



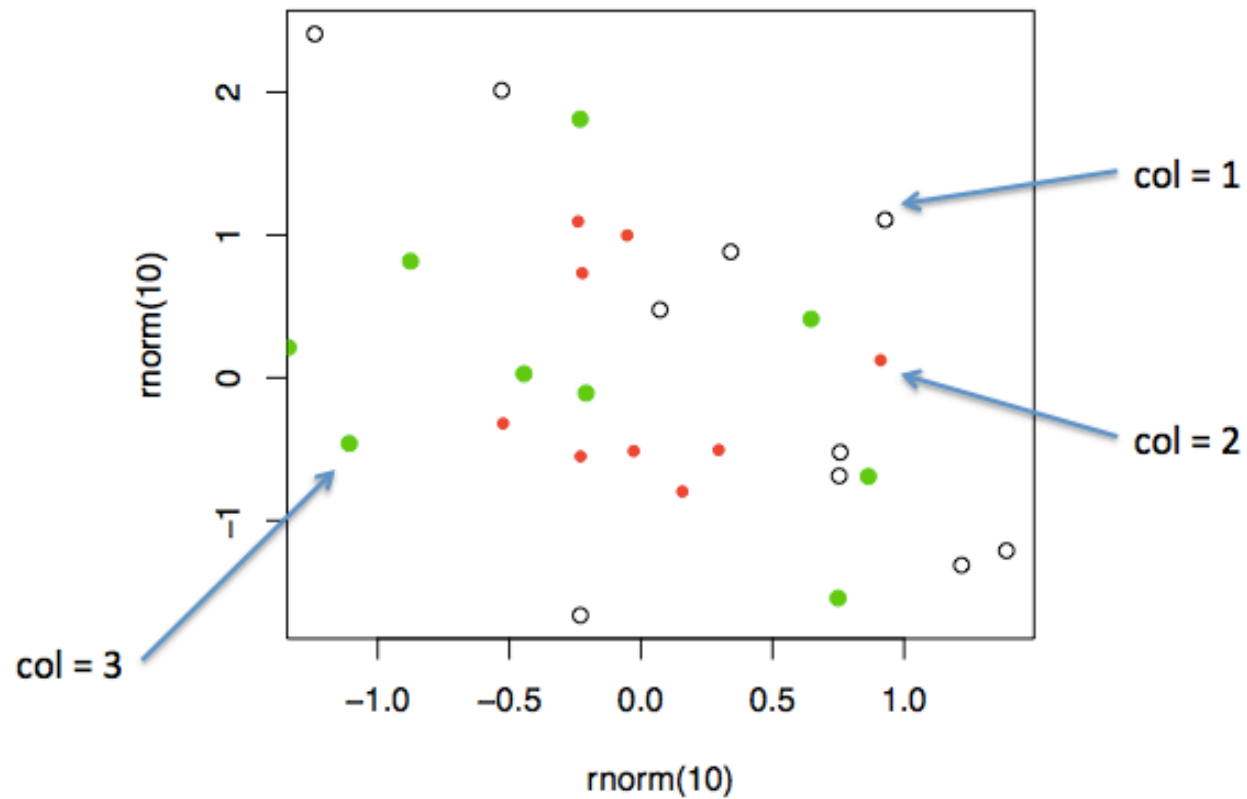
Plotting and Color in R

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Plotting and Color

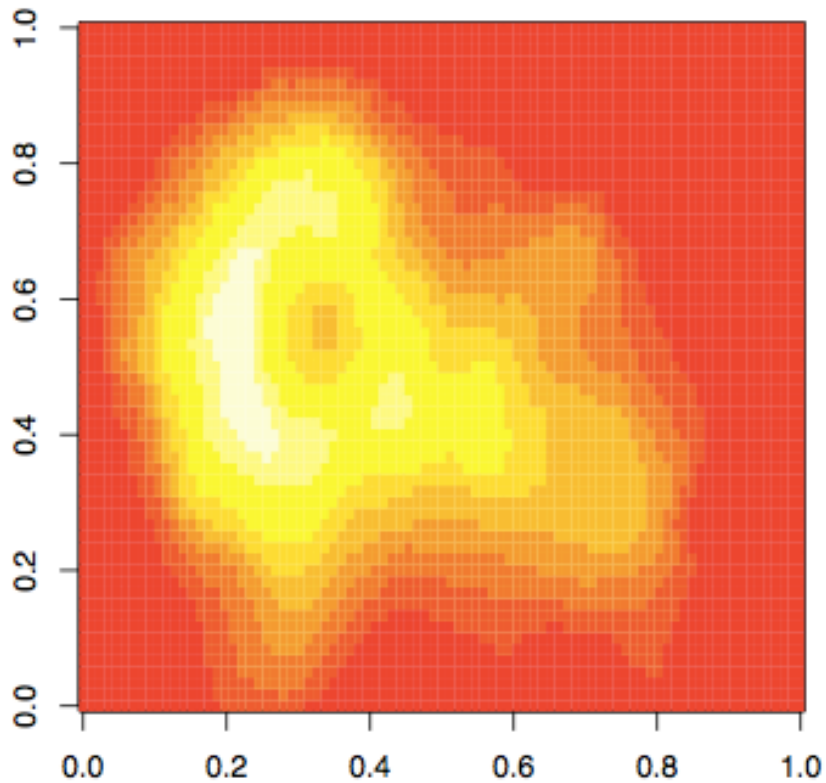
- The default color schemes for most plots in R are horrendous
 - I don't have good taste and even I know that
- Recently there have been developments to improve the handling/specification of colors in plots/graphs/etc.
- There are functions in R and in external packages that are very handy

Colors 1, 2, and 3

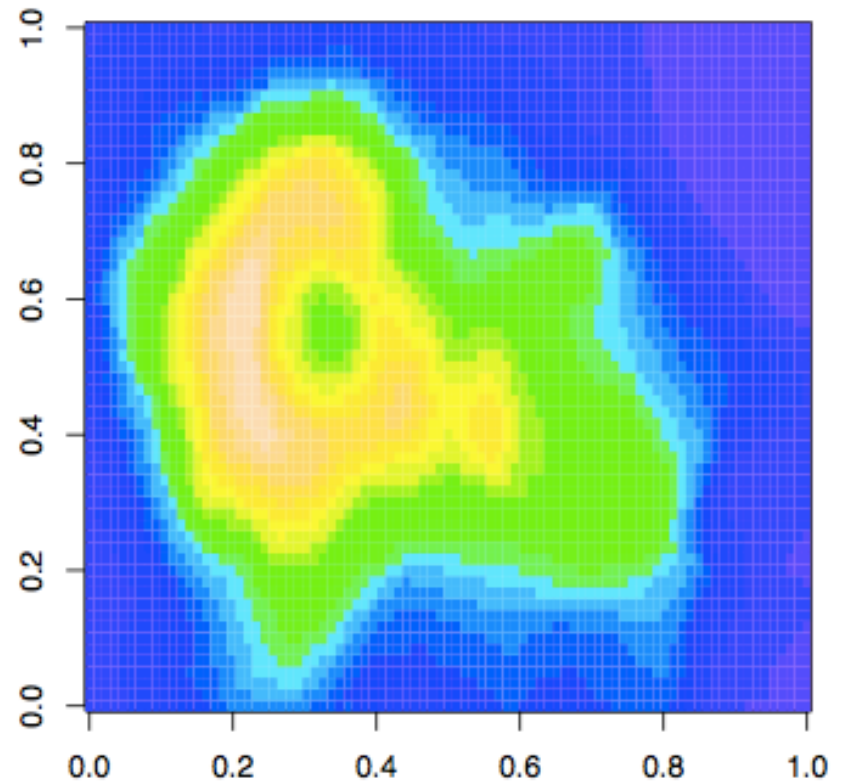


Default Image Plots in R

heat.colors()



topo.colors()



Color Utilities in R

- The `grDevices` package has two functions
 - `colorRamp`
 - `colorRampPalette`
- These functions take palettes of colors and help to interpolate between the colors
- The function `colors()` lists the names of colors you can use in any plotting function

Color Palette Utilities in R

- `colorRamp`: Take a palette of colors and return a function that takes values between 0 and 1, indicating the extremes of the color palette (e.g. see the 'gray' function)
- `colorRampPalette`: Take a palette of colors and return a function that takes integer arguments and returns a vector of colors interpolating the palette (like `heat.colors` or `topo.colors`)

colorRamp

[,1] [,2] [,3] corresponds to [Red] [Blue] [Green]

```
> pal <- colorRamp(c("red", "blue"))
```

```
> pal(0)
```

```
      [,1] [,2] [,3]  
[1,]  255    0    0
```

```
> pal(1)
```

```
      [,1] [,2] [,3]  
[1,]    0    0  255
```

```
> pal(0.5)
```

```
      [,1] [,2] [,3]  
[1,] 127.5    0 127.5
```

colorRamp

```
> pal(seq(0, 1, len = 10))
```

	[,1]	[,2]	[,3]
[1,]	255.00000	0	0
[2,]	226.66667	0	28.33333
[3,]	198.33333	0	56.66667
[4,]	170.00000	0	85.00000
[5,]	141.66667	0	113.33333
[6,]	113.33333	0	141.66667
[7,]	85.00000	0	170.00000
[8,]	56.66667	0	198.33333
[9,]	28.33333	0	226.66667
[10,]	0.00000	0	255.00000

colorRampPalette

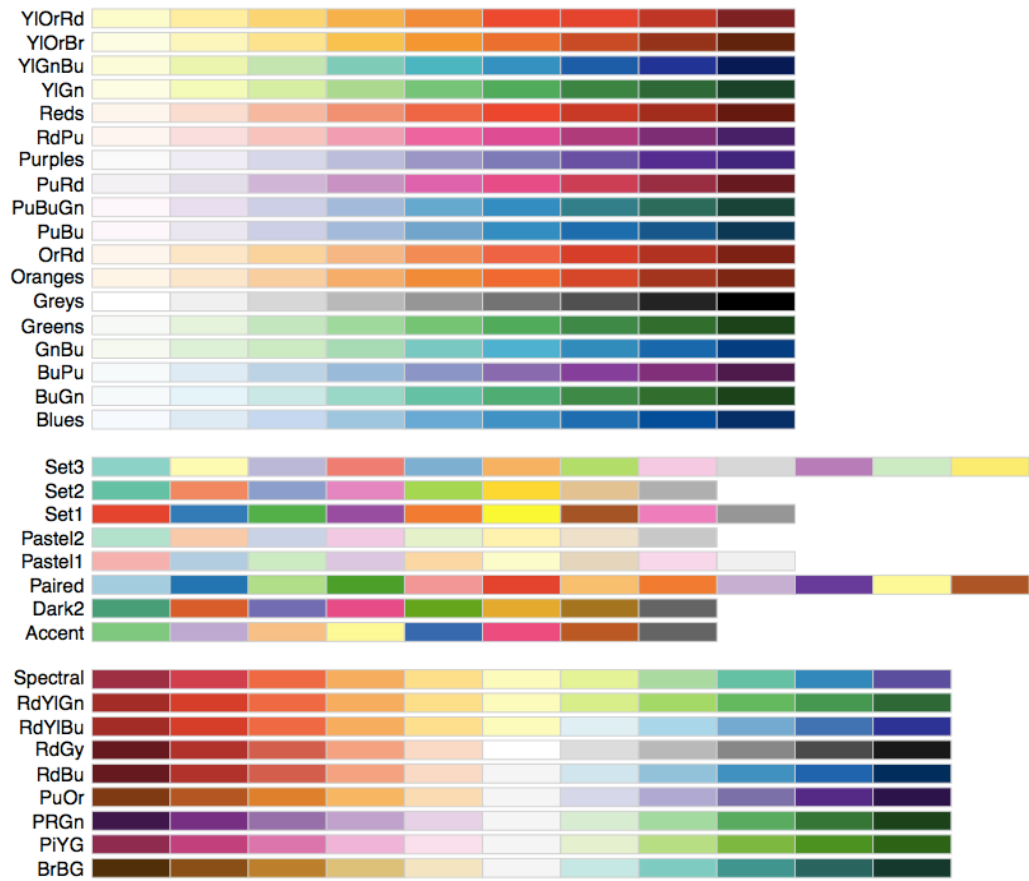
```
> pal <- colorRampPalette(c("red", "yellow"))

> pal(2)
[1] "#FF0000" "#FFFF00"

> pal(10)
[1] "#FF0000" "#FF1C00" "#FF3800" "#FF5500" "#FF7100"
[6] "#FF8D00" "#FFAA00" "#FFC600" "#FFE200" "#FFFF00"
```

RColorBrewer Package

- One package on CRAN that contains interesting/useful color palettes
- There are 3 types of palettes
 - Sequential
 - Diverging
 - Qualitative
- Palette information can be used in conjunction with the `colorRamp()` and `colorRampPalette()`



RColorBrewer and colorRampPalette

```
> library(RColorBrewer)

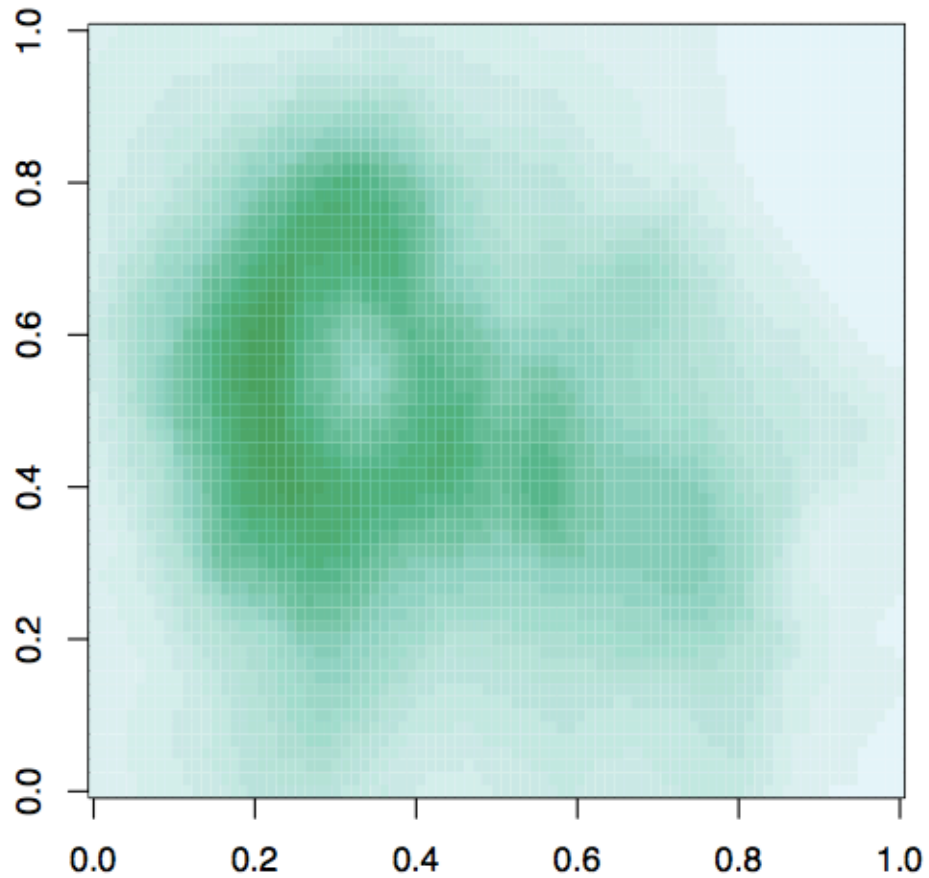
> cols <- brewer.pal(3, "BuGn")

> cols
[1] "#E5F5F9" "#99D8C9" "#2CA25F"

> pal <- colorRampPalette(cols)

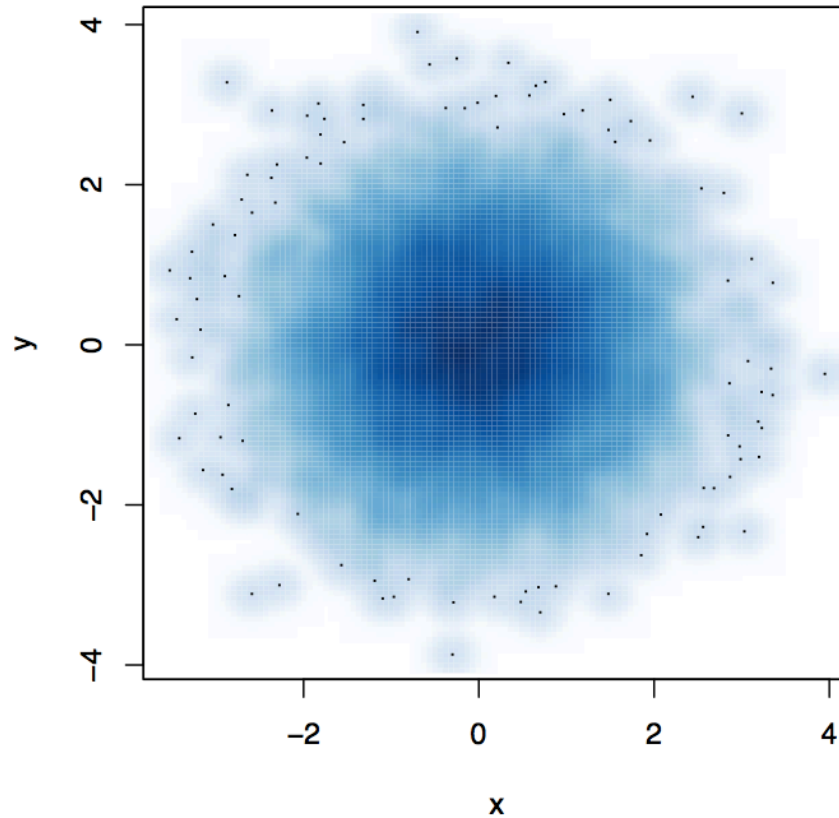
> image(volcano, col = pal(20))
```

RColorBrewer and colorRampPalette



The smoothScatter function

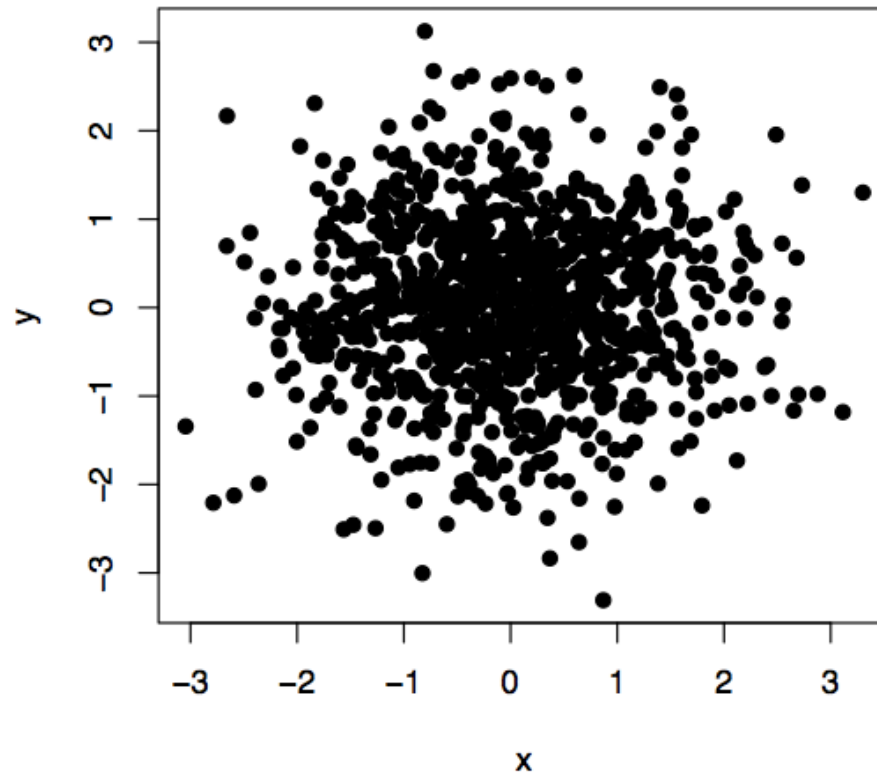
```
x <- rnorm(10000)  
y <- rnorm(10000)  
smoothScatter(x, y)
```



Some other plotting notes

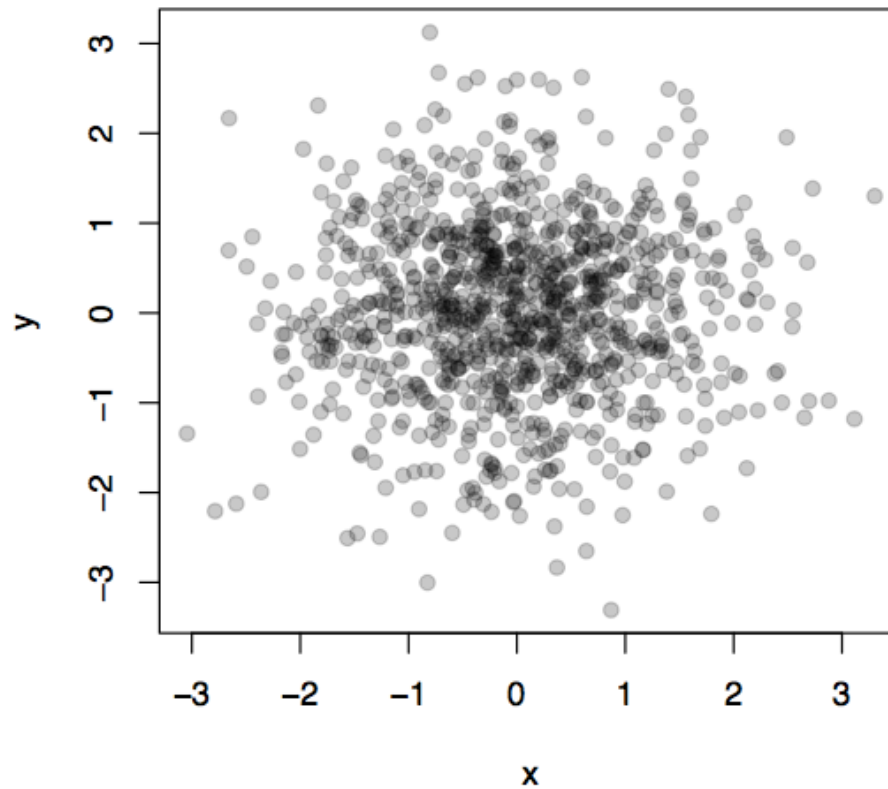
- The `rgb` function can be used to produce any color via red, green, blue proportions
- Color transparency can be added via the `alpha` parameter to `rgb`
- The `colorspace` package can be used for a different control over colors

Scatterplot with no transparency



`plot(x, y, pch = 19)`

Scatterplot with transparency



```
plot(x, y, col = rgb(0, 0, 0, 0.2), pch = 19)
```

Summary

- Careful use of colors in plots/maps/etc. can make it easier for the reader to get what you're trying to say (why make it harder?)
- The `RColorBrewer` package is an R package that provides color palettes for sequential, categorical, and diverging data
- The `colorRamp` and `colorRampPalette` functions can be used in conjunction with color palettes to connect data to colors
- Transparency can sometimes be used to clarify plots with many points