plotly

The Johns Hopkins Data Science Lab

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What is Plotly?

Plotly is a web application for creating and sharing data visualizations. Plotly can work with several programming languages and applications including R, Python, and Microsoft Excel. We're going to concentrate on creating different graphs with Plotly and sharing those graphs.

Installing Plotly

Installing Plotly is easy:

```
install.packages("plotly")
library(plotly)
```

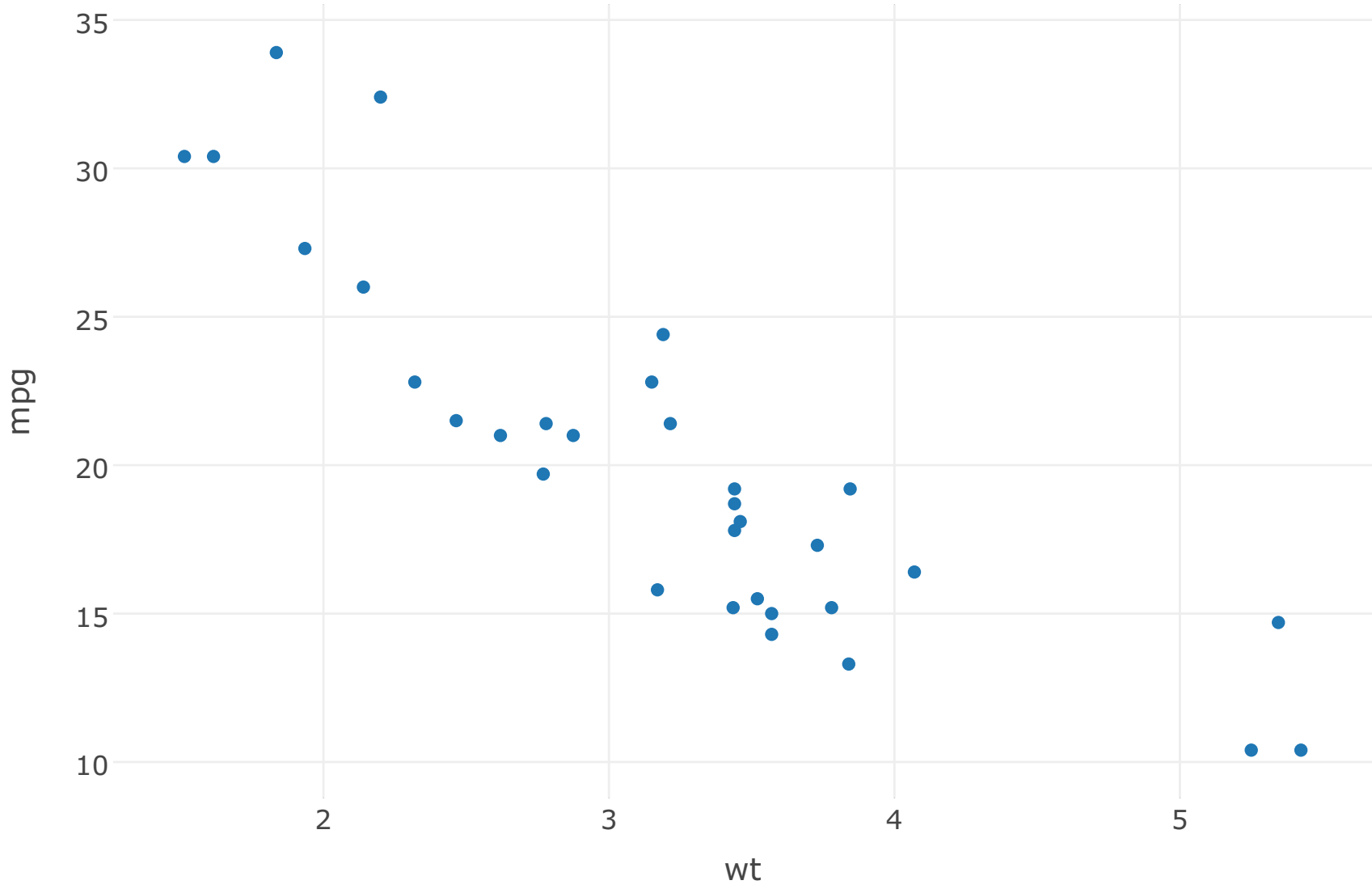
If you want to share your visualizations on `https://plot.ly/` you should make an account on their site.

Basic Scatterplot

A basic scatterplot is easy to make, with the added benefit of tooltips that appear when your mouse hovers over each point. Specify a scatterplot by indicating `type = "scatter"`. Notice that the arguments for the `x` and `y` variables as specified as formulas, with the tilde operator (~) preceding the variable that you're plotting.

```
library(plotly)
plot_ly(mtcars, x = ~wt, y = ~mpg, type = "scatter")
```

Basic Scatterplot

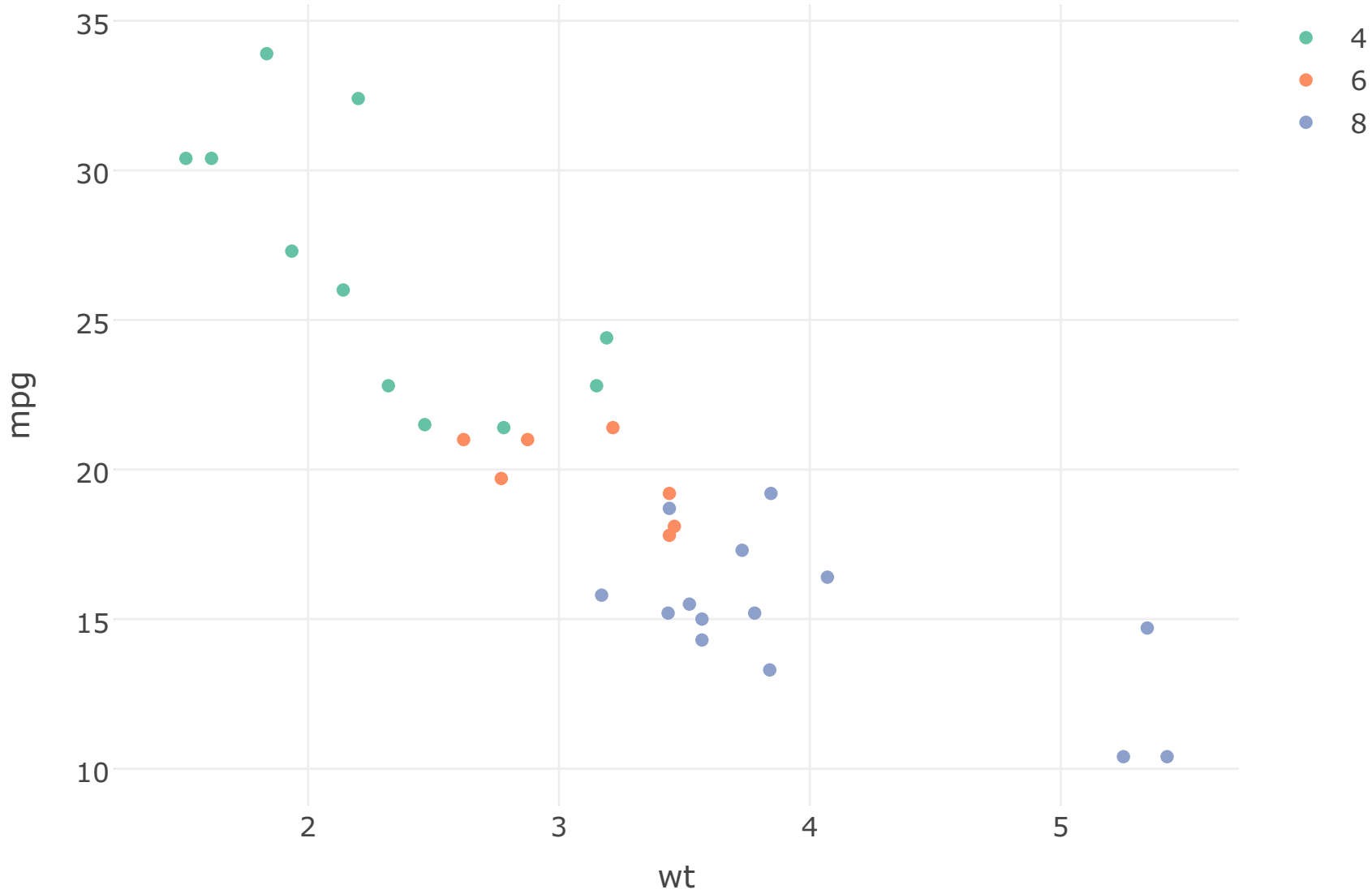


Scatterplot Color

You can add color to your scatterplot points according to a categorical variable in the data frame you use with `plot_ly()`.

```
plot_ly(mtcars, x = ~wt, y = ~mpg, type = "scatter", color
```

Scatterplot Color

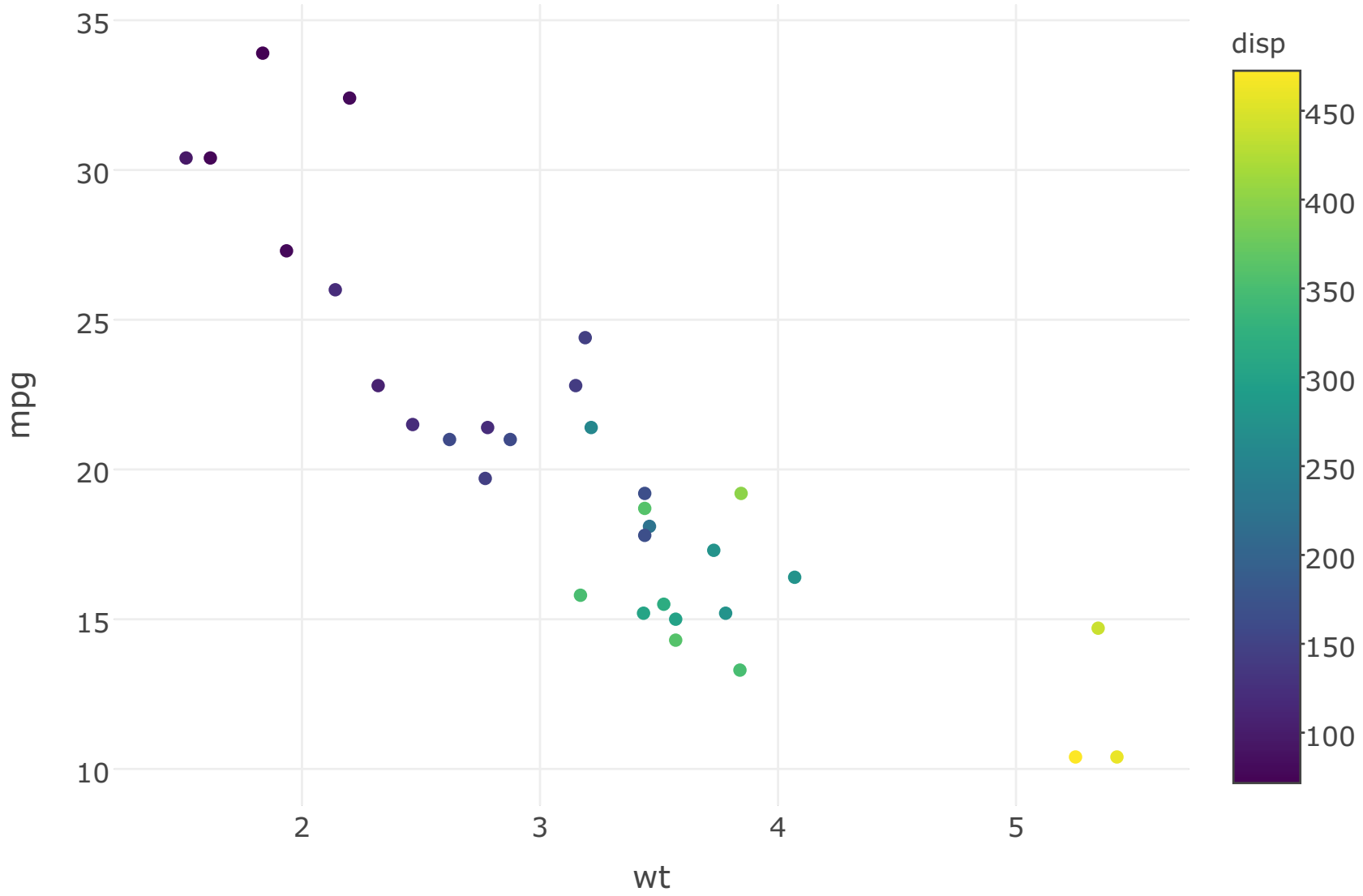


Continuous Color

You can also show continuous variables with color in scatterplots.

```
plot_ly(mtcars, x = ~wt, y = ~mpg, type = "scatter", color
```

Continuous Color

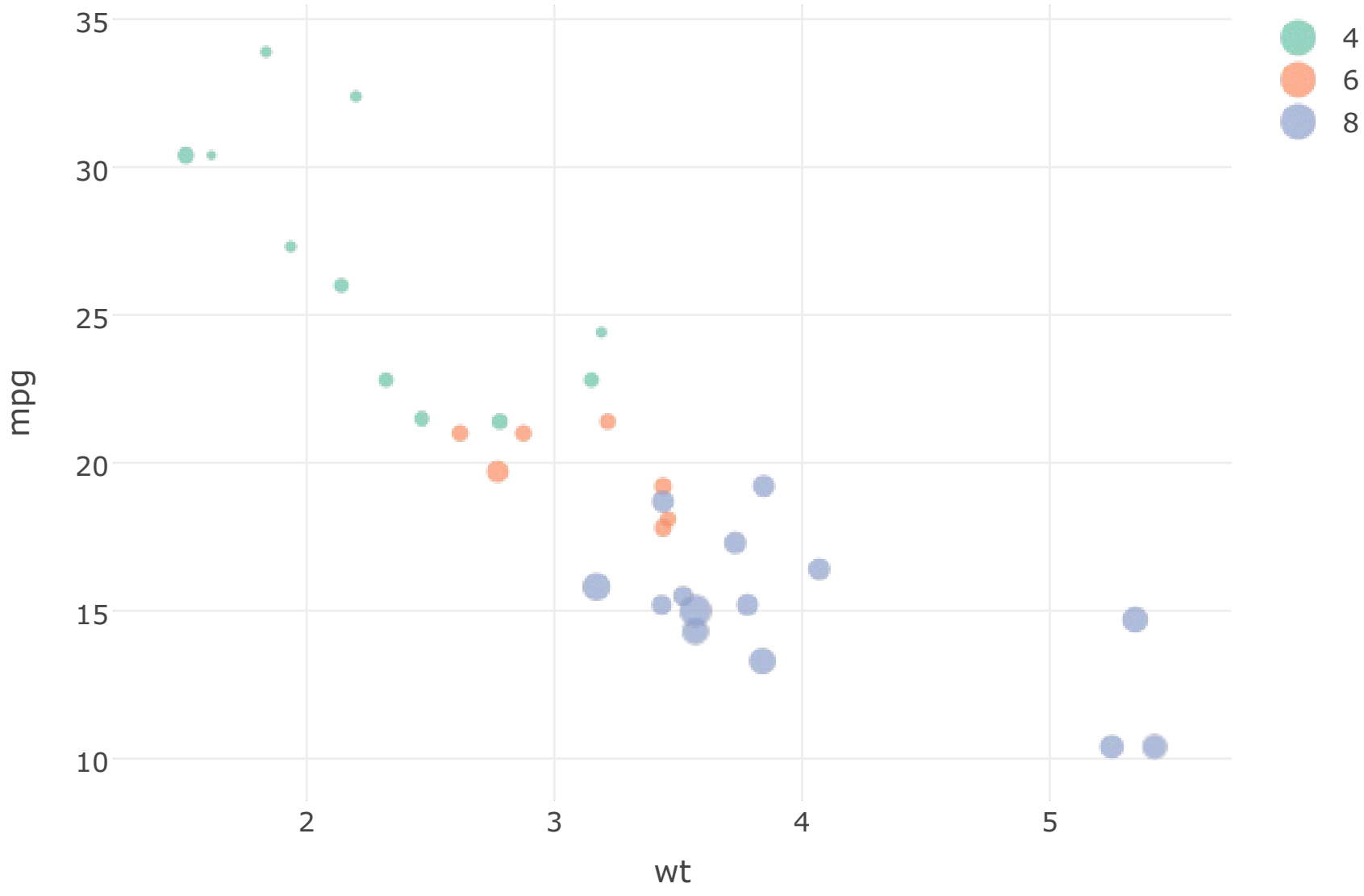


Scatterplot Sizing

By specifying the `size` argument you can make each point in your scatterplot a different size.

```
plot_ly(mtcars, x = ~wt, y = ~mpg, type = "scatter",
        color = ~factor(cyl), size = ~hp)
```

Scatterplot Sizing



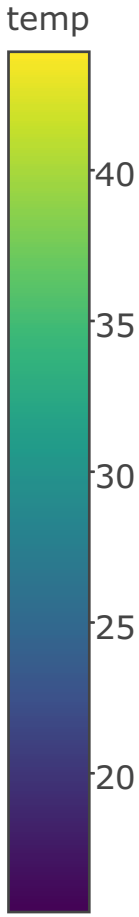
3D Scatterplot

You can create a three-dimensional scatterplot with the `type = "scatter3d"` argument. If you click and drag these scatterplots you can view them from different angles.

```
set.seed(2016-07-21)
temp <- rnorm(100, mean = 30, sd = 5)
pressue <- rnorm(100)
dtime <- 1:100
plot_ly(x = ~temp, y = ~pressue, z = ~dtime,
        type = "scatter3d", color = ~temp)
```

3D Scatterplot

Webgl is not supported by your browser - visit http://get.webgl.org for more info

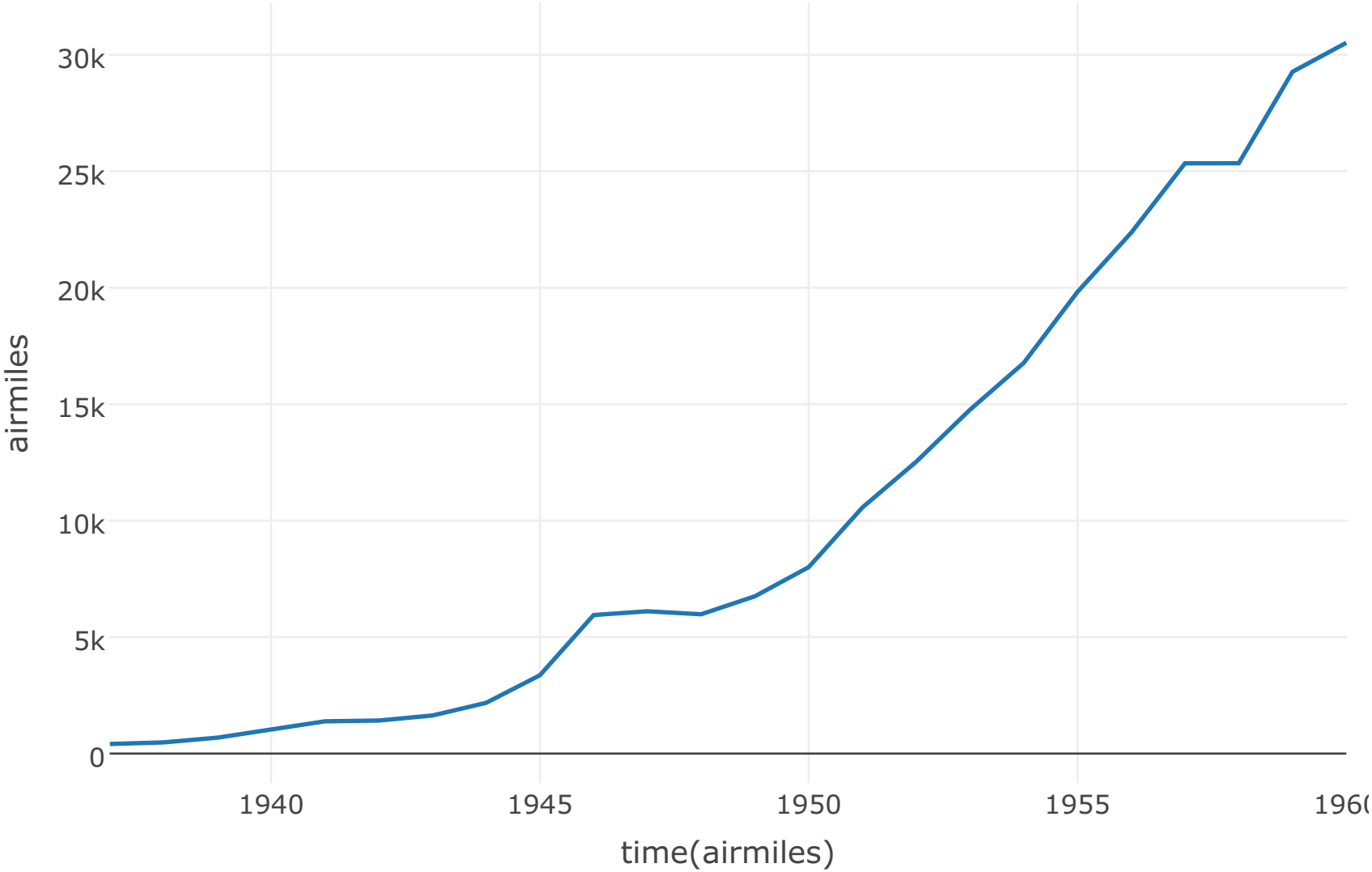


Line Graph

Line graphs are the default graph for `plot_ly()`. They're of course useful for showing change over time:

```
data("airmiles")
plot_ly(x = ~time(airmiles), y = ~airmiles, type = "scatter
```

Line Graph


30k
25k
20k
15k
10k
5k
0
airmiles
1940
1945
1950
1955
196(
time(airmiles)

Multi Line Graph

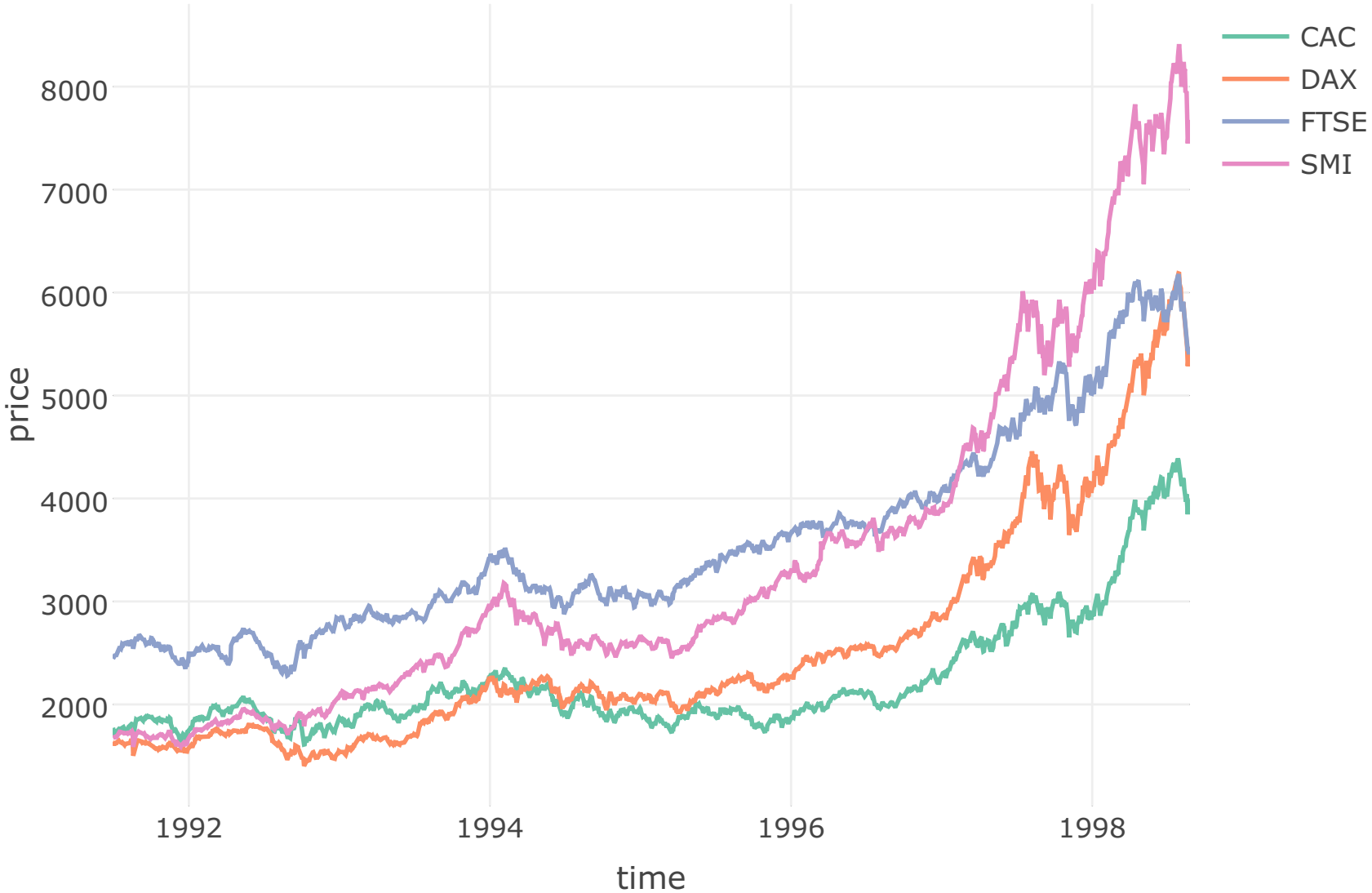
You can show multiple lines by specifying the column in the data frame that separates the lines:

```
library(plotly)
library(tidyr)
library(dplyr)
data("EuStockMarkets")

stocks <- as.data.frame(EuStockMarkets) %>%
  gather(index, price) %>%
  mutate(time = rep(time(EuStockMarkets), 4))

plot_ly(stocks, x = ~time, y = ~price, color = ~index, type
```

Multi Line Graph

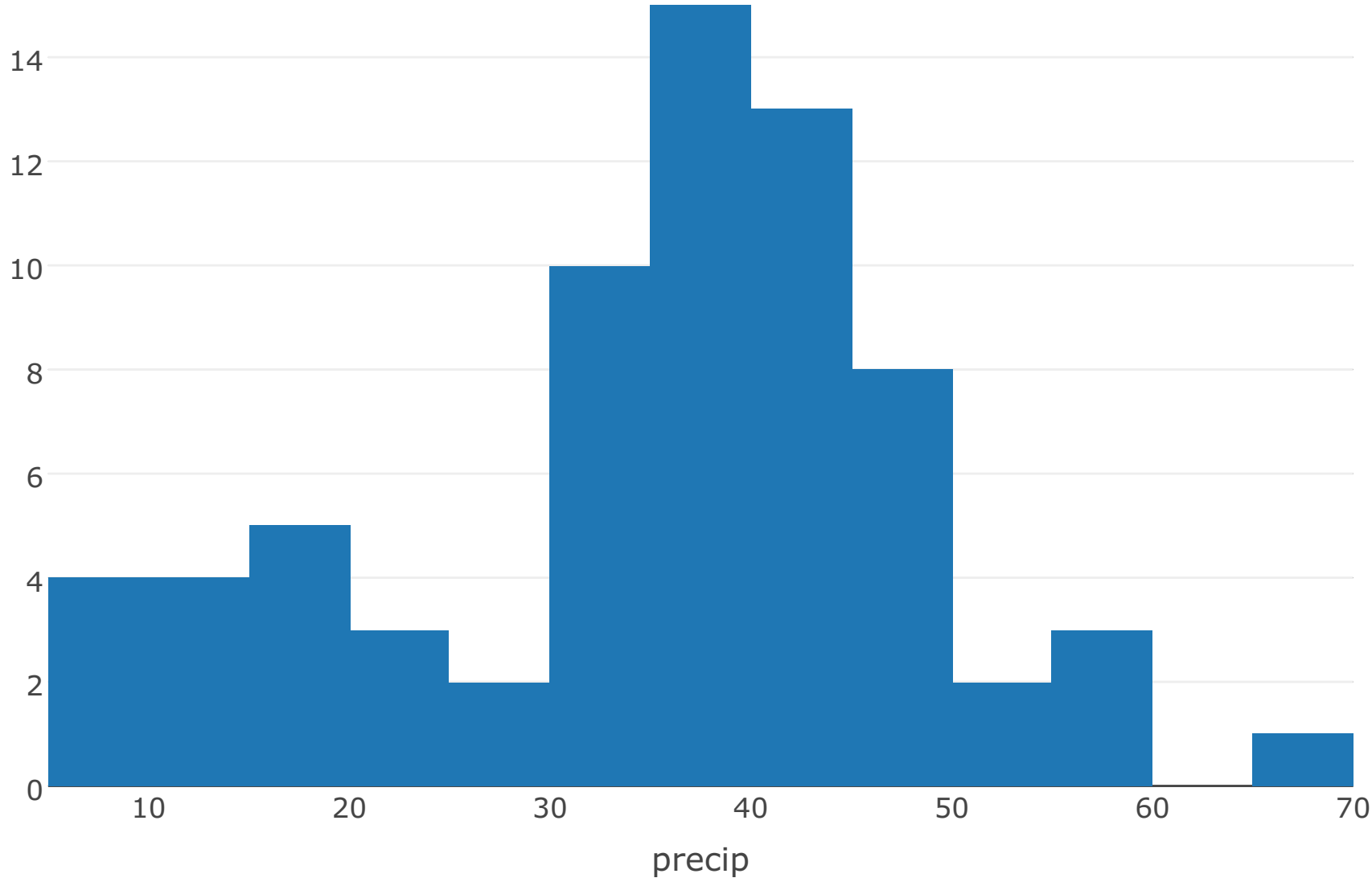


Histogram

A histogram is great for showing how counts of data are distributed. Use the `type = "histogram"` argument.

```
plot_ly(x = ~precip, type = "histogram")
```

Histogram

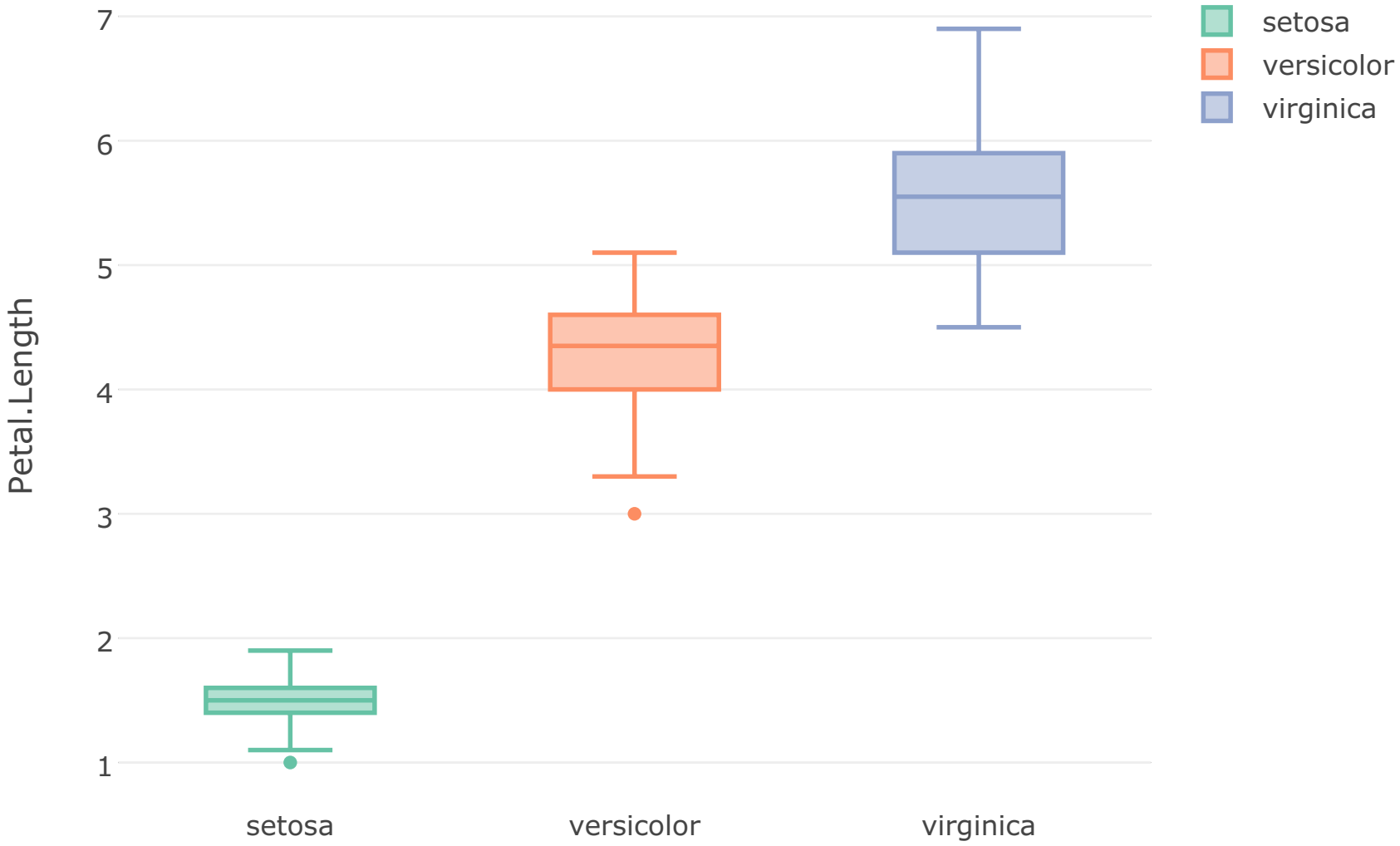


Boxplot

Boxplots are wonderful for comparing how different datasets are distributed. Specify `type = "box"` to create a boxplot.

```
plot_ly(iris, y = ~Petal.Length, color = ~Species, type = '
```

Boxplot

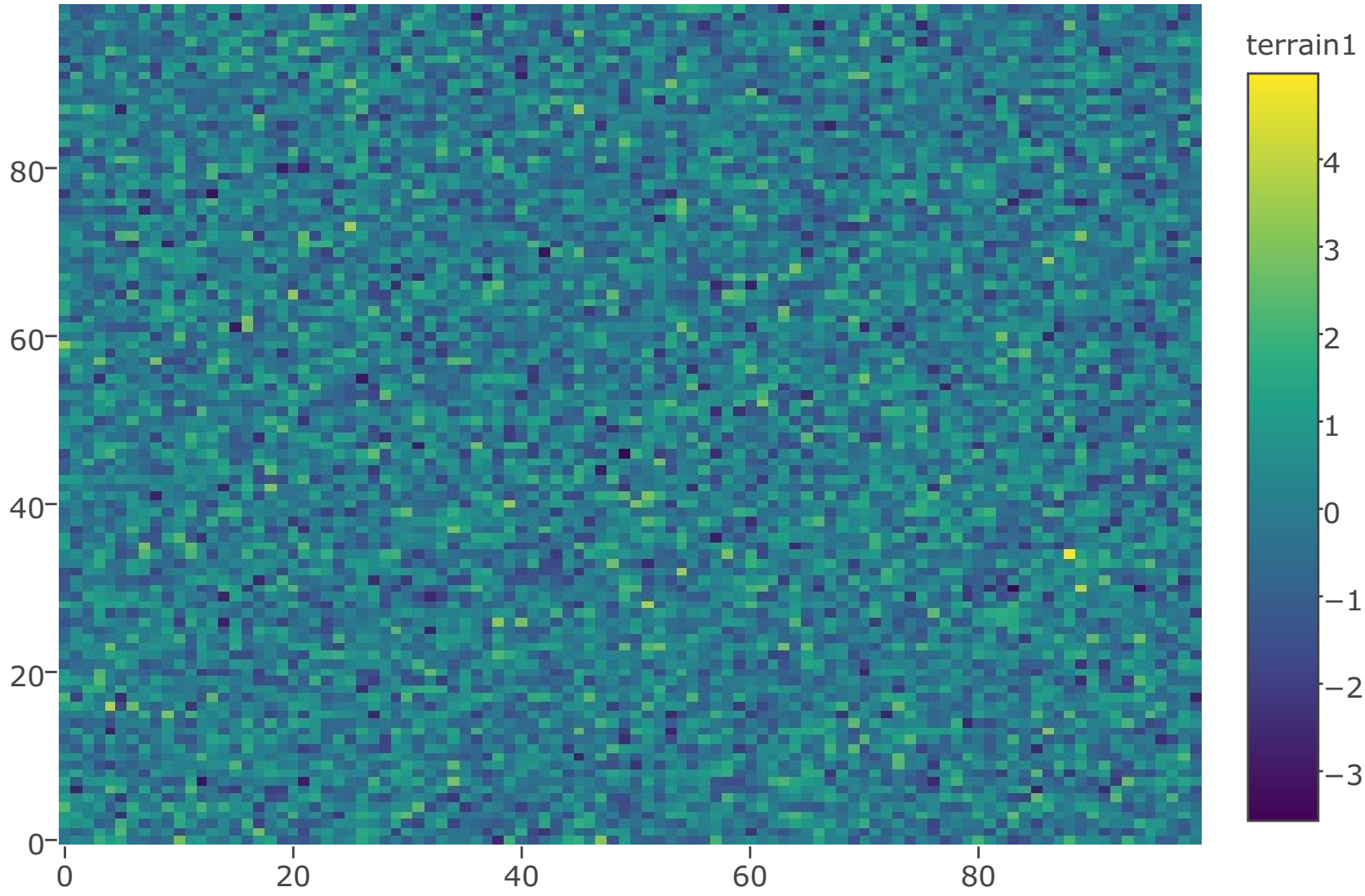

Petal.Length
7
6
5
4
3
2
1
setosa
versicolor
virginica
setosa
versicolor
virginica

Heatmap

Heatmaps are useful for displaying three dimensional data in two dimensions, using color for the third dimension. Create a heatmap by using the `type = "heatmap"` argument.

```
terrain1 <- matrix(rnorm(100*100), nrow = 100, ncol = 100)
plot_ly(z = ~terrain1, type = "heatmap")
```

Heatmap



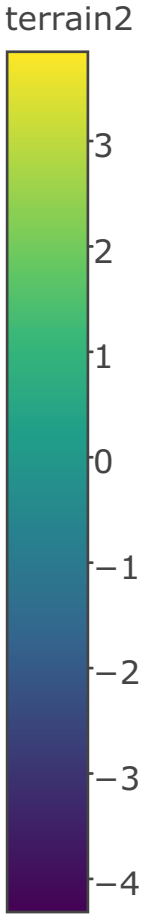
3D Surface

Why limit yourself to two dimensions when you can render three dimensions on a computer!? Create moveable 3D surfaces with `type = "surface"`.

```
terrain2 <- matrix(sort(rnorm(100*100)), nrow = 100, ncol =
plot_ly(z = ~terrain2, type = "surface")
```

3D Surface

Webgl is not supported by your browser - visit http://get.webgl.org for more info



Choropleth Maps: Setup

Choropleth maps illustrate data across geographic areas by shading regions with different colors. Choropleth maps are easy to make with Plotly though they require more setup compared to other Plotly graphics.

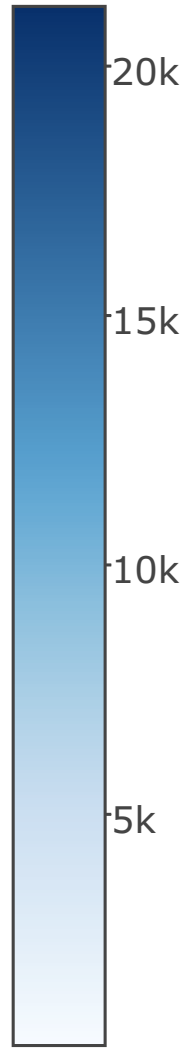
```
# Create data frame
state_pop <- data.frame(State = state.abb, Pop = as.vector(
# Create hover text
state_pop$hover <- with(state_pop, paste(State, '<br>', "Po
# Make state borders white
borders <- list(color = toRGB("red"))
# Set up some mapping options
map_options <- list(
  scope = 'usa',
  projection = list(type = 'albers usa'),
  showlakes = TRUE,
  lakecolor = toRGB('white')
)
```

Choropleth Maps: Mapping

```
plot_ly(z = ~state_pop$Pop, text = ~state_pop$hover, locati
        type = 'choropleth', locationmode = 'USA-states',
        color = state_pop$Pop, colors = 'Blues', marker = l
  layout(title = 'US Population in 1975', geo = map_options
```

Choropleth Maps

US Population in 1975



More Resources

- The Plolty Website
- The Plotly R API
- The Plotly R Package on GitHub
- The Plotly R Cheatsheet
- “Plotly for R” book by Carson Sievert