

## DSC 640: Weeks 9 – 10

Author: Kimberly Cable

Date: Nov 5, 2022

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

## Heat Map

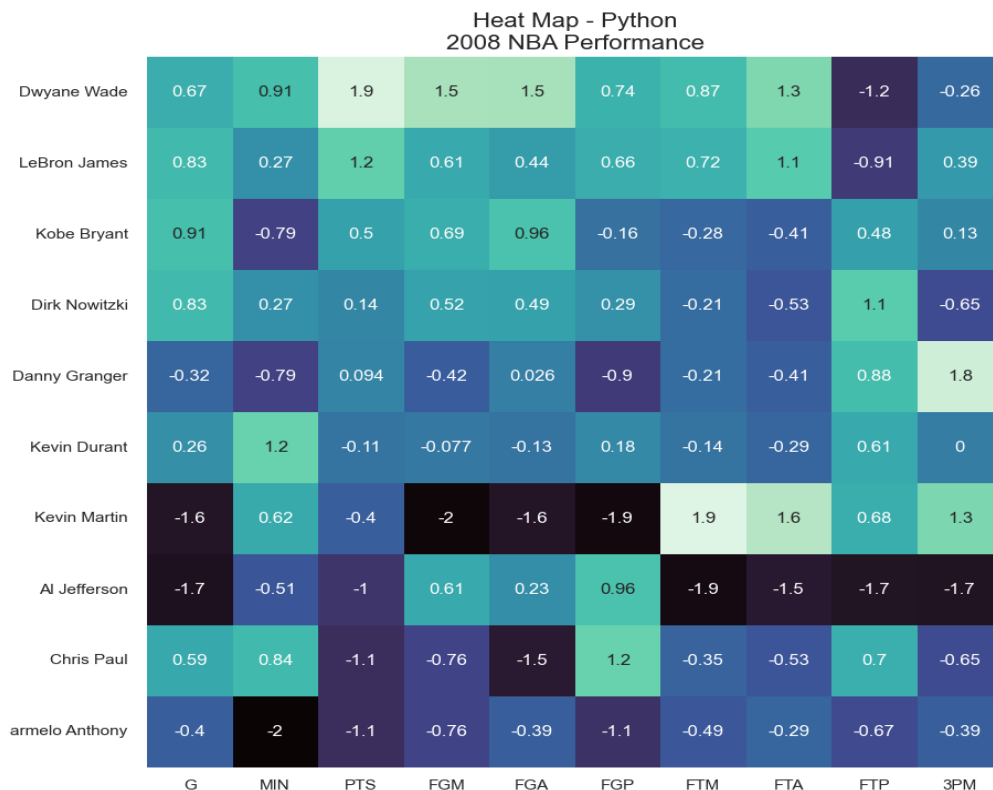
### Python

```
# Use only the first 10 rows and first 10 columns
ppg_ten_df = ppg_df.iloc[:10, :10]
ppg_ten_df
```

```
# Normalize Basketball data
ppg_ten_df_norm = (ppg_ten_df - ppg_ten_df.mean()) / ppg_ten_df.std()
ppg_ten_df_norm.head()
```

```
# 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 - Python\n2008 NBA Performance', fontdict = {'fontsize': 16})
plt.show()
```

```
# Save figure
heatmap_chart.figure.savefig('images/heat-map-python.png')
```



## R

```
```{r}
#| label: firstten

# 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')

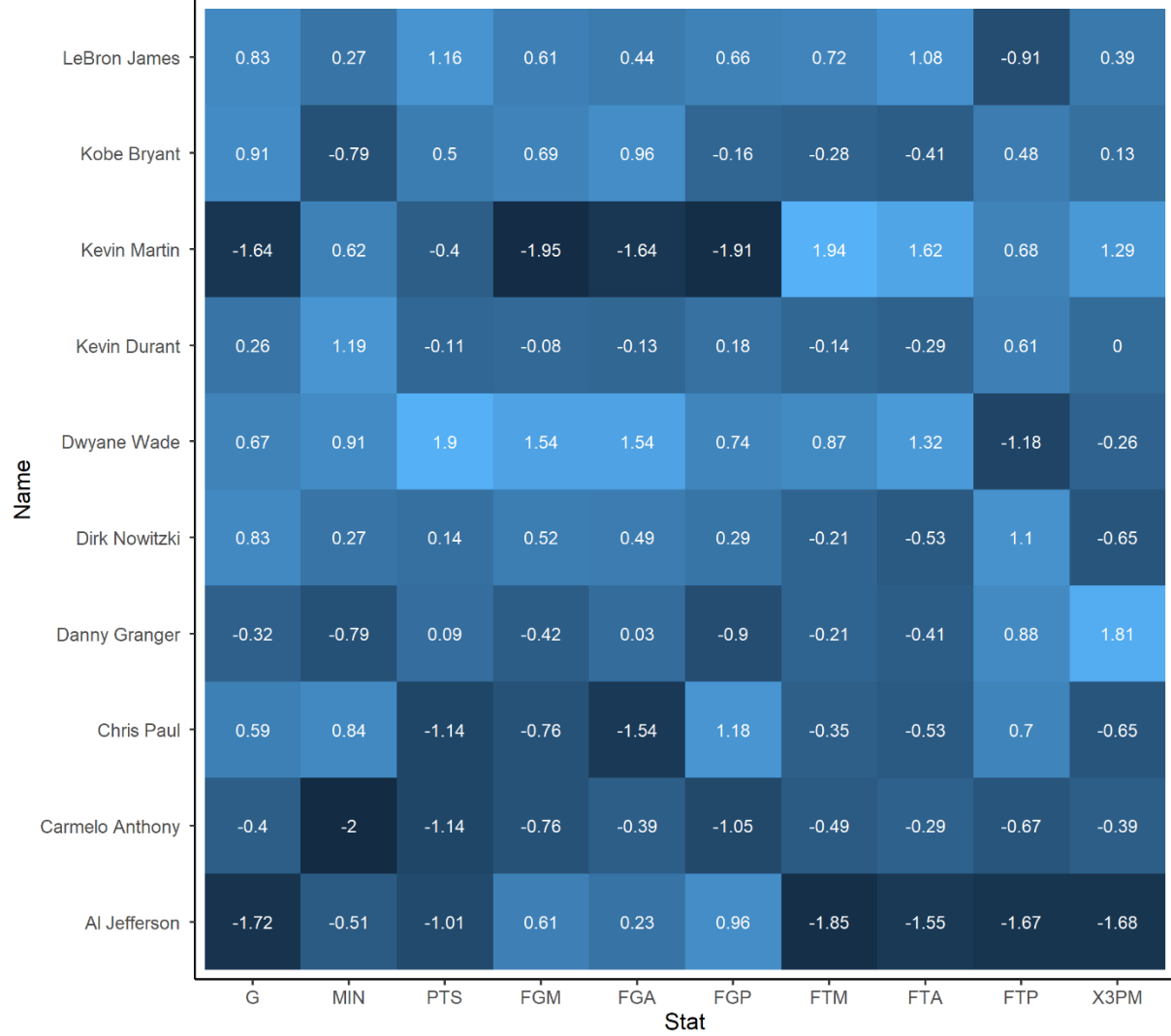
head(ppg_df_long)
```
```

```
```{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
ggsave("images/heat-map-r.png", width = 8, height = 10, units = "in")
```
```

Heat Map - R  
2008 NBA Performance



## Tableau

(see Weeks9\_10\_Tableau.twb for code)

### Heat Map - Tableau 2008 NBA Performance

| Name            | G     | MIN   | PTS   | FGM   | FGA   | FGP   | FTM   | FTA   | FTP   | 3PM   |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Al Jefferson    | -1.72 | -0.51 | -1.01 | 0.61  | 0.23  | 0.96  | -1.85 | -1.55 | -1.67 | -1.68 |
| Carmelo Anthony | -0.40 | -2.00 | -1.14 | -0.76 | -0.39 | -1.05 | -0.49 | -0.29 | -0.67 | -0.39 |
| Chris Paul      | 0.59  | 0.84  | -1.14 | -0.76 | -1.54 | 1.18  | -0.35 | -0.53 | 0.70  | -0.65 |
| Danny Granger   | -0.32 | -0.79 | 0.09  | -0.42 | 0.03  | -0.90 | -0.21 | -0.41 | 0.88  | 1.81  |
| Dirk Nowitzki   | 0.83  | 0.27  | 0.14  | 0.52  | 0.49  | 0.29  | -0.21 | -0.53 | 1.10  | -0.65 |
| Dwyane Wade     | 0.67  | 0.91  | 1.90  | 1.54  | 1.54  | 0.74  | 0.87  | 1.32  | -1.18 | -0.26 |
| Kevin Durant    | 0.26  | 1.19  | -0.11 | -0.08 | -0.13 | 0.18  | -0.14 | -0.29 | 0.61  | 0.00  |
| Kevin Martin    | -1.64 | 0.62  | -0.40 | -1.95 | -1.64 | -1.91 | 1.94  | 1.62  | 0.68  | 1.29  |
| Kobe Bryant     | 0.91  | -0.79 | 0.50  | 0.69  | 0.96  | -0.16 | -0.28 | -0.41 | 0.48  | 0.13  |
| LeBron James    | 0.83  | 0.27  | 1.16  | 0.61  | 0.44  | 0.66  | 0.72  | 1.08  | -0.91 | 0.39  |

# Spatial Chart

## Python

```
# Read Shape File
states = gpd.read_file('Data/States_shapefile.shp')
type(states)
```

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

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

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

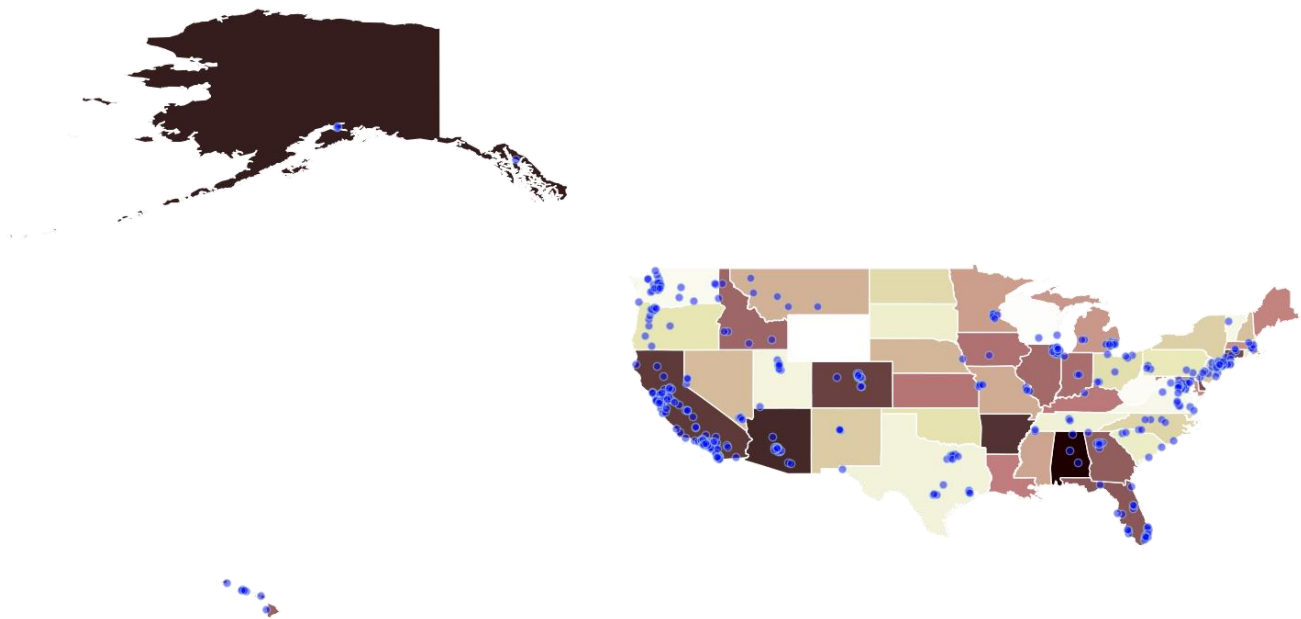
# Plot United States
states.to_crs(epsg = 4326).plot(ax = ax, cmap = 'pink')

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

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

# Save figure
ax.get_figure().savefig('images/spatial-chart-python.png',
                        bbox_inches = 'tight',
                        transparent = True)
```

Spatial Chart - Python  
USA Costco Locations



## R

```
```{r}
#| label: readshape

usa_states <- readOGR("Data/States_shapefile.shp", stringsAsFactors = FALSE)
```
```

```
```{r}
#| label: transform

latLong <- data.frame(lon = costcos_df$Longitude, lat = costcos_df$Latitude)

transformed_data <- usmap_transform(latLong)
transformed_data
```
```

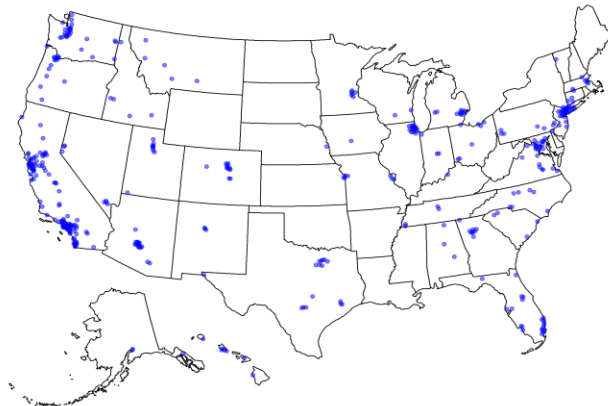
```
```{r}
#| label: spatialchart

# 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
ggsave("images/spatial-chart-r.png", width = 8, height = 10, units = "in")
```
```

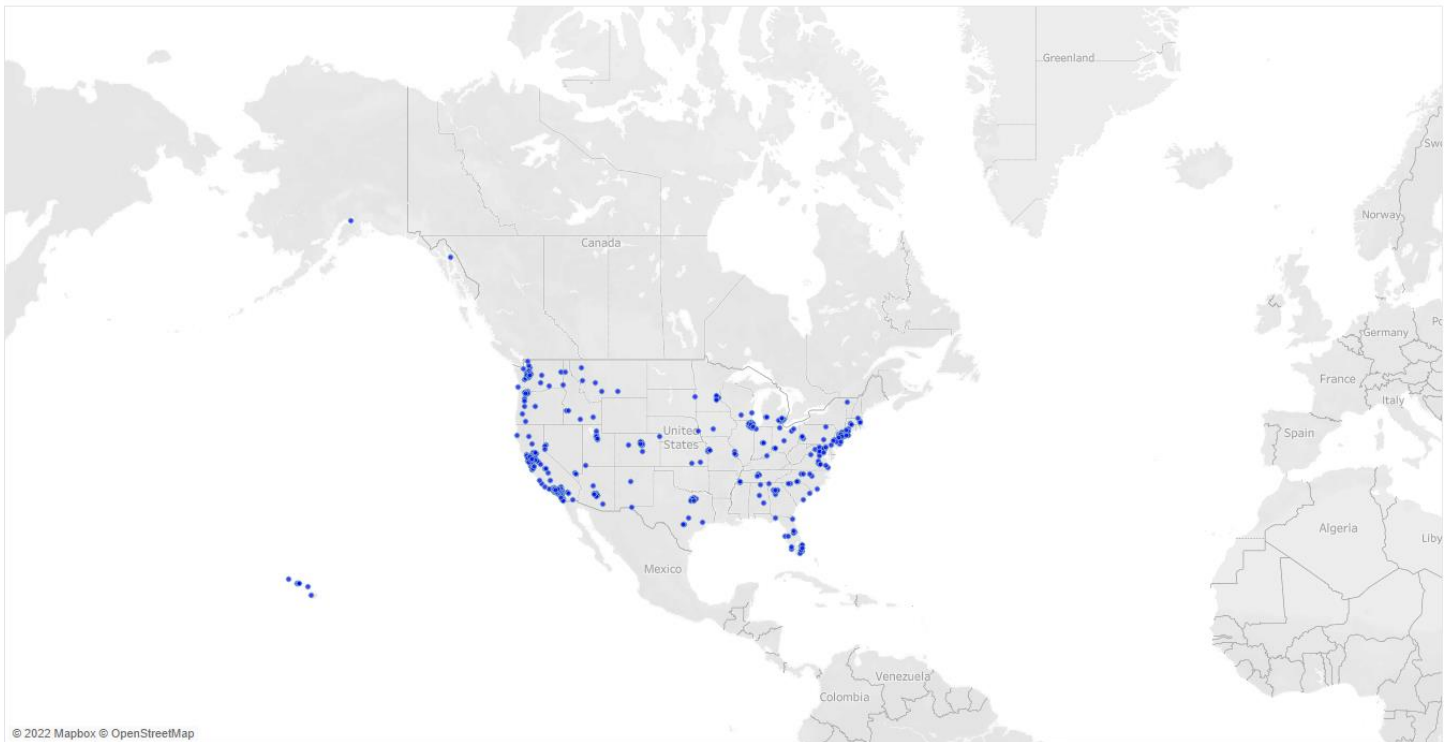
Spatial Chart - R  
USA Costco Locations



## Tableau

(see Weeks9\_10\_Tableau.twb for code)

### Spatial Chart - Tableau US Costco Locations



# Contour Chart

## Python

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

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

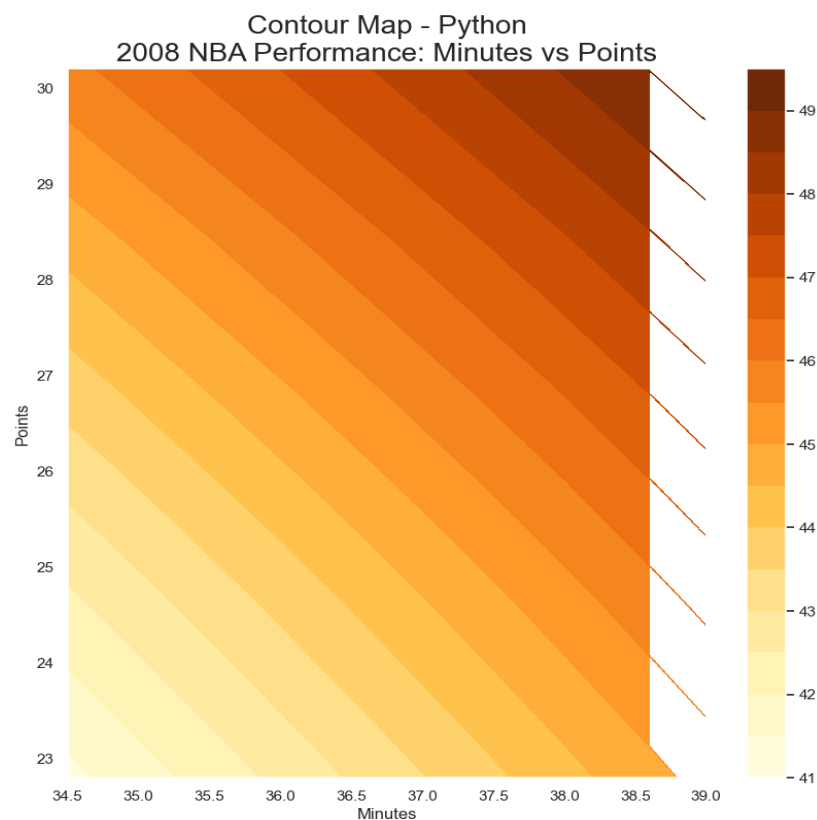
```
fig, ax = plt.subplots()

test = ax.contourf(X, Y, Z, 16, cmap='YlOrBr')
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()

# Save figure
ax.get_figure().savefig('images/contour-chart-python.png',
                        bbox_inches = 'tight',
                        transparent = True)
```





## R

```
```{r}
#| label: bbvars

X <- sort(ppg_df$MIN, decreasing = FALSE)
Y <- sort(ppg_df$PTS, decreasing = FALSE)

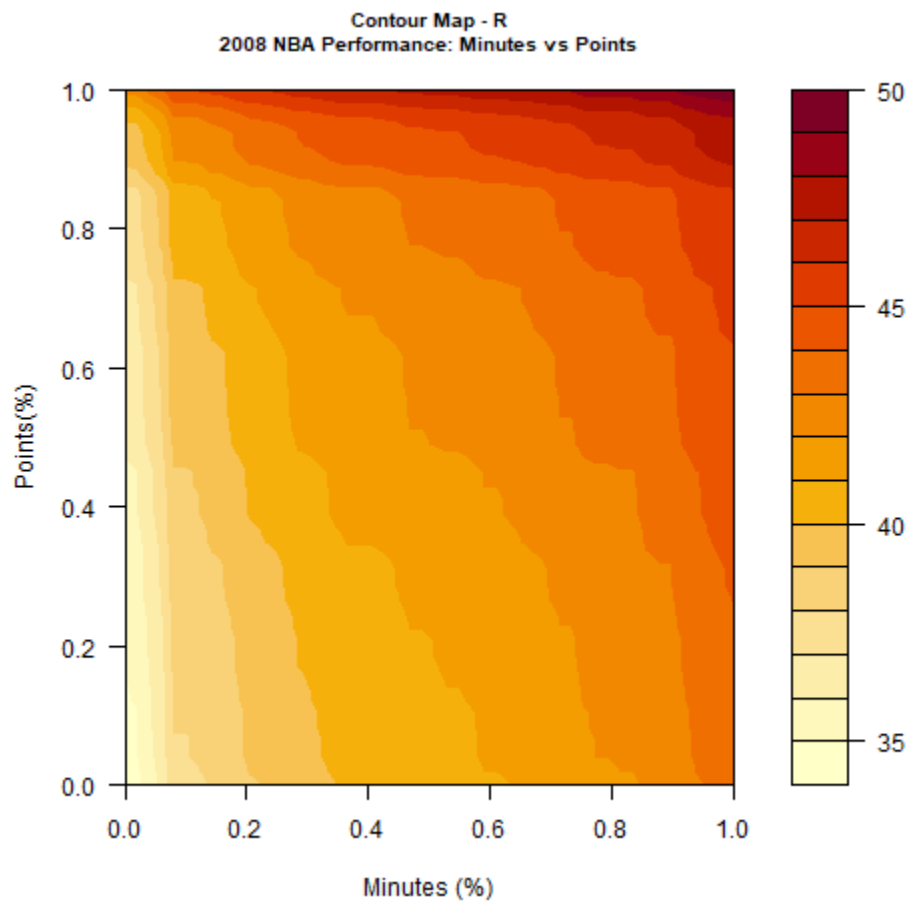
Z <- sqrt(outer(X ^ 2, Y ^ 2, '+'))
```
```

```
```{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))

dev.off()
```
```



## Tableau

(see Weeks9\_10\_Tableau.twb for code)

Funnel Chart - Tableau  
2008 NBA Percentage of Points Summary

