640: Weeks 9 – 10

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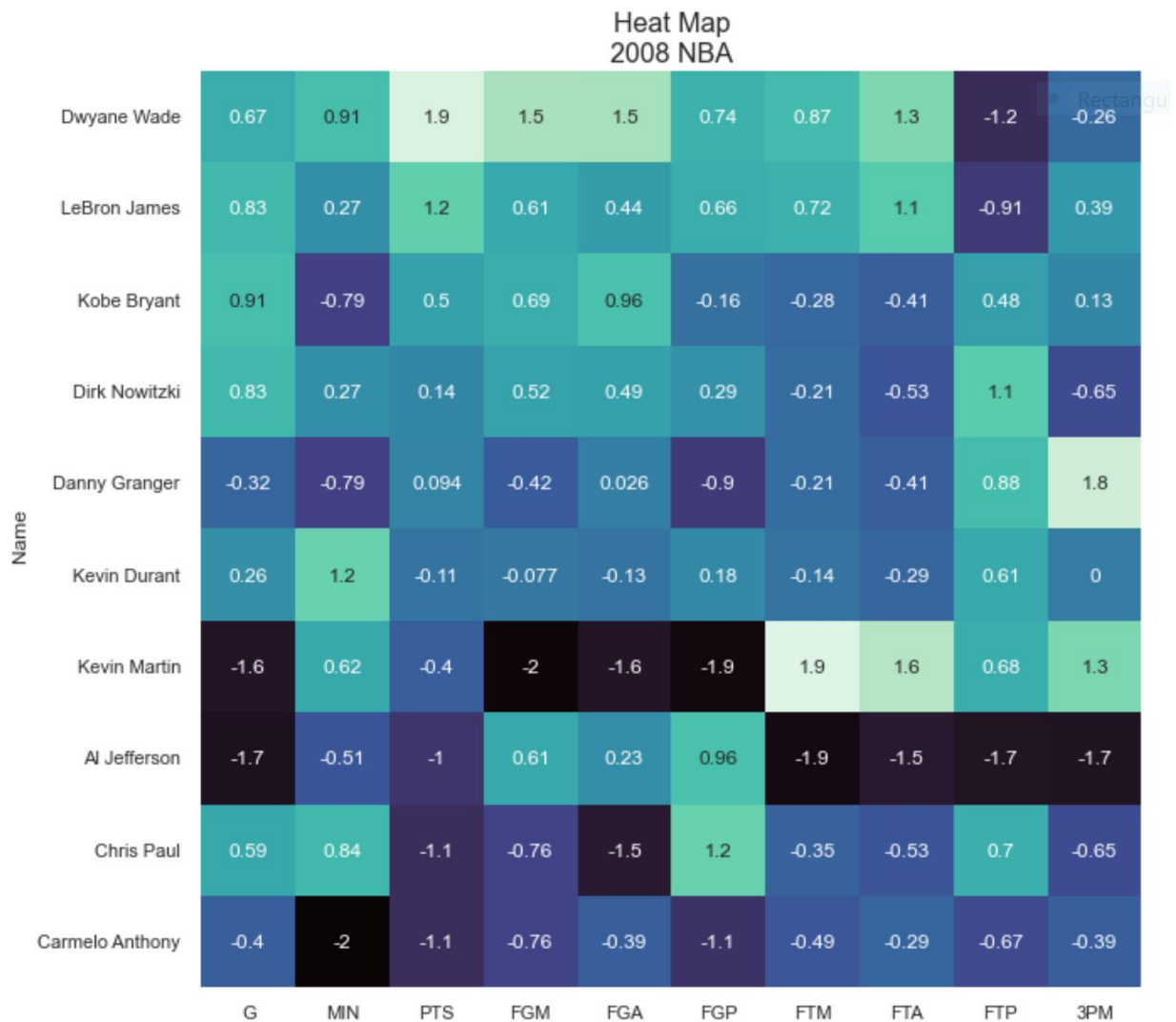
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Exercise 5.2 Heat Map, Spatial Chart, and contour Chart/Funnel Chart


**Heat Map**

**Python**

```
# Build a heatmap
sns.set(rc = {'figure.figsize':(10, 10)})
sns.set(font_scale = 1)
heatmap_chart = sns.heatmap(ppg_ten_df_norm, cmap = "mako",
        annot = ppg_ten_df_norm, cbar = False).set_title('Heat Map\n2008 NBA', fontdict = { 'fontsize': 16})
plt.show()
```

R

```r
### Heat Map
```

```{r}
#| label: firsten
# Use only the first 10 rows and first 10 columns
ppg_ten_df <- ppg_df[c(1:10), c(1:11)]
head(ppg_ten_df)
```
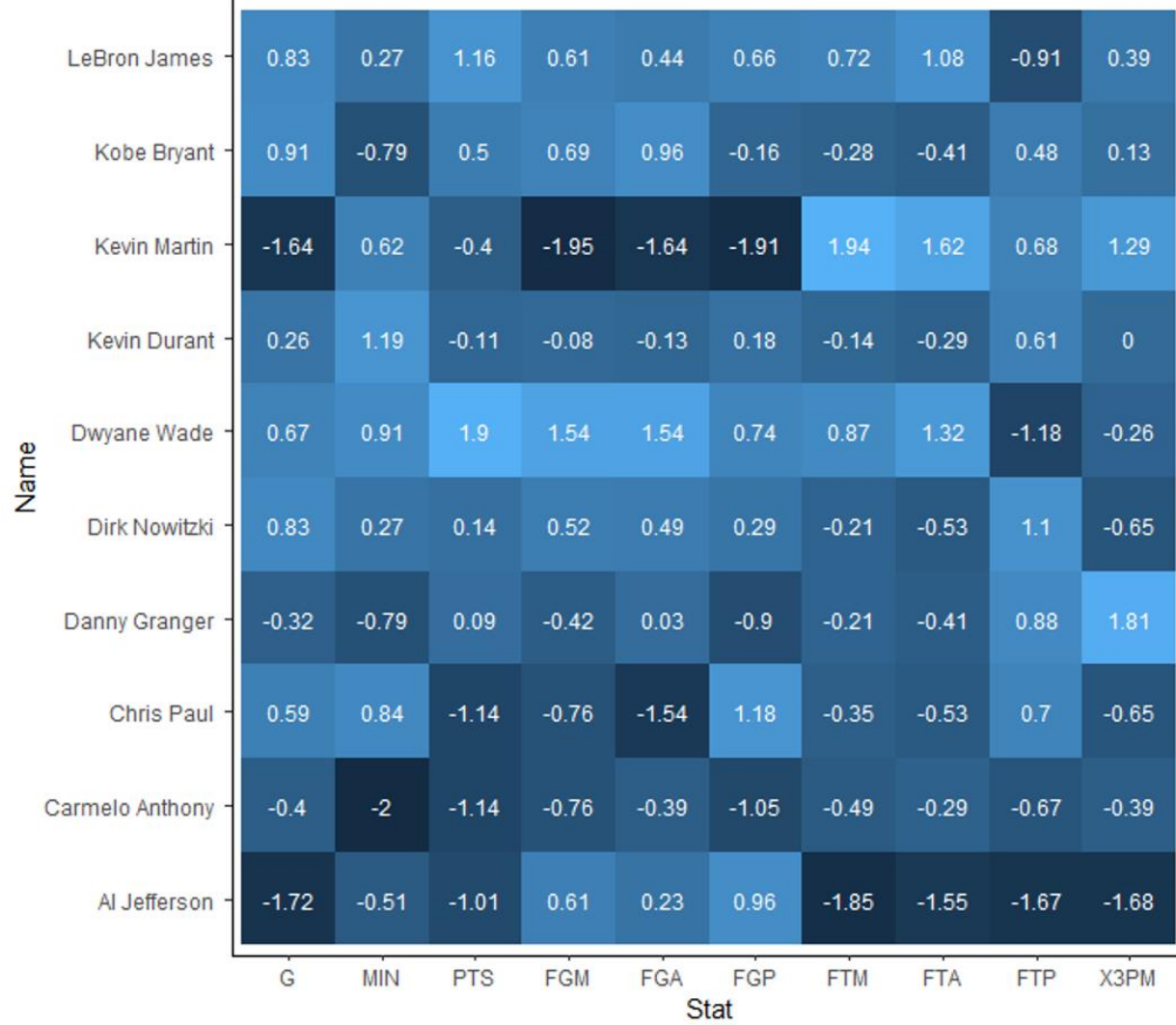
```{r}
#| label: normalize
# copy dataset
ppg_df_norm <- data.frame(ppg_ten_df)
# normalize the columns
ppg_df_norm[c(2:11)] <- scale(ppg_df_norm[c(2:11)])
head(ppg_df_norm)
```

```{r}
#| label: pivottable
ppg_df_long <- ppg_df_norm %>% pivot_longer(!Name,
                                            names_to = 'Type',
                                            values_to = 'Stat')

head(ppg_df_long)
```

```r
#| label: heatmap
fig <- ggplot(ppg_df_long, aes(x = factor(Type, level = c('G', 'MIN', 'PTS',
                                              'FGM', 'FGA', 'FGP',
                                              'FTM', 'FTA', 'FTP',
                                              'X3PM')),
                       y = Name, fill = Stat)) +
  geom_tile(show.legend = FALSE) +
  geom_text(aes(label = round(Stat, digits = 2)), color = 'white', size = 3) +
  coord_fixed() +
  guides(fill = guide_colorbar(barwidth = 20, barheight = 0.5)) +
  ggtitle("Heat Map - R\n2008 NBA Performance") +
  xlab('Stat')
theme(axis.text.x = element_text(angle = 45, vjust = 1, hjust = 1,
                                 size = 8),
      legend.position = 'top')
fig
```

## Heat Map - R
## 2008 NBA Performance

| Name | G | MIN | PTS | FGM | FGA | FGP | FTM | FTA | FTP | X3PM |
|---|---|---|---|---|---|---|---|---|---|---|
| LeBron James | 0.83 | 0.27 | 1.16 | 0.61 | 0.44 | 0.66 | 0.72 | 1.08 | -0.91 | 0.39 |
| Kobe Bryant | 0.91 | -0.79 | 0.5 | 0.69 | 0.96 | -0.16 | -0.28 | -0.41 | 0.48 | 0.13 |
| Kevin Martin | -1.64 | 0.62 | -0.4 | -1.95 | -1.64 | -1.91 | 1.94 | 1.62 | 0.68 | 1.29 |
| Kevin Durant | 0.26 | 1.19 | -0.11 | -0.08 | -0.13 | 0.18 | -0.14 | -0.29 | 0.61 | 0 |
| Dwyane Wade | 0.67 | 0.91 | 1.9 | 1.54 | 1.54 | 0.74 | 0.87 | 1.32 | -1.18 | -0.26 |
| Dirk Nowitzki | 0.83 | 0.27 | 0.14 | 0.52 | 0.49 | 0.29 | -0.21 | -0.53 | 1.1 | -0.65 |
| Danny Granger | -0.32 | -0.79 | 0.09 | -0.42 | 0.03 | -0.9 | -0.21 | -0.41 | 0.88 | 1.81 |
| Chris Paul | 0.59 | 0.84 | -1.14 | -0.76 | -1.54 | 1.18 | -0.35 | -0.53 | 0.7 | -0.65 |
| Carmelo Anthony | -0.4 | -2 | -1.14 | -0.76 | -0.39 | -1.05 | -0.49 | -0.29 | -0.67 | -0.39 |
| Al Jefferson | -1.72 | -0.51 | -1.01 | 0.61 | 0.23 | 0.96 | -1.85 | -1.55 | -1.67 | -1.68 |

Tableau

## Heat Map

| Name | 3PM | 3PP | FGA | FGM | FGP | FTM | G | MIN | PTS |
|---|---|---|---|---|---|---|---|---|---|
| Monta Ellis | 0.30 | 0.31 | 17.20 | 7.80 | 0.45 | 3.10 | 25.00 | 35.60 | 19.00 |
| Nate Robinson | 1.70 | 0.33 | 13.90 | 6.10 | 0.44 | 3.40 | 74.00 | 29.90 | 17.20 |
| O.J. Mayo | 1.80 | 0.38 | 15.60 | 6.90 | 0.44 | 3.00 | 82.00 | 38.00 | 18.50 |
| Pau Gasol | 0.00 | 0.50 | 12.90 | 7.30 | 0.57 | 4.20 | 81.00 | 37.10 | 18.90 |
| Paul Pierce | 1.50 | 0.39 | 14.60 | 6.70 | 0.46 | 5.70 | 81.00 | 37.40 | 20.50 |
| Rashard Lewis | 2.80 | 0.40 | 13.80 | 6.10 | 0.44 | 2.80 | 79.00 | 36.20 | 17.70 |
| Ray Allen | 2.50 | 0.41 | 13.20 | 6.30 | 0.48 | 3.00 | 79.00 | 36.30 | 18.20 |
| Richard Hamilton | 1.00 | 0.37 | 15.60 | 7.00 | 0.45 | 3.30 | 67.00 | 34.00 | 18.30 |
| Richard Jefferson | 1.40 | 0.40 | 14.90 | 6.50 | 0.44 | 5.10 | 82.00 | 35.90 | 19.60 |
| Rudy Gay | 1.10 | 0.35 | 16.00 | 7.20 | 0.45 | 3.30 | 79.00 | 37.30 | 18.90 |
| Shaquille O'neal | 0.00 | 0.00 | 11.20 | 6.80 | 0.61 | 4.10 | 75.00 | 30.10 | 17.80 |
| Stephen Jackson | 1.70 | 0.34 | 16.90 | 7.00 | 0.41 | 5.00 | 59.00 | 39.70 | 20.70 |
| Tim Duncan | 0.00 | 0.00 | 14.80 | 7.40 | 0.50 | 4.50 | 75.00 | 33.70 | 19.30 |
| Tony Parker | 0.30 | 0.29 | 17.50 | 8.90 | 0.51 | 3.90 | 72.00 | 34.10 | 22.00 |
| Vince Carter | 1.90 | 0.39 | 16.80 | 7.40 | 0.44 | 4.20 | 80.00 | 36.80 | 20.80 |
| Yao Ming | 0.00 | 1.00 | 13.40 | 7.40 | 0.55 | 4.90 | 77.00 | 33.60 | 19.70 |
| Zachary Randolph | 0.60 | 0.33 | 17.50 | 8.30 | 0.48 | 3.60 | 50.00 | 35.10 | 20.80 |

**Spatial Chart**

**Python**

```python
# Reading the PopCenterCounty_US shapefile
states = gpd.read_file(r'PopCenterCounty_US.shp')
type(states)
```

```python
crs = {'init':'EPSG:4326'}
```

```python
geometry = [Point(xy) for xy in zip(costcos_df['Longitude'], costcos_df['Latitude'])]
geo_df = gpd.GeoDataFrame(costcos_df, crs = crs, geometry = geometry)

#remove warning
import warnings
warnings.filterwarnings("ignore", category=FutureWarning)
```

```python
fig, ax = plt.subplots(figsize = (20, 20))

# Plot United States
states.to_crs(epsg = 4326).plot(ax = ax, cmap = 'YlOrBr')

# Plot Costcos Cities
geo_df.plot(ax = ax, alpha = 0.5, edgecolor = 'black', color = 'blue')

ax.set_title('Spatial Chart - Python\nUSA Costco Locations', fontsize = 20)
ax.set_axis_off()
```



Spatial Chart - Python
USA Costco Locations

**R**

```
### Spatial Chart


```{r}
#| label: readshape
# reading the dataset in via "sf"
sf::st_read("PopCenterCounty_US.shp")
```


```{r}
#| label: transform
latLong <- data.frame(lon = costcos_df$Longitude, lat = costcos_df$Latitude)
transformed_data <- usmap_transform(latLong)
transformed_data
```

```{r}
#| label: spatialchart
# map the counties
fig <- plot_usmap(regions = "states") +
  labs(title = "Spatial Chart - R", subtitle = "USA Costco Locations") +
  theme(panel.background=element_blank()) +
  geom_point(data = transformed_data, aes(x = x, y = y), color = 'blue', alpha = 0.5)
fig
```

## Spatial Chart - R
USA Costco Locations
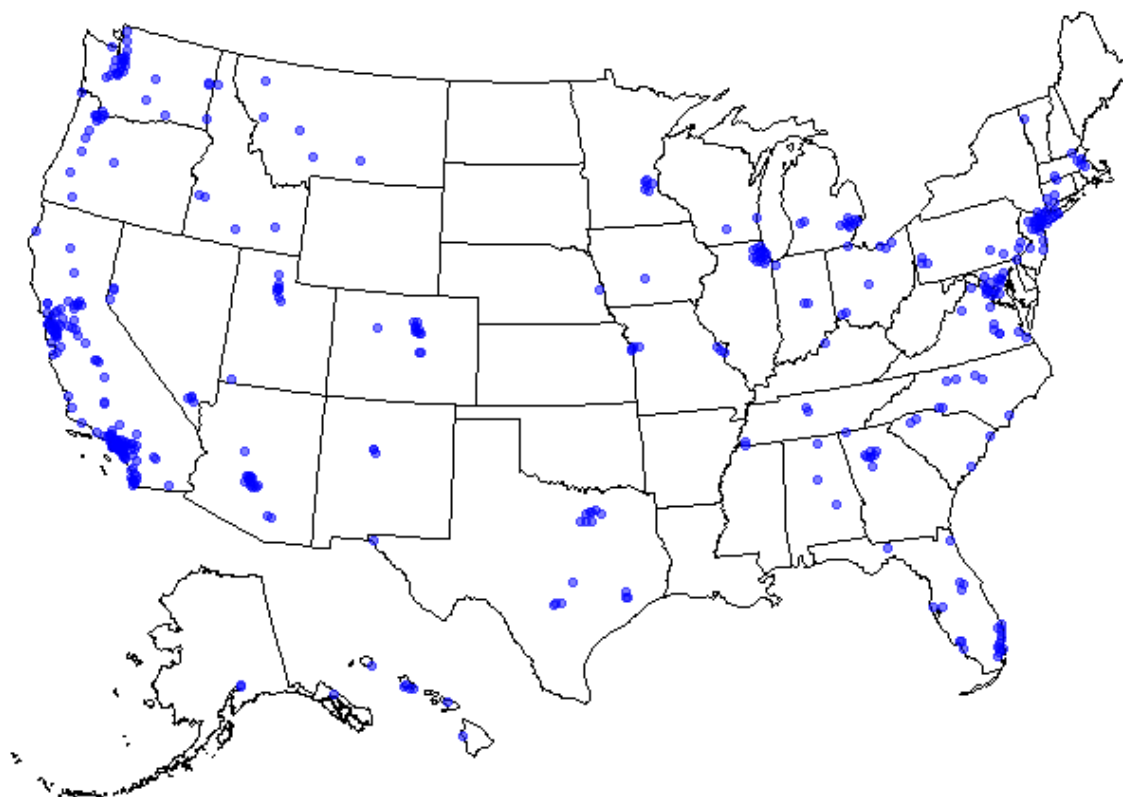
## Tableau
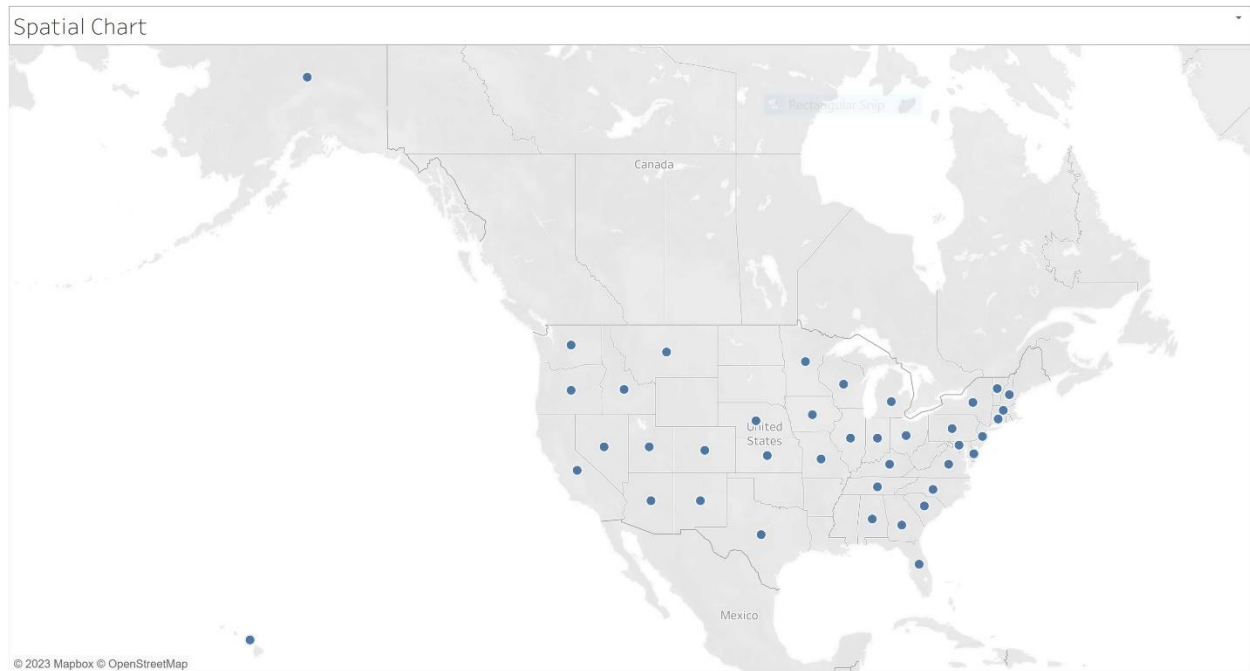


## Contour Chart

## Python

```python
# create meshgrid for basketball games and points
[X, Y] = np.meshgrid(ppg_ten_df['MIN'], ppg_ten_df['PTS'])
```

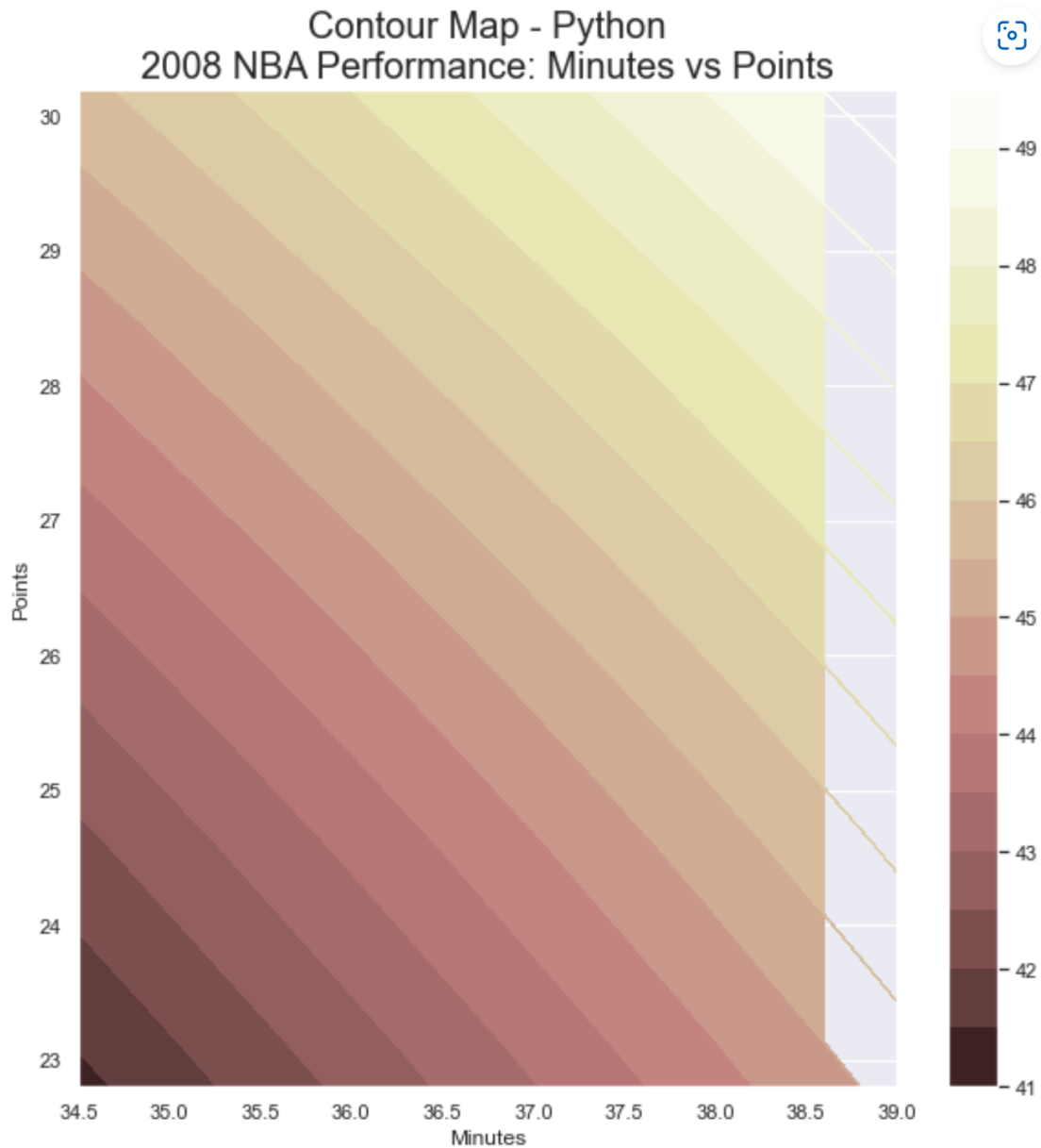```python
# Create Z
Z = np.sqrt(X ** 2 + Y ** 2)
```

```python
fig, ax = plt.subplots()

test = ax.contourf(X, Y, Z, 16, cmap='pink')
cbar = fig.colorbar(test)

ax.set_title('Contour Map - Python\n2008 NBA Performance: Minutes vs Points', fontsize = 20)
ax.set_xlabel('Minutes')
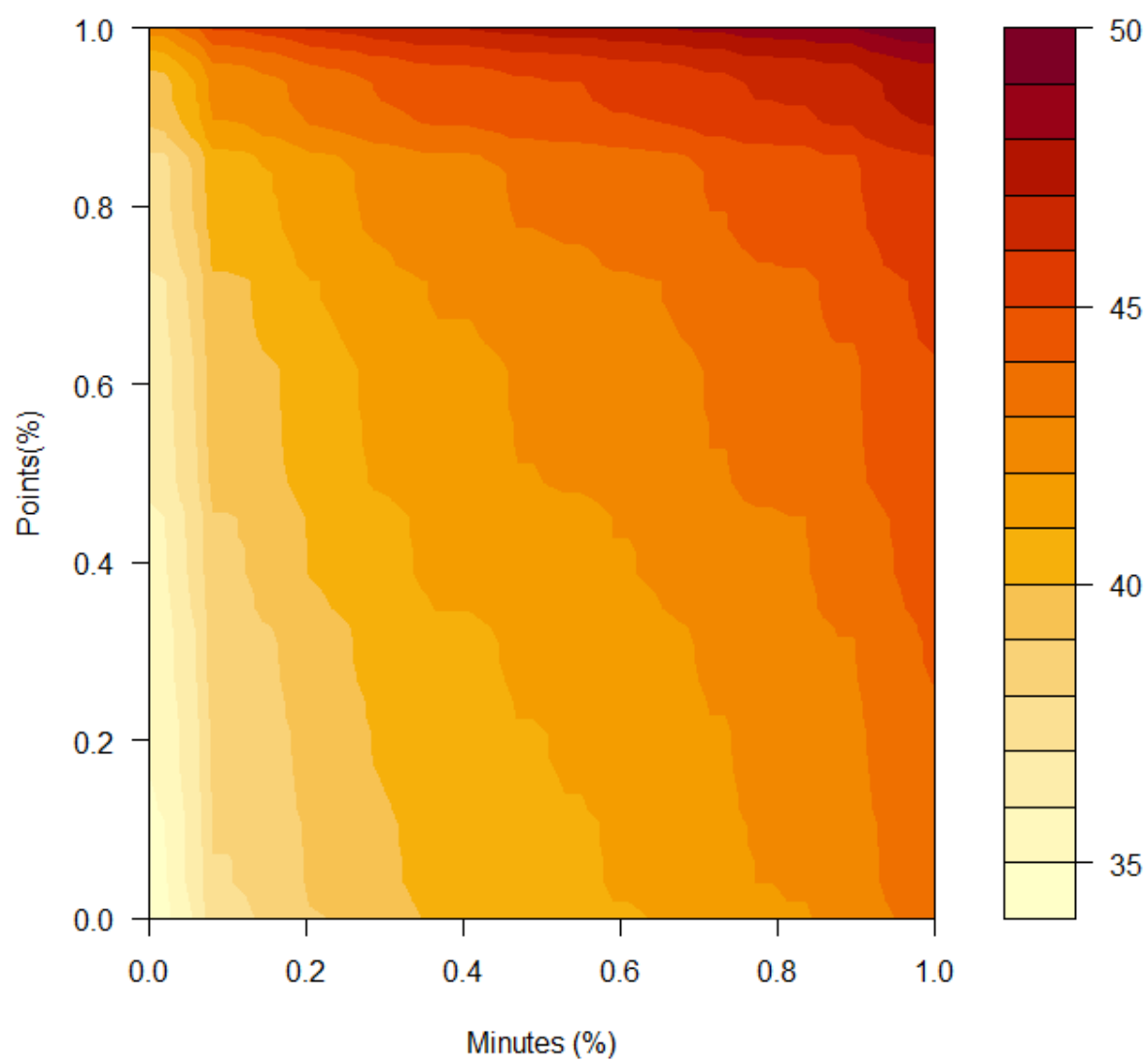ax.set_ylabel('Points')

plt.show()
```

Contour Map - Python
2008 NBA Performance: Minutes vs Points

R

```
### Contour Chart

```{r}
#| label: bbvars
X <- sort(ppg_df$MIN, decreasing = FALSE)
Y <- sort(ppg_df$PTS, decreasing = FALSE)
Z <- sqrt(outer(X ^ 2, Y ^ 2, '+'))
```


```{r}
#| label: contourchart
# create png file
#png('images/contour-chart-r.png')
filled.contour(Z, plot.title = title(main = "Contour Map - R\n2008 NBA Performance: Minutes vs Points",
                      xlab = 'Minutes (%)',  ylab = 'Points(%)', cex.main = 0.8))
```
```

Contour Map - R
2008 NBA Performance: Minutes vs Points

**Tableau**

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