DHRUV GARG 16 BCE 1190

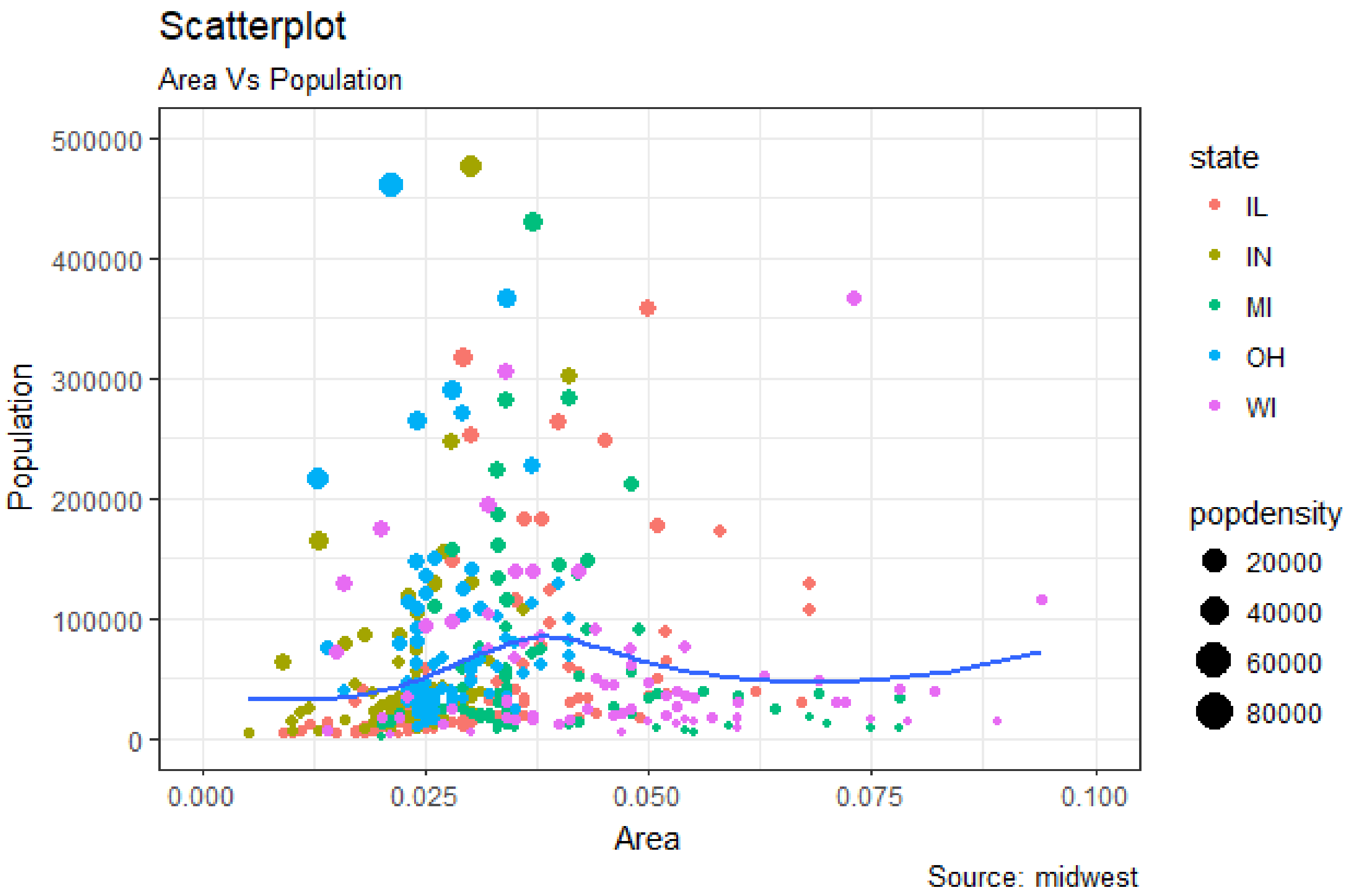
Data visualization

Lab-3

PLOT 1

Scatterplot

```
install.packages("ggplot2")

read.csv("http://goo.gl/G1K41K")

options(scipen=999) # turn-off scientific notation like 1e+48

library(ggplot2)

theme_set(theme_bw()) # pre-set the bw theme.

data("midwest", package = "ggplot2")

ggplot(midwest, aes(x=area, y=poptotal)) +

  geom_point(aes(col=state, size=popdensity)) +

  geom_smooth(method="loess", se=F) +

  xlim(c(0, 0.1)) +

  ylim(c(0, 500000)) +

  labs(subtitle="Area Vs Population",

       y="Population",

       x="Area",

       title="Scatterplot",

       caption = "Source: midwest")

plot(gg)
```

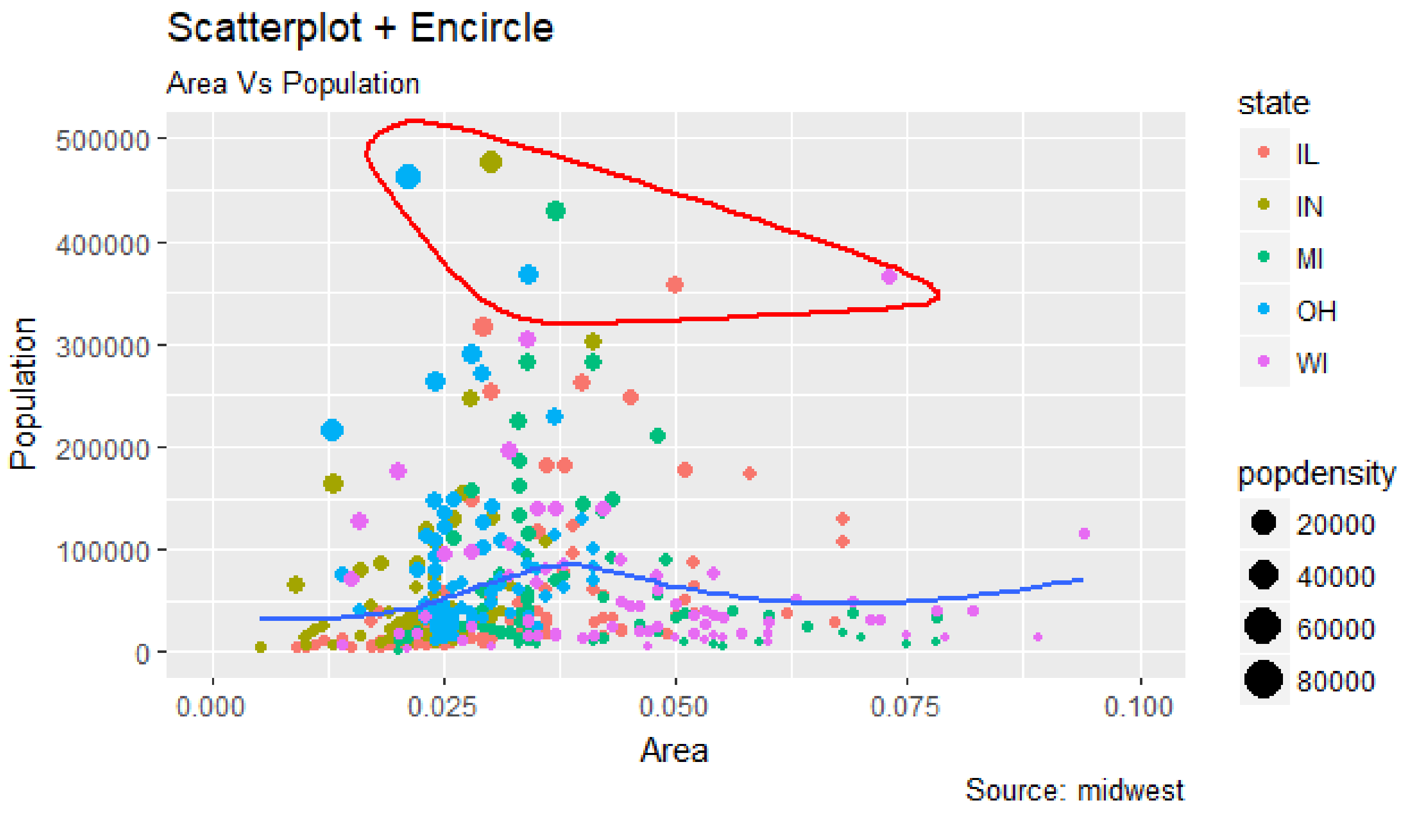


PLOT 2

Scatterplot with encircling

```
install.packages("devtools");

devtools::install_github("hrbrmstr/ggalt")

install.packages("ggalt")


options(scipen = 999)

library(ggplot2)

library(ggalt)

midwest_select <- midwest[midwest$poptotal > 350000 &

                          midwest$poptotal <= 500000 &

                          midwest$area > 0.01 &

                          midwest$area < 0.1, ]

# Plot
```

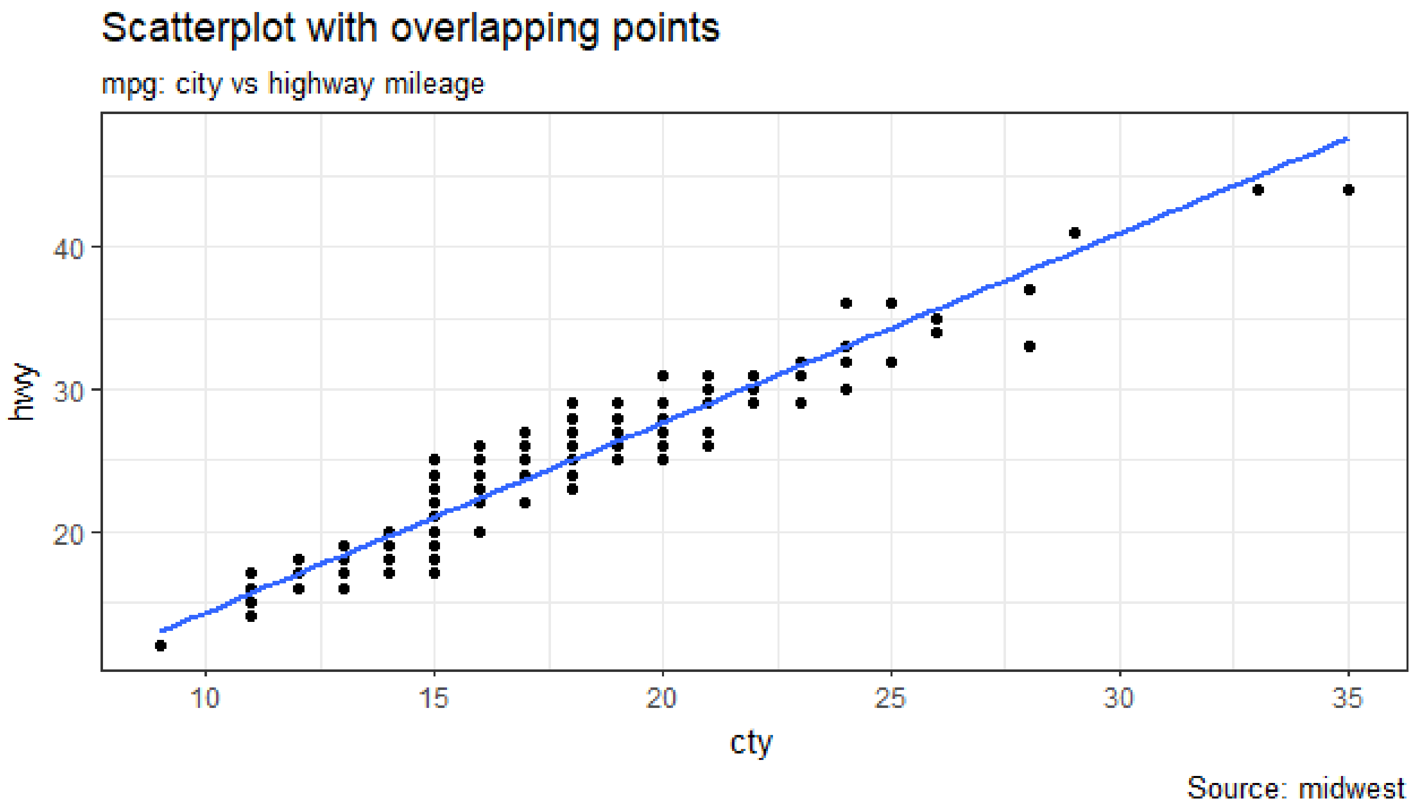
```
ggplot(midwest, aes(x=area, y=poptotal)) +
  geom_point(aes(col=state, size=popdensity)) + # draw points
  geom_smooth(method="loess", se=F) +
  xlim(c(0, 0.1)) +
  ylim(c(0, 500000)) + geom_encircle(aes(x=area, y=poptotal),
                data=midwest_select,
                color="red",
                size=2,
                expand=0.08) + # encircle
  labs(subtitle="Area Vs Population",
      y="Population",
      x="Area",
      title="Scatterplot + Encircle",
      caption="Source: midwest")
```



PLOT 3

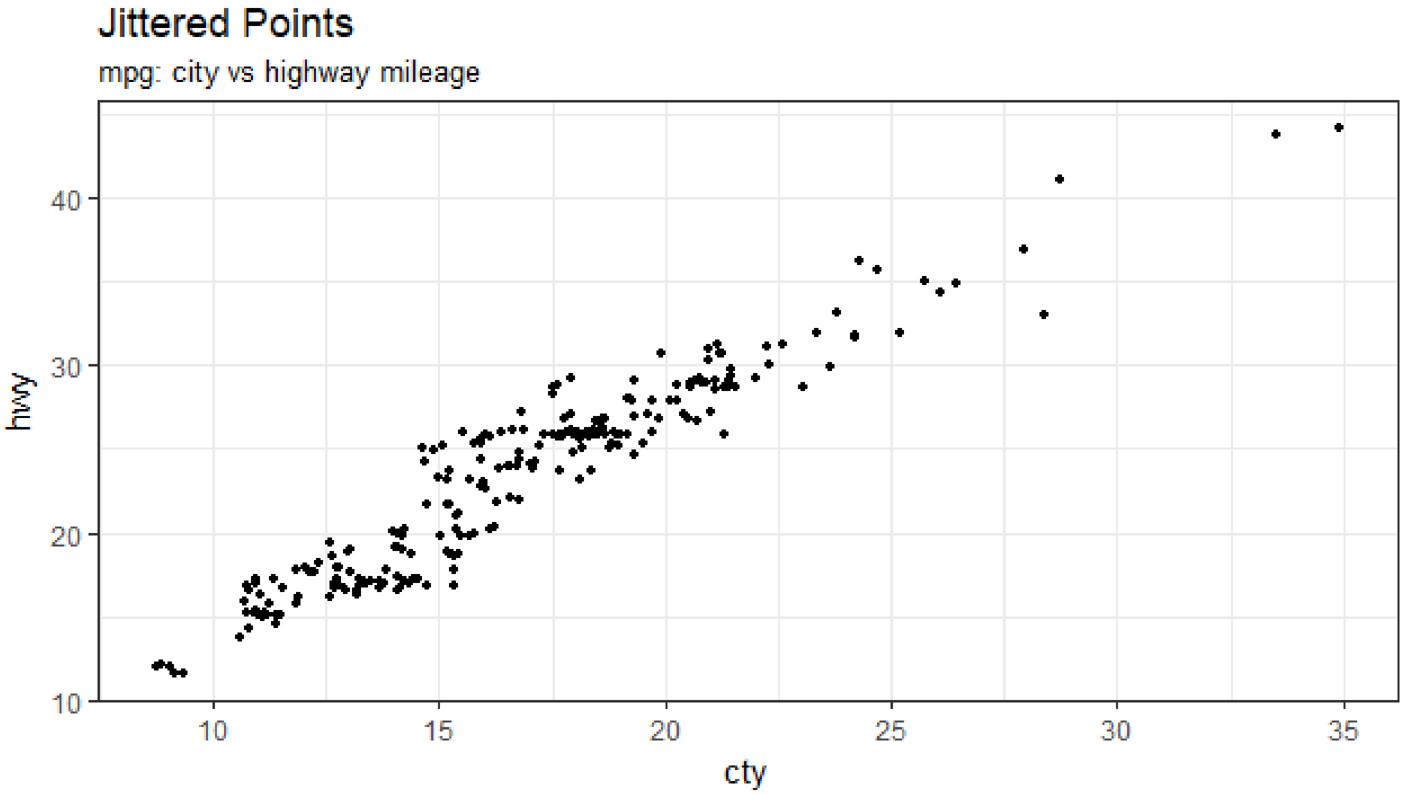
Jitter Plot

```
library(ggplot2)

data(mpg, package="ggplot2") # alternate source: "http://goo.gl/uEeRGu")

theme_set(theme_bw()) # pre-set the bw theme.

g <- ggplot(mpg, aes(cty, hwy))

# Scatterplot

g + geom_point() +

  geom_smooth(method="lm", se=F) +

  labs(subtitle="mpg: city vs highway mileage",

      y="hwy",

      x="cty",

      title="Scatterplot with overlapping points",

      caption="Source: midwest")
```



PLOT 4

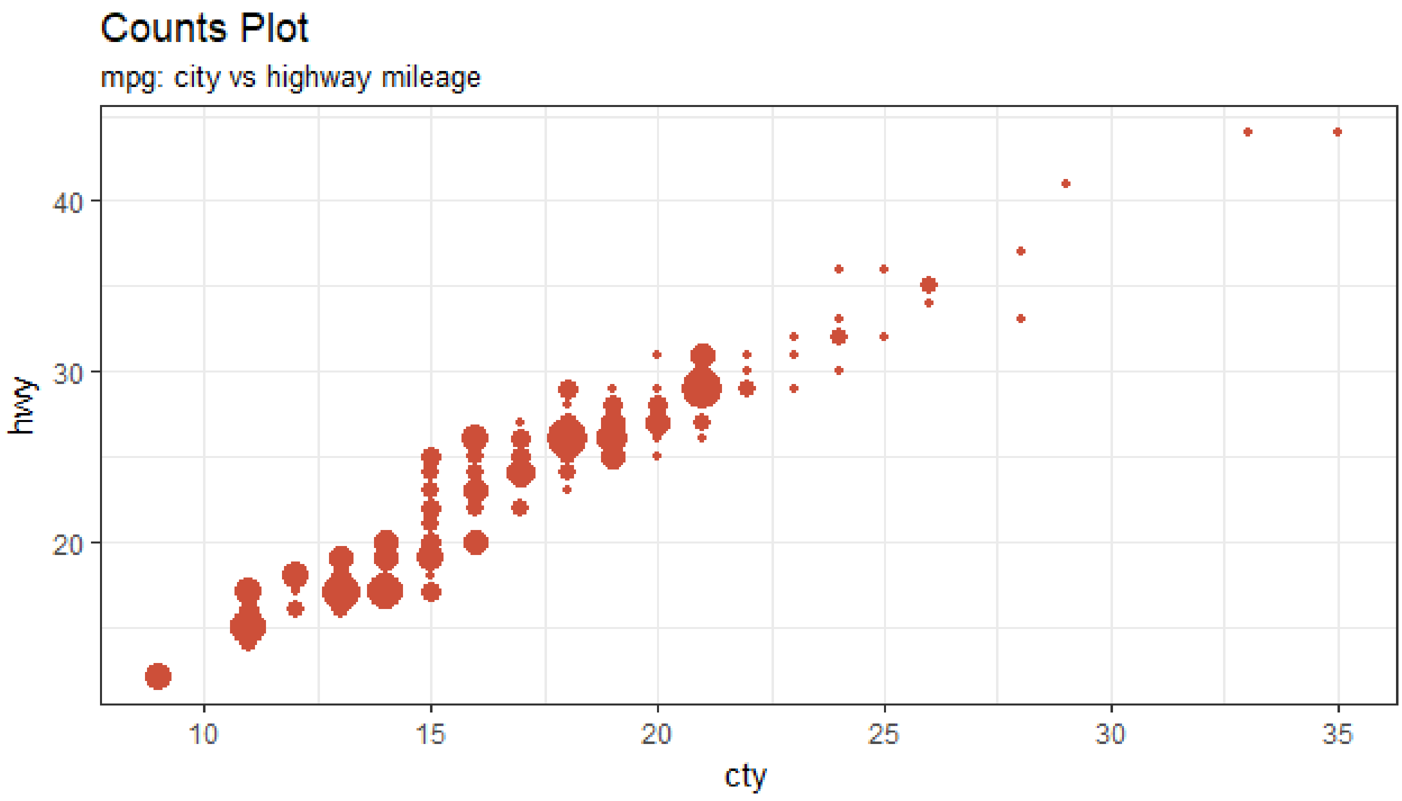
```
library(ggplot2)

data(mpg, package="ggplot2")

# mpg <- read.csv("http://goo.gl/uEeRGu")

# Scatterplot

theme_set(theme_bw()) # pre-set the bw theme.

g <- ggplot(mpg, aes(cty, hwy))

g + geom_jitter(width = .5, size=1) +

  labs(subtitle="mpg: city vs highway mileage",

      y="hwy",

      x="cty",

      title="Jittered Points")
```



PLOT 5

Counts chart

```
library(ggplot2)

data(mpg, package="ggplot2")

mpg <- read.csv("http://goo.gl/uEeRGu")

# Scatterplot

theme_set(theme_bw()) # pre-set the bw theme.

g <- ggplot(mpg, aes(cty, hwy))

g + geom_count(col="tomato3", show.legend=F) +

  labs(subtitle="mpg: city vs highway mileage",

     y="hwy",

     x="cty",

     title="Counts Plot")
```

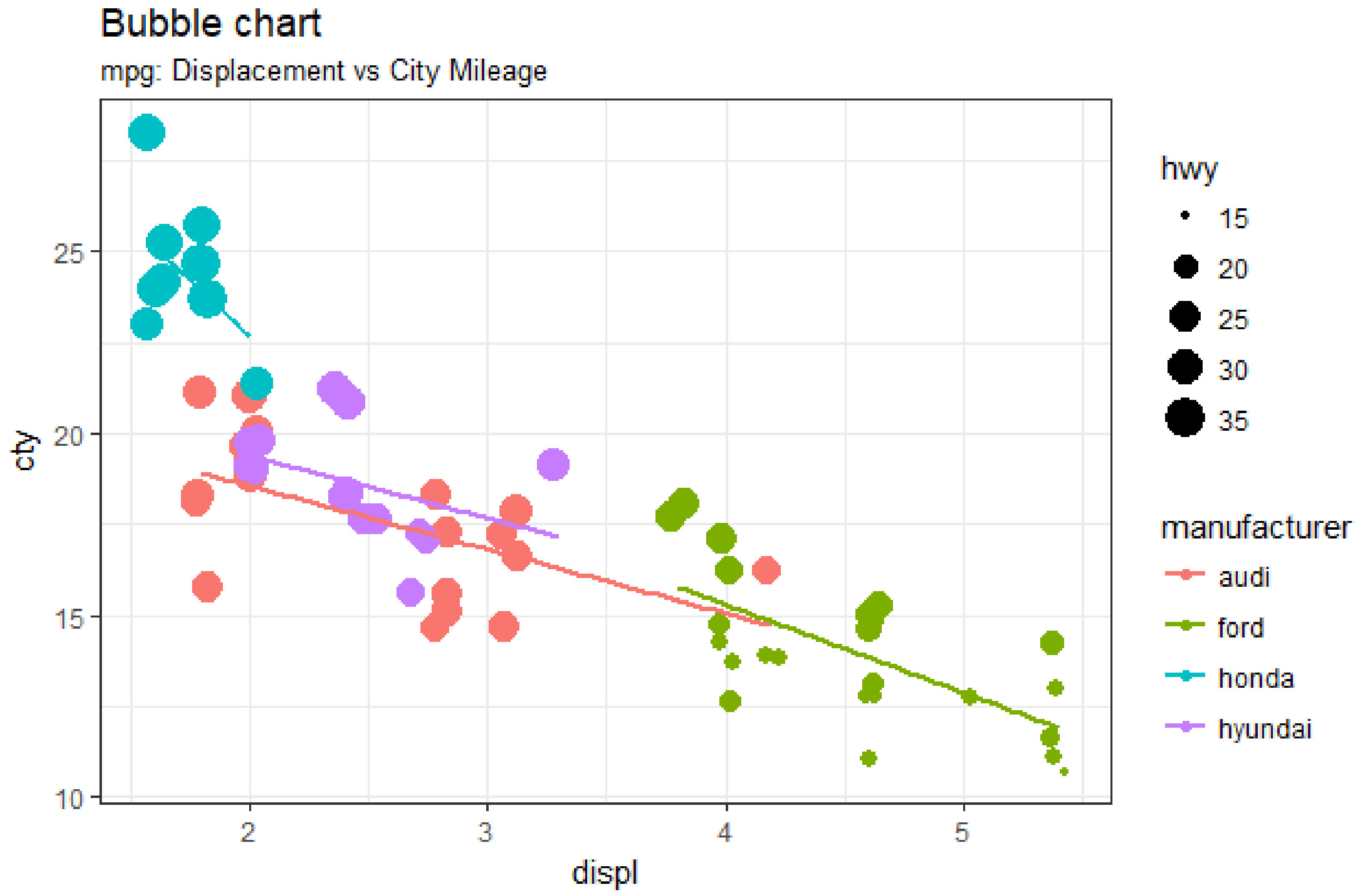


PLOT 6

Counts Chart

```
data(mpg, package="ggplot2")

mpg_select <- mpg[mpg$manufacturer %in% c("audi", "ford", "honda", "hyundai"), ]
```

```
theme_set(theme_bw())

g <- ggplot(mpg_select, aes(displ, cty)) +

  labs(subtitle="mpg: Displacement vs City Mileage",

       title="Bubble chart")

g + geom_jitter(aes(col=manufacturer, size=hwy)) +

  geom_smooth(aes(col=manufacturer), method="lm", se=F)
```

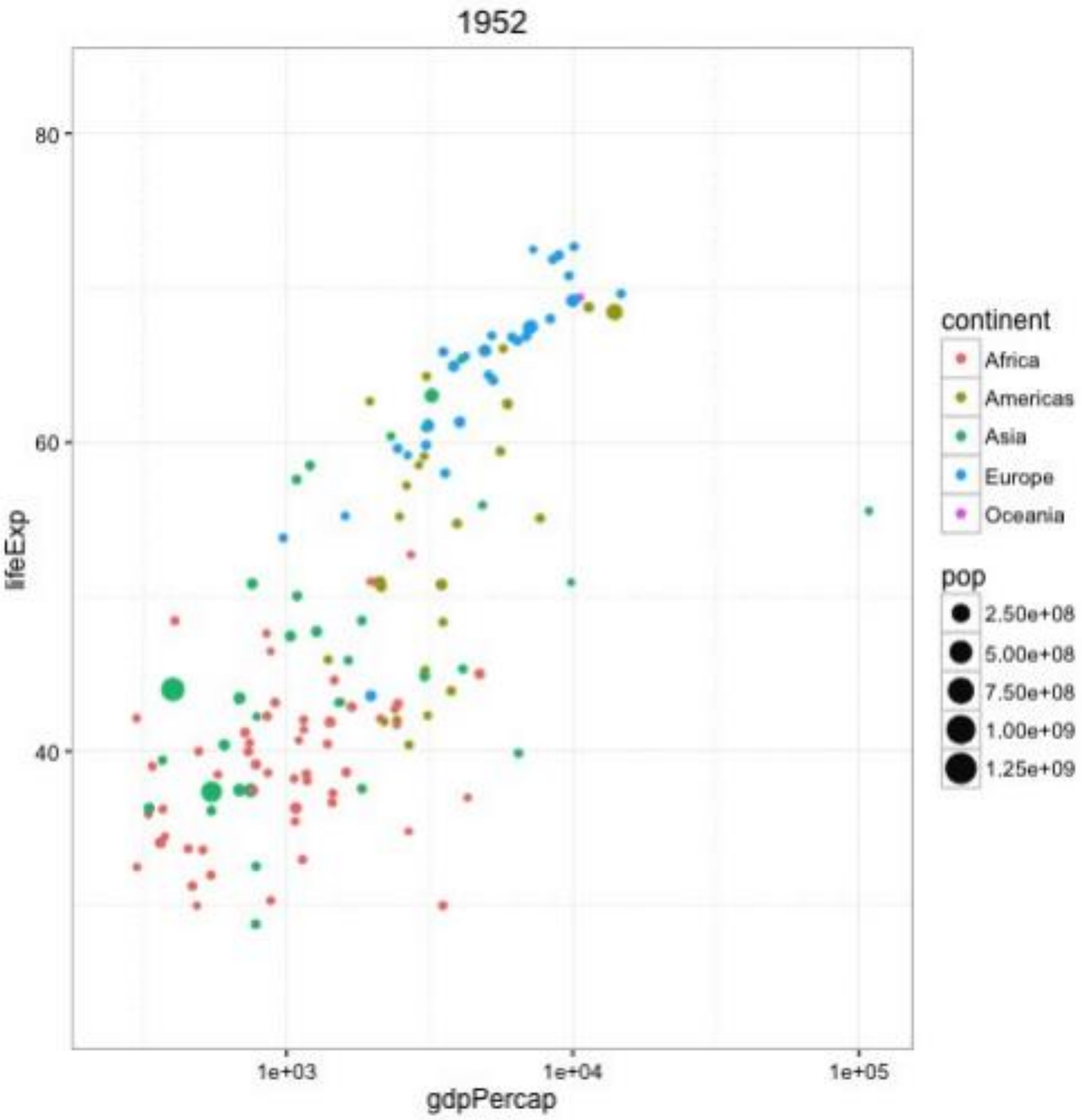


PLOT 7

Animated Bubble chart

```
install.packages("cowplot")

devtools::install_github("dgrtwo/gganimate")

install.packages("files.choose(), repos=NULL,type=source")

install.packages("gapminder")

library(ggplot2)

library(gganimate)

library(gapminder)
```

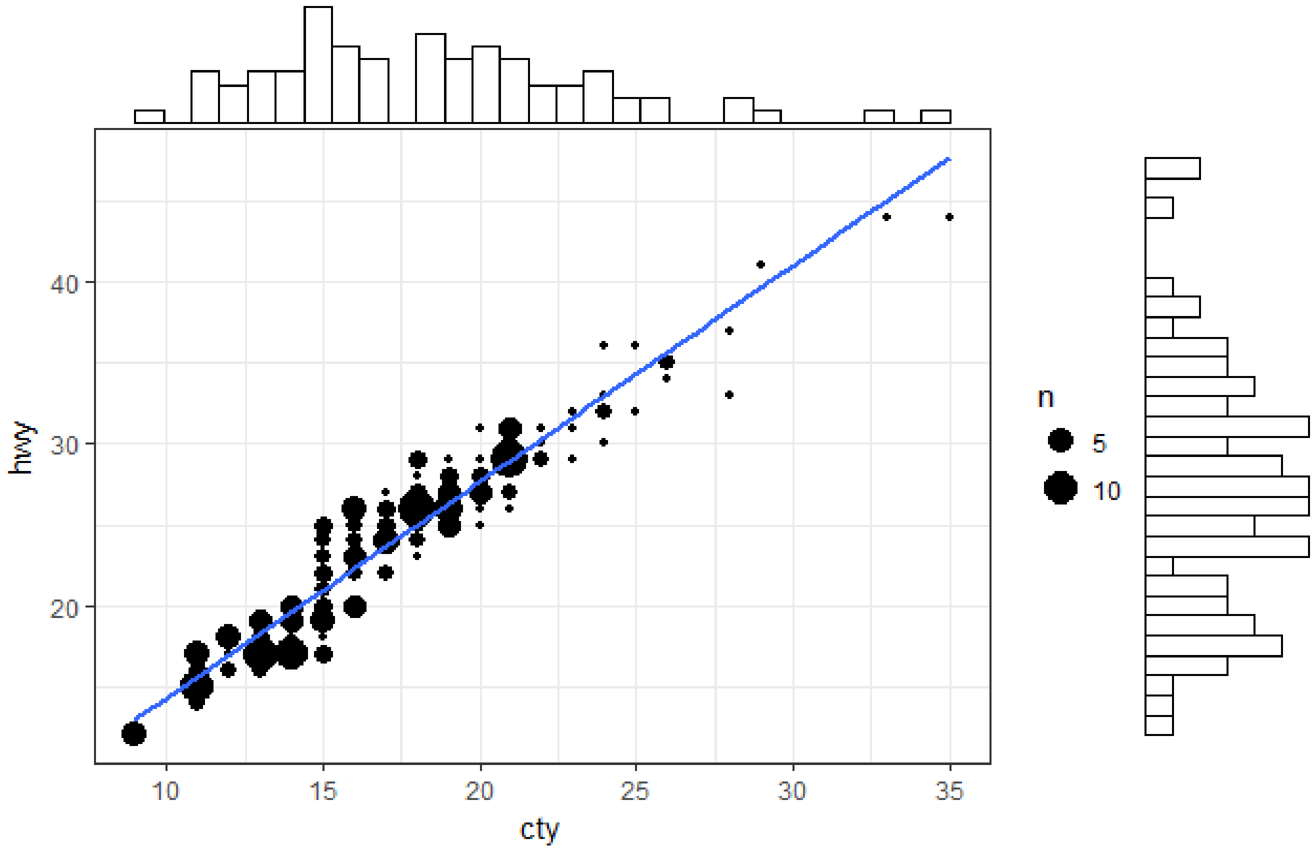
```
theme_set(theme_bw()) # pre-set the bw theme.

g <- ggplot(gapminder, aes(gdpPercap, lifeExp, size = pop, frame = year)) +

  geom_point() +

  geom_smooth(aes(group = year),

            method = "lm",

            show.legend = FALSE) +

  facet_wrap(~continent, scales = "free") +

  scale_x_log10() # convert to log scale

gganimate(g, interval=0.2)
```

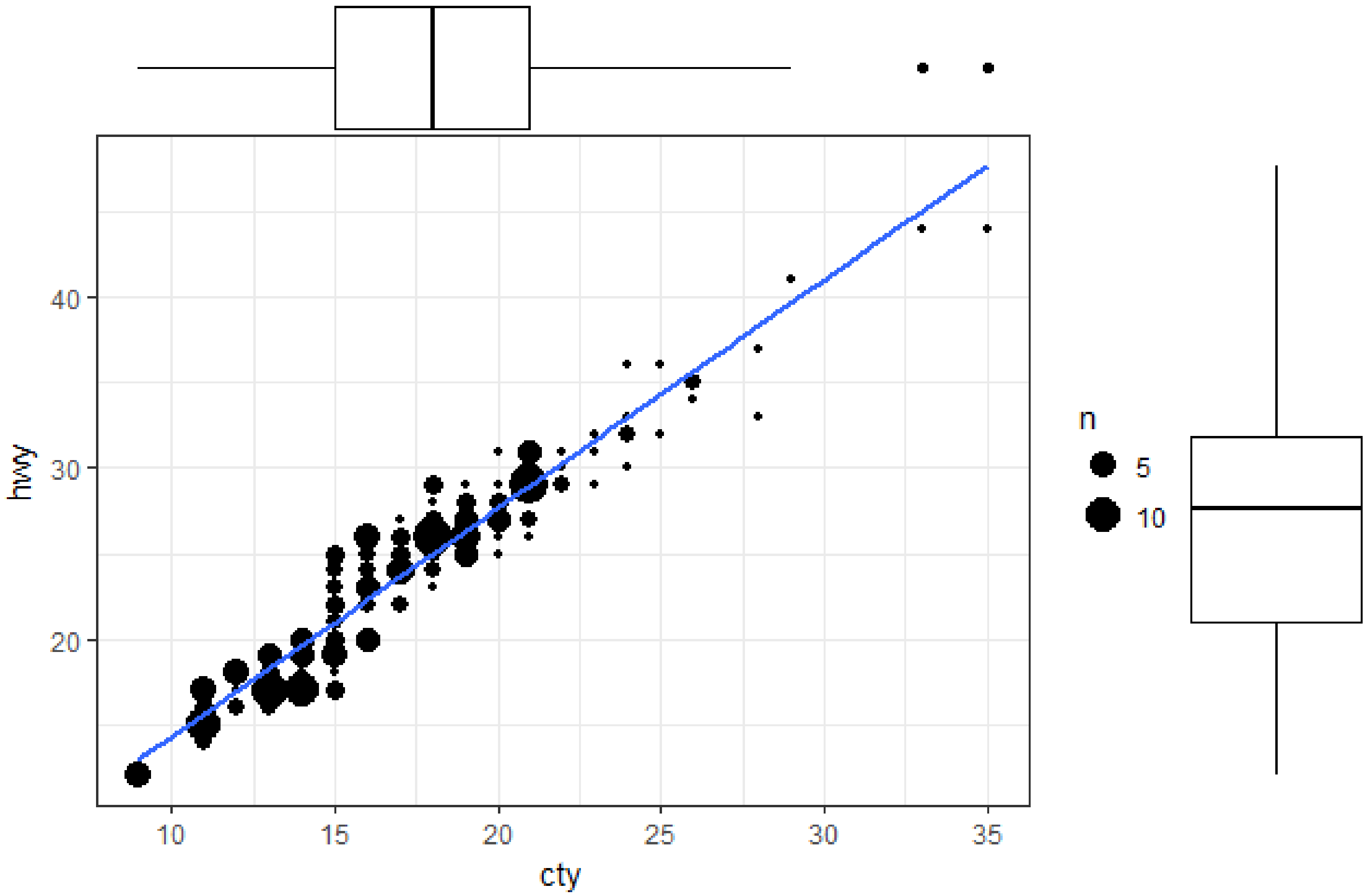


PLOT 8

Marginal Histogram / Boxplot

```
install.packages("ggExtra")

library(ggplot2)

library(ggExtra)

data(mpg, package="ggplot2")

# mpg <- read.csv("http://goo.gl/uEeRGu")

# Scatterplot

theme_set(theme_bw()) # pre-set the bw theme.

mpg_select <- mpg[mpg$hwy >= 35 & mpg$cty > 27, ]

g <- ggplot(mpg, aes(cty, hwy)) +

  geom_count() +

  geom_smooth(method="lm", se=F)

ggMarginal(g, type = "histogram", fill="transparent")

ggMarginal(g, type = "boxplot", fill="transparent")

# ggMarginal(g, type = "density", fill="transparent")
```

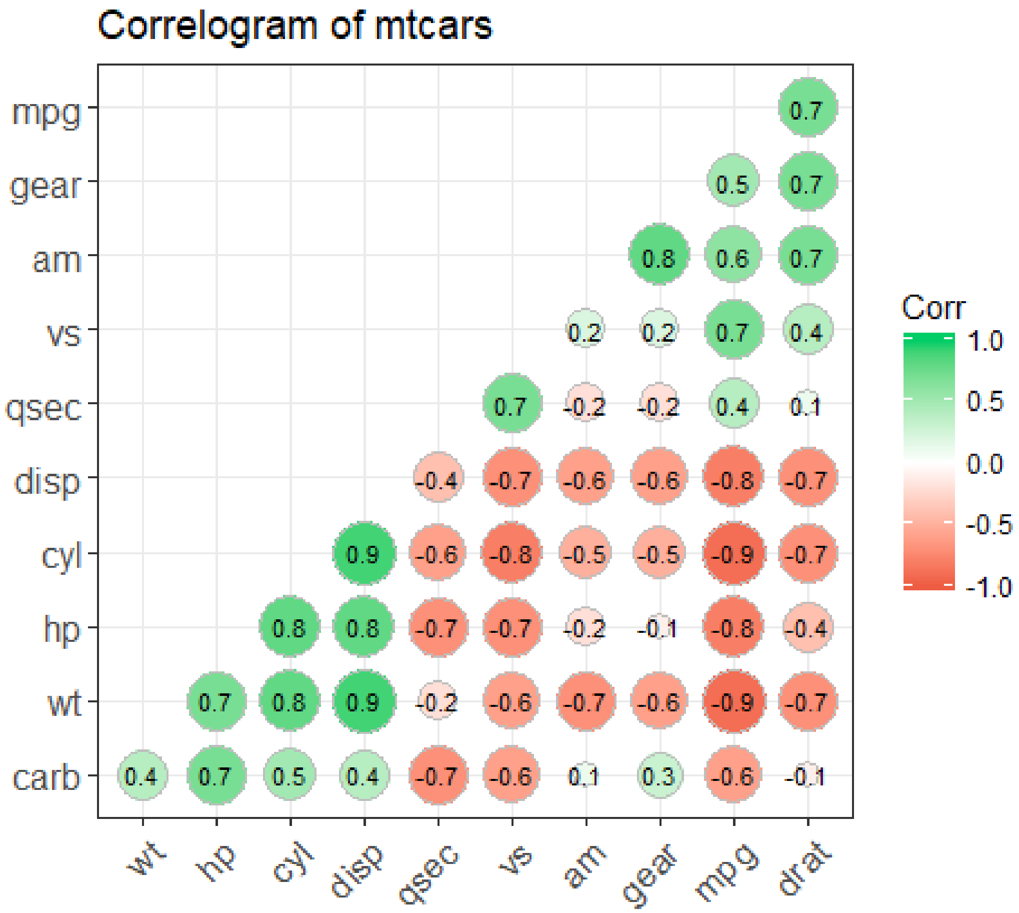




PLOT 9

Correlogram

```
install.packages("ggcorrplot")

library(ggplot2)

library(ggcorrplot)

# Correlation matrix

data(mtcars)

corr <- round(cor(mtcars), 1)

ggcorrplot(corr, hc.order = TRUE,

           type = "lower",

           lab = TRUE,

           lab_size = 3,

           method="circle",
           colors = c("tomato2", "white", "springgreen3"),

           title="Correlogram of mtcars",

           ggtheme=theme_bw)
```



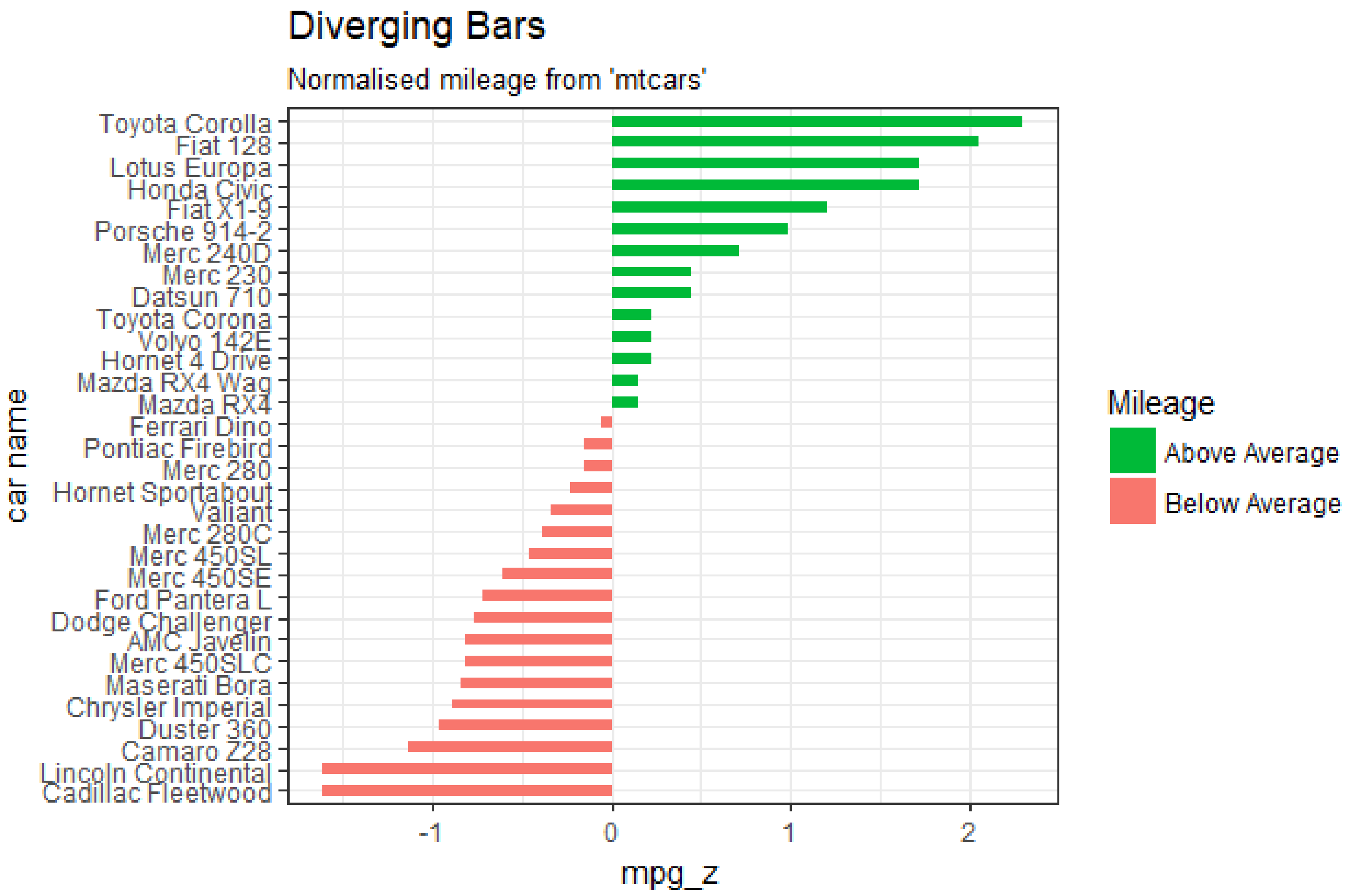
DEVIATION

PLOT 10

Diverging bars

```
library(ggplot2)

theme_set(theme_bw())

# Data Prep

data("mtcars") # load data

mtcars$`car name` <- rownames(mtcars) # create new column for car names

mtcars$mpg_z <- round((mtcars$mpg - mean(mtcars$mpg))/sd(mtcars$mpg), 2) # compute

normalized mpg

mtcars$mpg_type <- ifelse(mtcars$mpg_z < 0, "below", "above") # above / below avg

flag

mtcars <- mtcars[order(mtcars$mpg_z), ] # sort
```

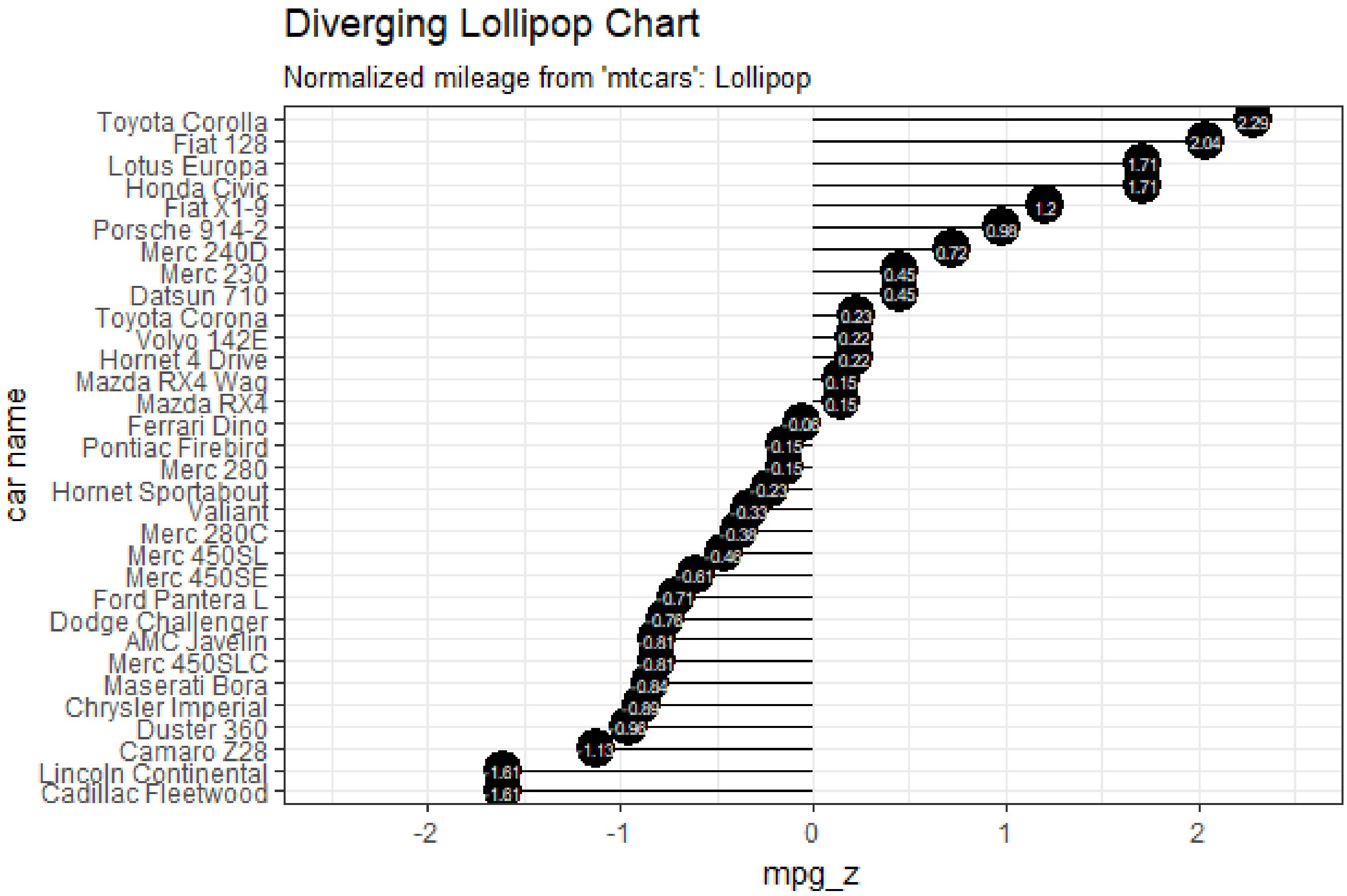
```
mtcars$`car name` <- factor(mtcars$`car name`, levels = mtcars$`car name`) # convert to factor to retain sorted order in plot.

# Diverging Barcharts

ggplot(mtcars, aes(x=`car name`, y=mpg_z, label=mpg_z)) +
  geom_bar(stat='identity', aes(fill=mpg_type), width=.5) +
  scale_fill_manual(name="Mileage",
                    labels = c("Above Average", "Below Average"),
                    values = c("above"="#00ba38", "below"="#f8766d")) +
  labs(subtitle="Normalised mileage from 'mtcars'",
       title= "Diverging Bars") +
  coord_flip()
```



PLOT 11

Diverging Lollipop Chart

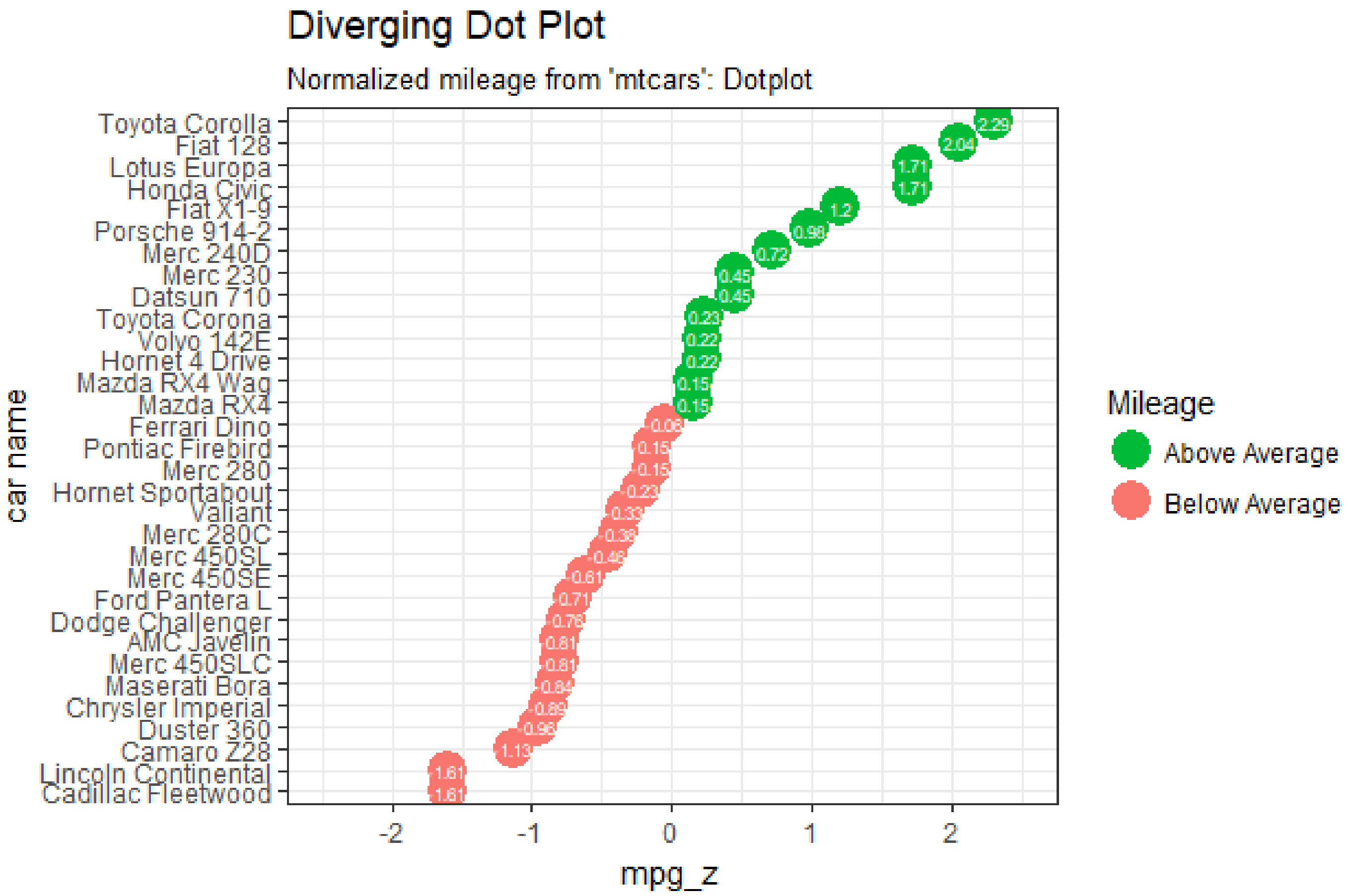
```
library(ggplot2)
theme_set(theme_bw())
ggplot(mtcars, aes(x=`car name`, y=mpg_z, label=mpg_z)) +
 geom_point(stat='identity', fill="black", size=6) +
 geom_segment(aes(y = 0,
                  x = `car name`,
                  yend = mpg_z,
                  xend = `car name`),
              color = "black") +
 geom_text(color="white", size=2) +
 labs(title="Diverging Lollipop Chart",
     subtitle="Normalized mileage from 'mtcars': Lollipop") +
 ylim(-2.5, 2.5) +
 coord_flip()
```



PLOT 12

Diverging Dot Plot

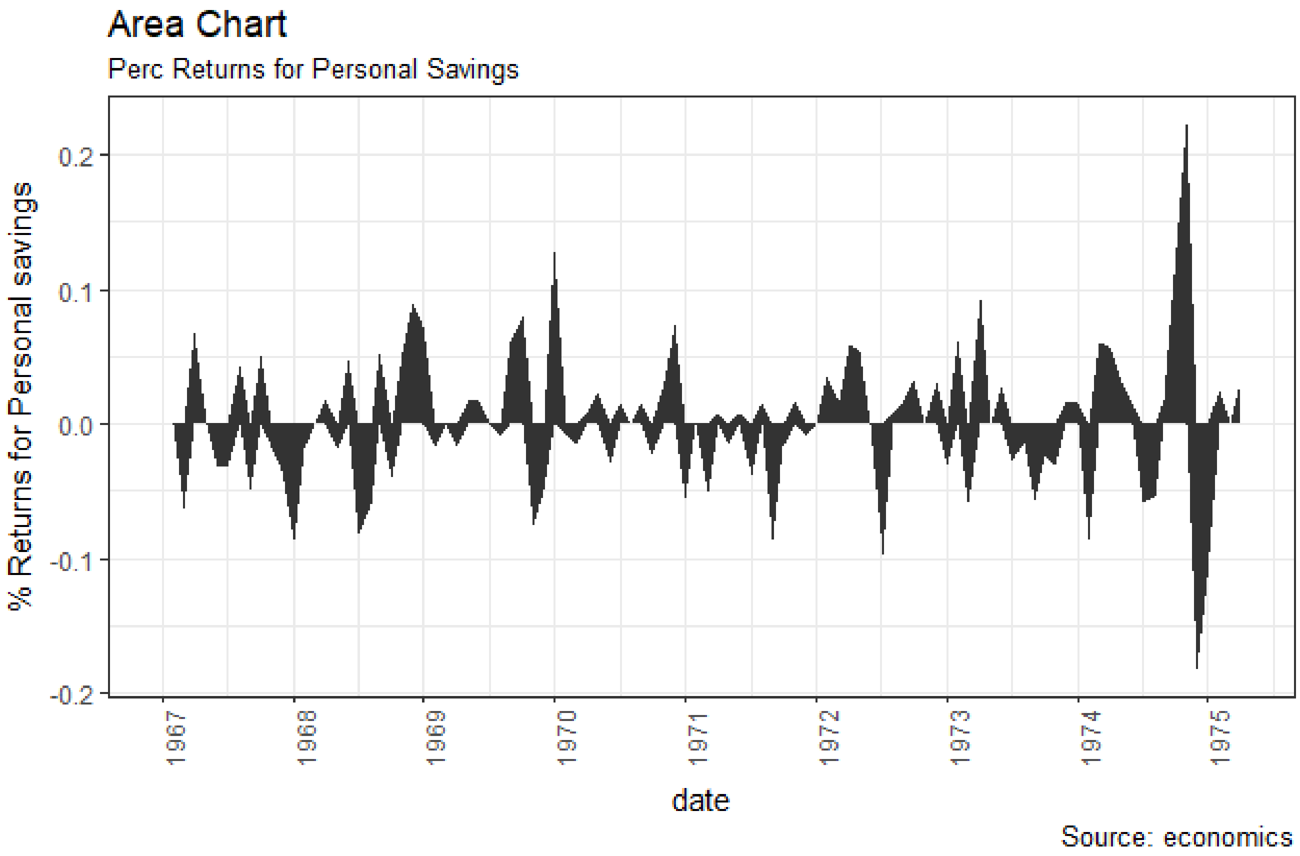
```
library(ggplot2)

theme_set(theme_bw())

# Plot

ggplot(mtcars, aes(x=`car name`, y=mpg_z, label=mpg_z)) +

 geom_point(stat='identity', aes(col=mpg_type), size=6) +

 scale_color_manual(name="Mileage",

                    labels = c("Above Average", "Below Average"),

                    values = c("above"="#00ba38", "below"="#f8766d")) +

 geom_text(color="white", size=2) +

 labs(title="Diverging Dot Plot",

     subtitle="Normalized mileage from 'mtcars': Dotplot") +

 ylim(-2.5, 2.5) +

 coord_flip()
```



PLOT 13

Area Chart

```
install.packages("quantmod")
install.packages("lubridate")
library(ggplot2)
library(quantmod)
data("economics", package = "ggplot2")
# Compute % Returns
economics$returns_perc <- c(0, diff(economics$psavert)/economics$psavert[-
                                                                 length(economics$psavert)])
# Create break points and labels for axis ticks
brks <- economics$date[seq(1, length(economics$date), 12)]
lbls <- lubridate::year(economics$date[seq(1, length(economics$date), 12)])
# Plot
ggplot(economics[1:100, ], aes(date, returns_perc)) +
  geom_area() +
  scale_x_date(breaks=brks, labels=lbls) +
  theme(axis.text.x = element_text(angle=90)) +
  labs(title="Area Chart",
       subtitle = "Perc Returns for Personal Savings",
       y="% Returns for Personal savings",
       caption="Source: economics")
```



RANKING

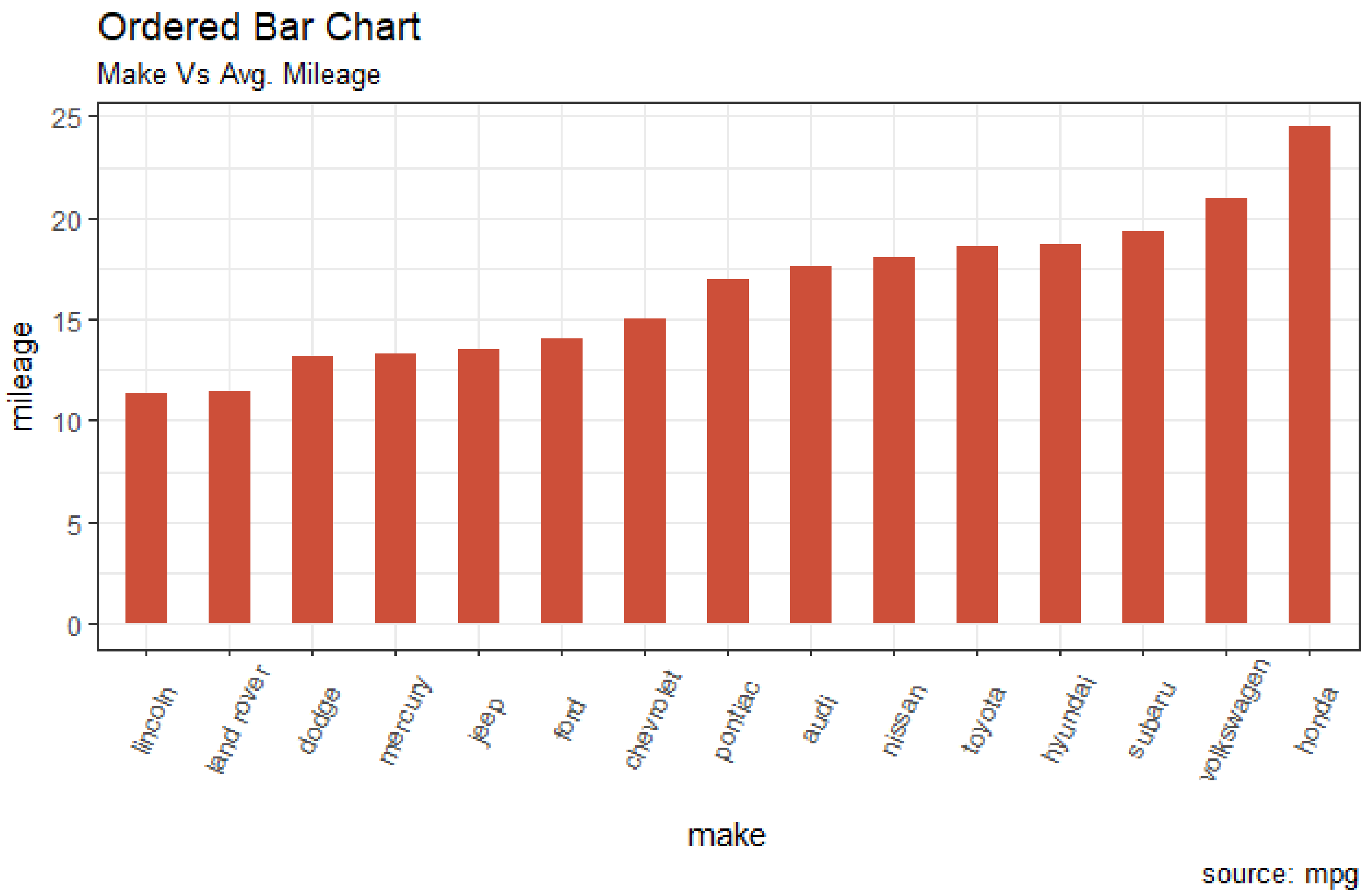
PLOT 14

Ordered Bar Chart

```
cty_mpg <- aggregate(mpg$cty, by=list(mpg$manufacturer), FUN=mean) # aggregate
colnames(cty_mpg) <- c("make", "mileage") # change column names
cty_mpg <- cty_mpg[order(cty_mpg$mileage), ] # sort
cty_mpg$make <- factor(cty_mpg$make, levels = cty_mpg$make) # to retain the order in plot.
head(cty_mpg, 4)
#> make mileage
#> 9 lincoln 11.33333
#> 8 land rover 11.50000
#> 3 dodge 13.13514
#> 10 mercury 13.25000
```

The X variable is now a factor, let’s plot.

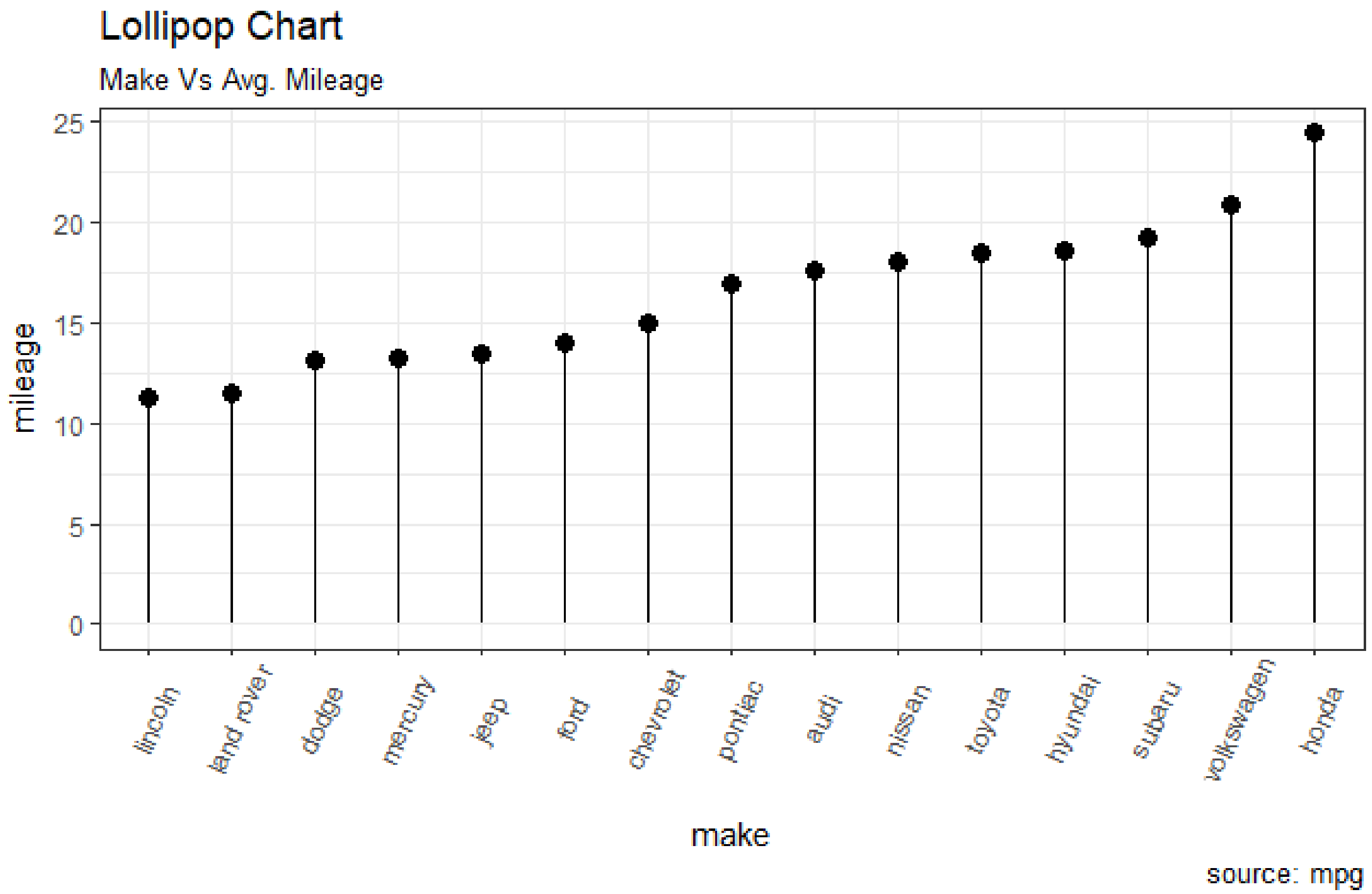
```
library(ggplot2)

theme_set(theme_bw())

# Draw plot

ggplot(cty_mpg, aes(x=make, y=mileage)) +

  geom_bar(stat="identity", width=.5, fill="tomato3") +

  labs(title="Ordered Bar Chart",

       subtitle="Make Vs Avg. Mileage",

       caption="source: mpg") +

  theme(axis.text.x = element_text(angle=65, vjust=0.6))
```



PLOT 15

Lollipop Chart

```
library(ggplot2)

theme_set(theme_bw())

# Plot

ggplot(cty_mpg, aes(x=make, y=mileage)) +
 geom_point(size=3) +
 geom_segment(aes(x=make,
               xend=make,
               y=0,
               yend=mileage)) +
 labs(title="Lollipop Chart",
     subtitle="Make Vs Avg. Mileage",
     caption="source: mpg") +
 theme(axis.text.x = element_text(angle=65, vjust=0.6))
```

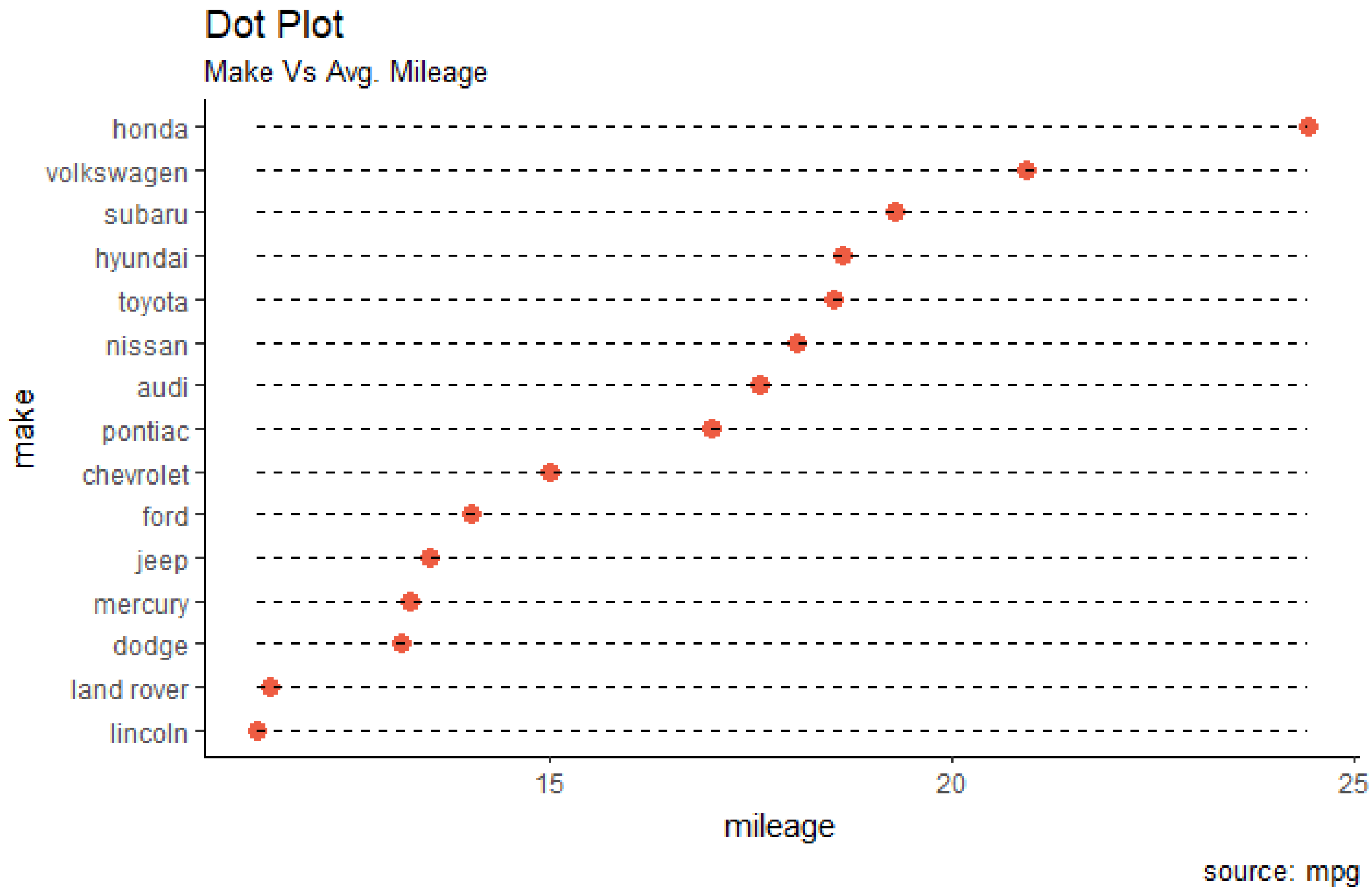


PLOT 16

Dot Plot

```
library(ggplot2)
library(scales)
theme_set(theme_classic())
```

```
# Plot

ggplot(cty_mpg, aes(x=make, y=mileage)) +

 geom_point(col="tomato2", size=3) + # Draw points

 geom_segment(aes(x=make,

              xend=make,

              y=min(mileage),

              yend=max(mileage)),

           linetype="dashed",

           size=0.1) + # Draw dashed lines

 labs(title="Dot Plot",

     subtitle="Make Vs Avg. Mileage",

     caption="source: mpg") +

 coord_flip()
```



Dot Plot

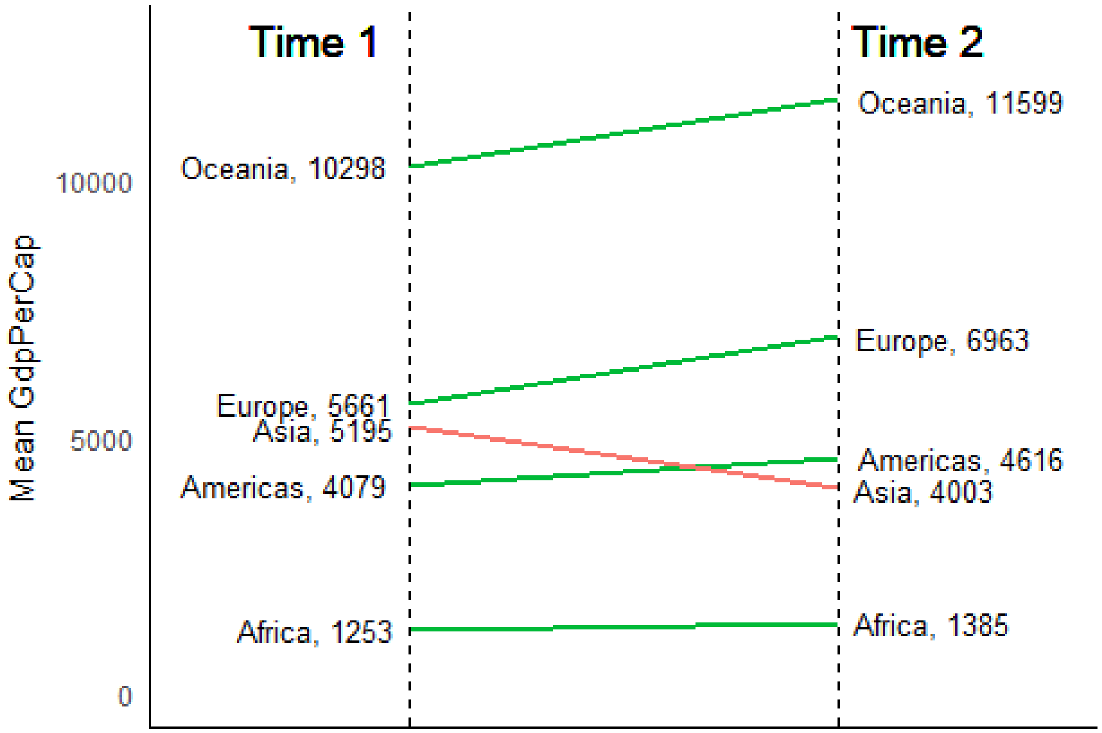
Make Vs Avg. Mileage

source: mpg

PLOT 17

Slope Chart

```
library(ggplot2)
library(scales)
theme_set(theme_classic())
# prep data
df <-
  read.csv("https://raw.githubusercontent.com/selva86/datasets/master/gdppercap.csv")
colnames(df) <- c("continent", "1952", "1957")
left_label <- paste(df$continent, round(df$`1952`),sep=", ")
right_label <- paste(df$continent, round(df$`1957`),sep=", ")
df$class <- ifelse((df$`1957` - df$`1952`) < 0, "red", "green")
# Plot
p <- ggplot(df) + geom_segment(aes(x=1, xend=2, y=`1952`, yend=`1957`, col=class),
                               size=.75, show.legend=F) +
  geom_vline(xintercept=1, linetype="dashed", size=.1) +
  geom_vline(xintercept=2, linetype="dashed", size=.1) +
  scale_color_manual(labels = c("Up", "Down"),
                     values = c("green"="#00ba38",
                                "red"="#f8766d")) + # color of lines
  labs(x="", y="Mean GdpPerCap") + # Axis labels
  xlim(.5, 2.5) + ylim(0,(1.1*(max(df$`1952`, df$`1957`)))) # X
and Y axis limits
# Add texts
p <- p + geom_text(label=left_label, y=df$`1952`, x=rep(1, NROW(df)), hjust=1.1,
                   size=3.5)
p <- p + geom_text(label=right_label, y=df$`1957`, x=rep(2, NROW(df)), hjust=-0.1,
                   size=3.5)
p <- p + geom_text(label="Time 1", x=1, y=1.1*(max(df$`1952`, df$`1957`)),
                   hjust=1.2, size=5) # title
p <- p + geom_text(label="Time 2", x=2, y=1.1*(max(df$`1952`, df$`1957`)), hjust=-
          0.1, size=5) # title

# Minify theme

p + theme(panel.background = element_blank(),

      panel.grid = element_blank(),

      axis.ticks = element_blank(),

      axis.text.x = element_blank(),

      panel.border = element_blank(),

      plot.margin = unit(c(1,2,1,2), "cm"))
```

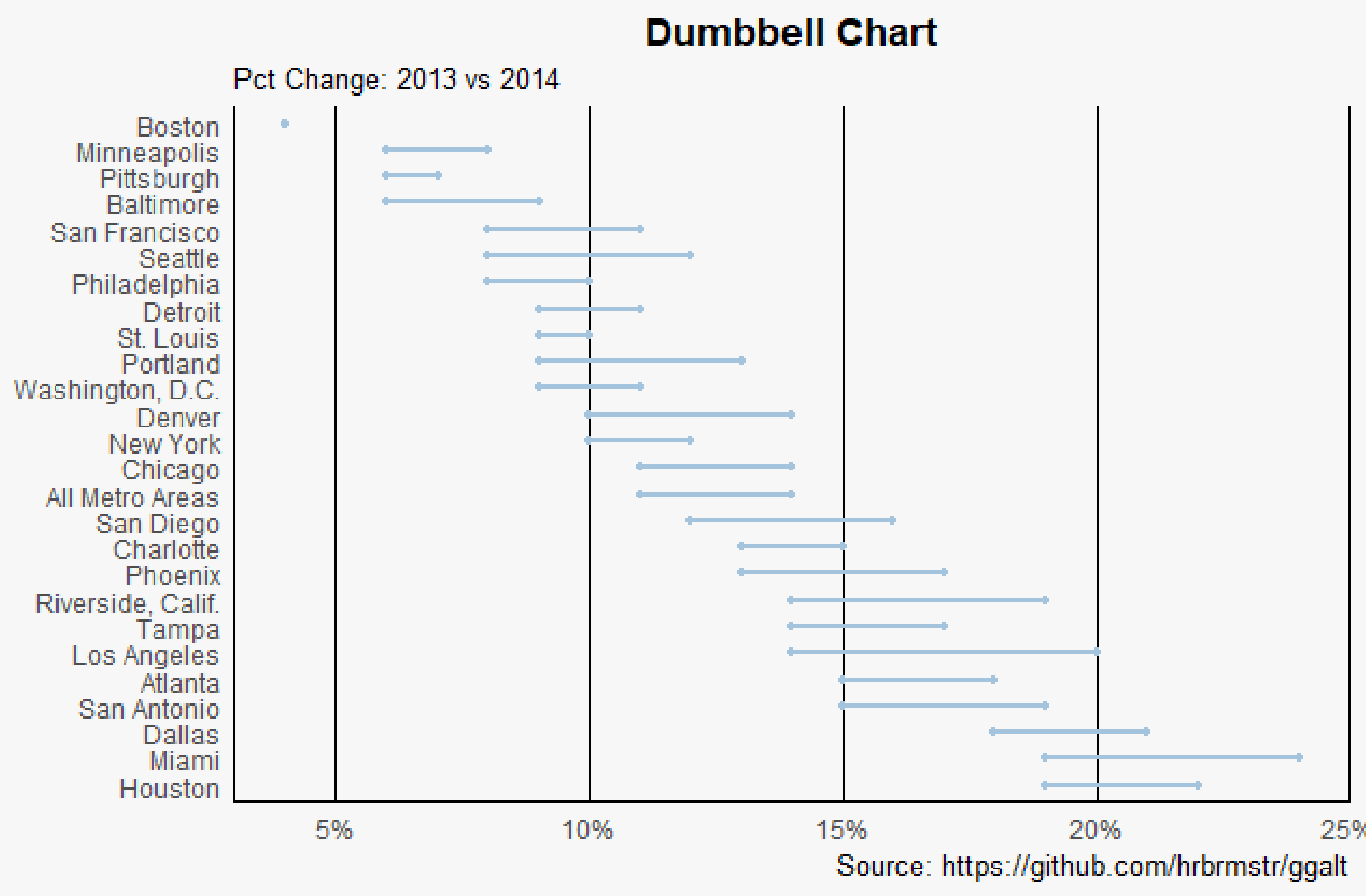


PLOT 18

Dumbbell Plot

```
library(ggplot2)

library(ggalt)

theme_set(theme_classic())

health <-
```

```
 read.csv("https://raw.githubusercontent.com/selva86/datasets/master/health.csv")

health$Area <- factor(health$Area, levels=as.character(health$Area)) # for right

ordering of the dumbells

# health$Area <- factor(health$Area)

gg <- ggplot(health, aes(x=pct_2013, xend=pct_2014, y=Area, group=Area)) +

 geom_dumbbell(color="#a3c4dc",

               size=0.75,

               point.colour.l="#0e668b") +

 scale_x_continuous(label=percent) +

 labs(x=NULL,

      y=NULL,

      title="Dumbbell Chart",

      subtitle="Pct Change: 2013 vs 2014",

      caption="Source: https://github.com/hrbrmstr/ggalt") +

 theme(plot.title = element_text(hjust=0.5, face="bold"),

       plot.background=element_rect(fill="#f7f7f7"),

       panel.background=element_rect(fill="#f7f7f7"),

       panel.grid.minor=element_blank(),

       panel.grid.major.y=element_blank(),

       panel.grid.major.x=element_line(),

       axis.ticks=element_blank(),

       legend.position="top",

       panel.border=element_blank())

plot(gg)
```



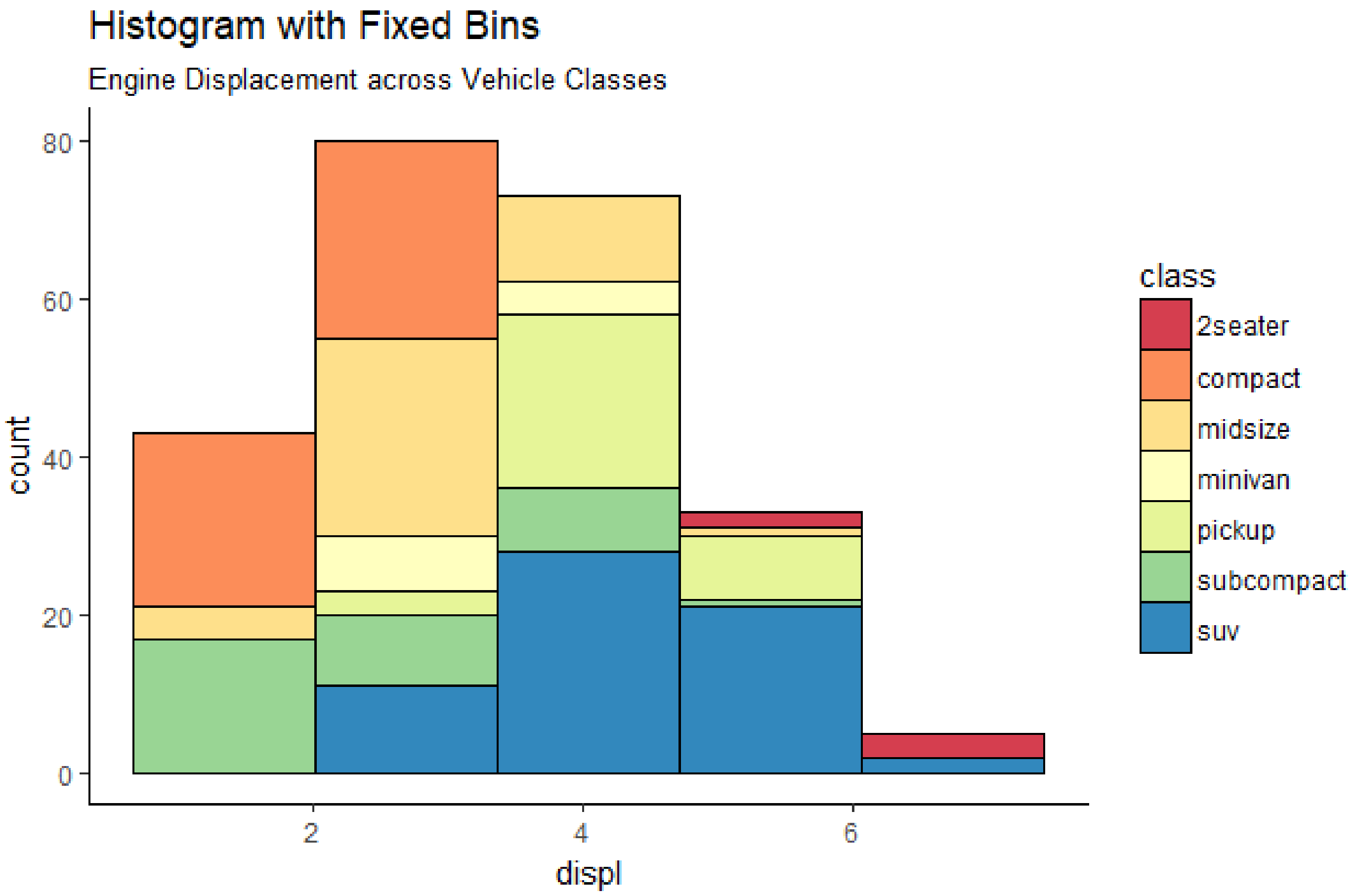
DISTRIBUTION

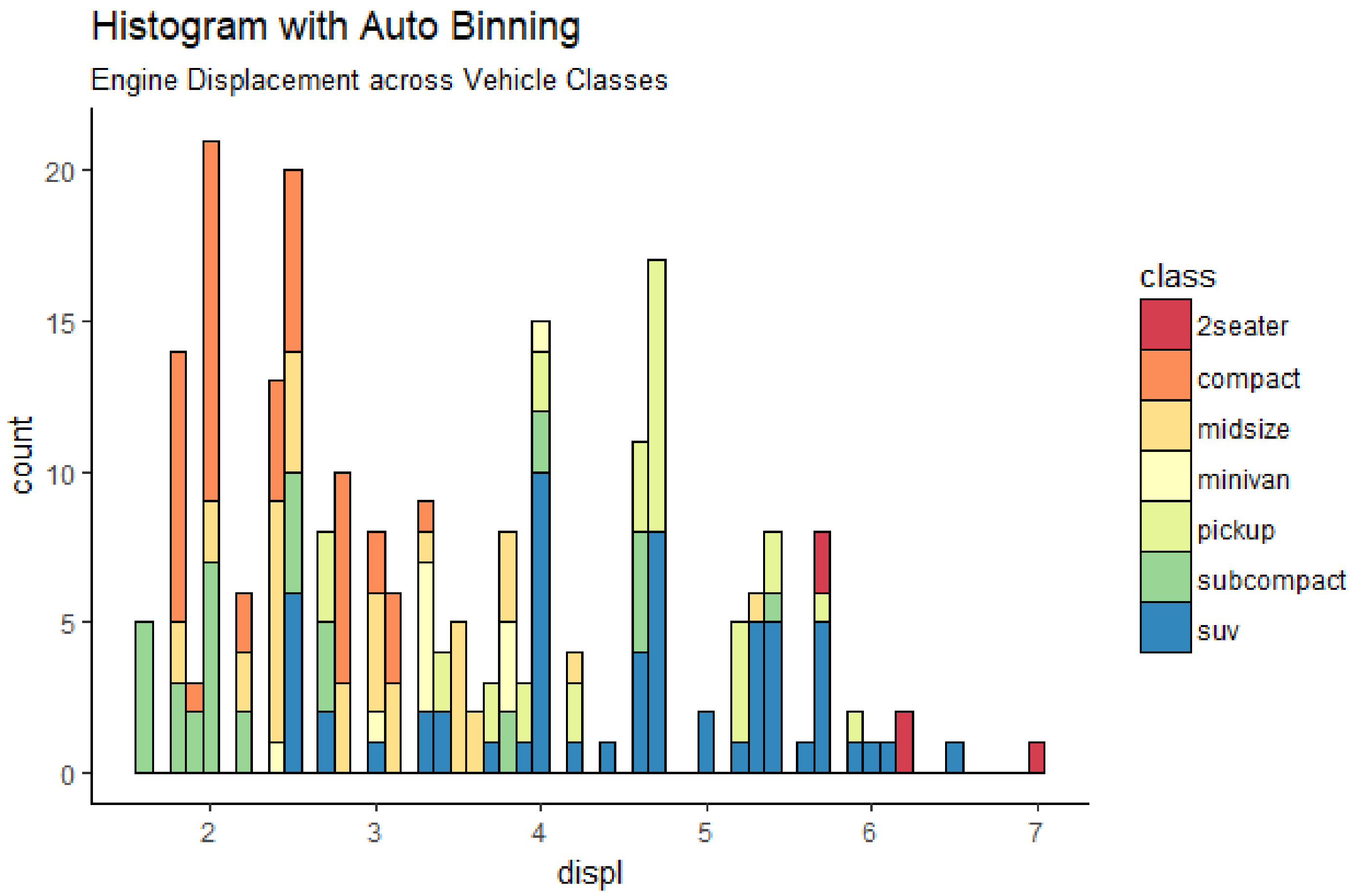
PLOT 19

Histogram

```
library(ggplot2)

theme_set(theme_classic())

# Histogram on a Continuous (Numeric) Variable

g <- ggplot(mpg, aes(displ)) + scale_fill_brewer(palette = "Spectral")

g + geom_histogram(aes(fill=class),

            binwidth = .1,

            col="black",

            size=.1) + # change binwidth
```

```
  labs(title="Histogram with Auto Binning",
       subtitle="Engine Displacement across Vehicle Classes")
g + geom_histogram(aes(fill=class),
                   bins=5,
                   col="black",
                   size=.1) + # change number of bins
  labs(title="Histogram with Fixed Bins",
       subtitle="Engine Displacement across Vehicle Classes")
```

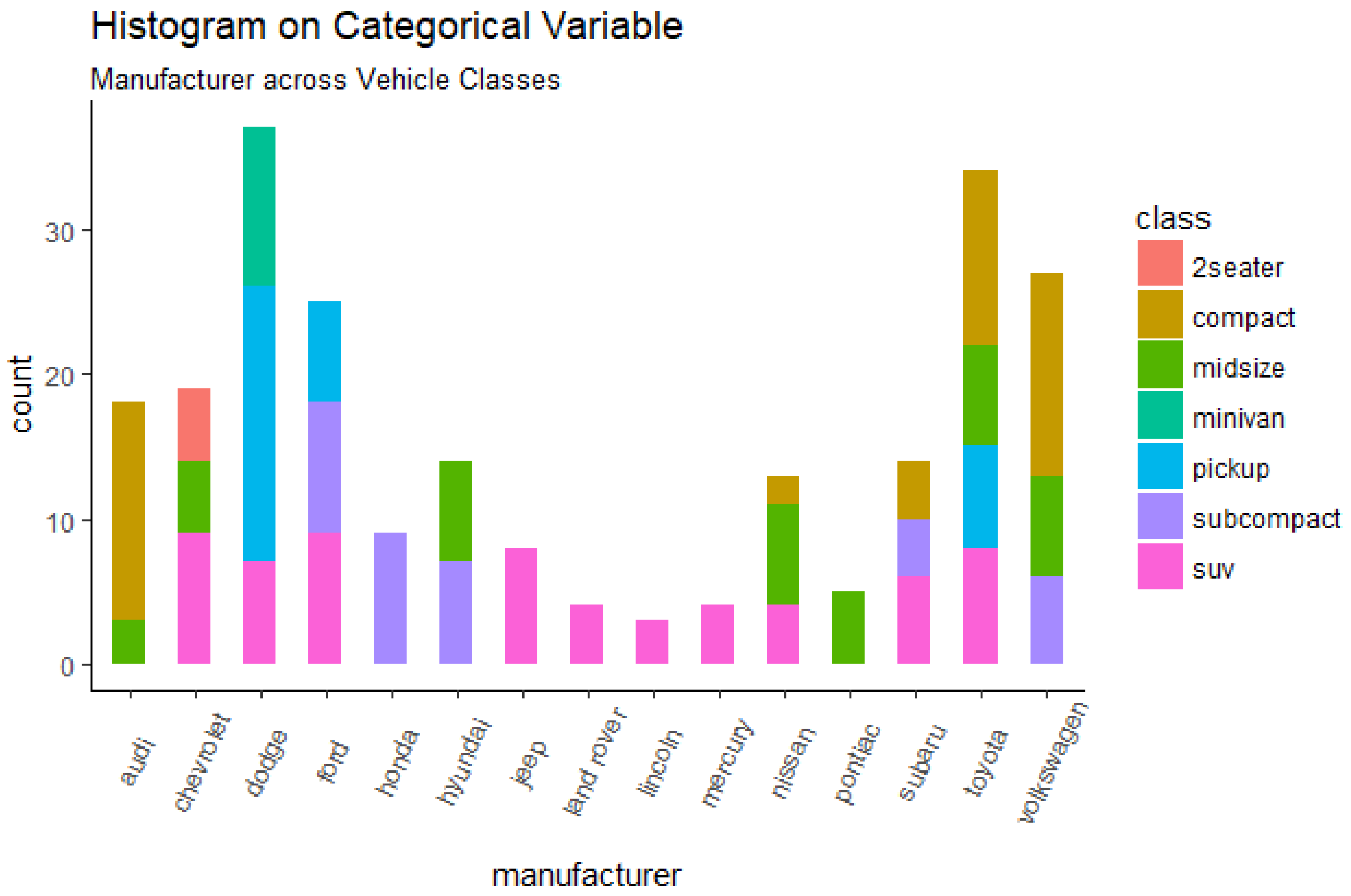




PLOT 20

Histogram on a categorical variable

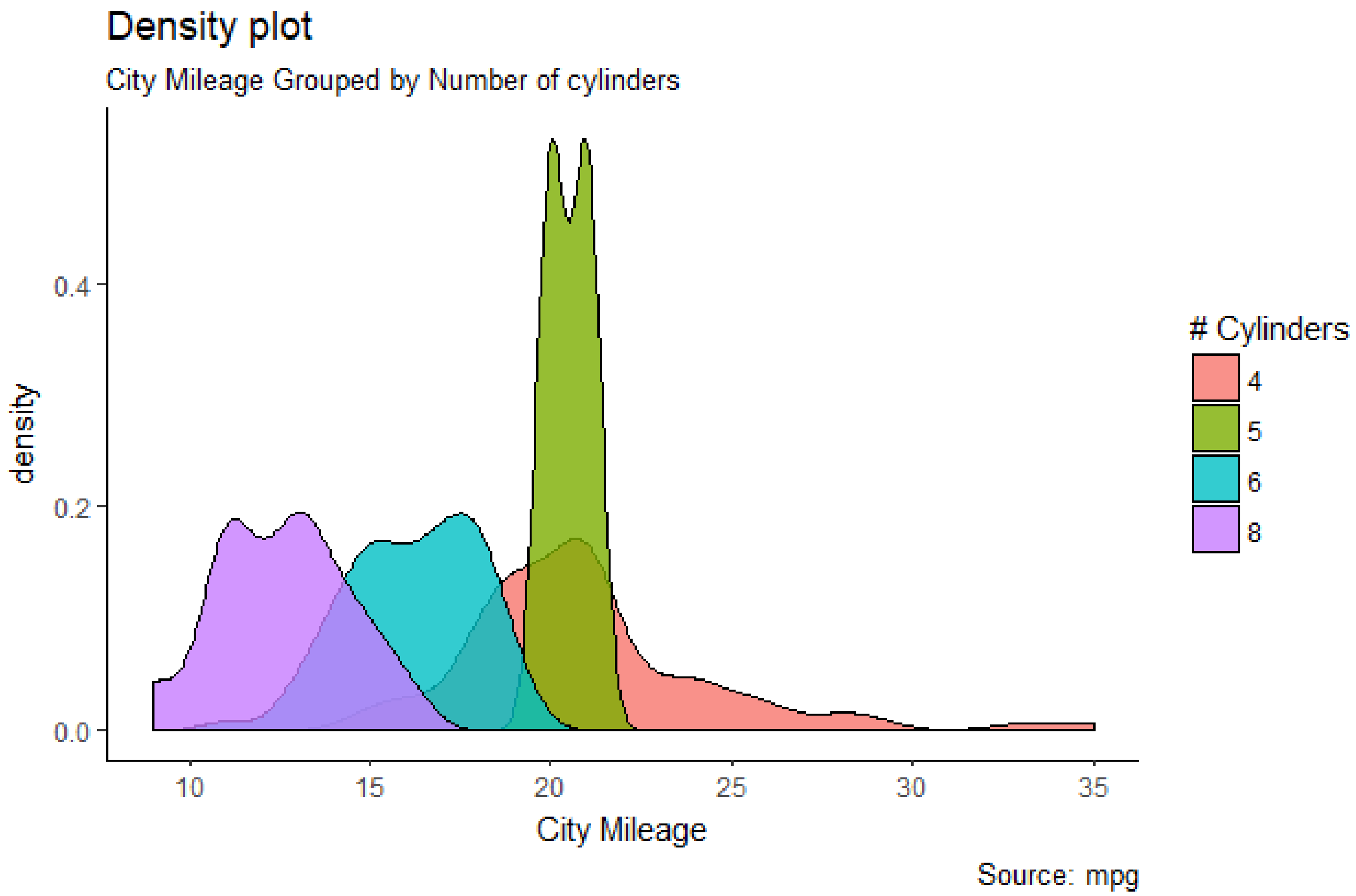
```
library(ggplot2)

theme_set(theme_classic())

# Histogram on a Categorical variable

g <- ggplot(mpg, aes(manufacturer))

g + geom_bar(aes(fill=class), width = 0.5) +

  theme(axis.text.x = element_text(angle=65, vjust=0.6)) +

  labs(title="Histogram on Categorical Variable",

       subtitle="Manufacturer across Vehicle Classes")
```



PLOT 21

Density plot

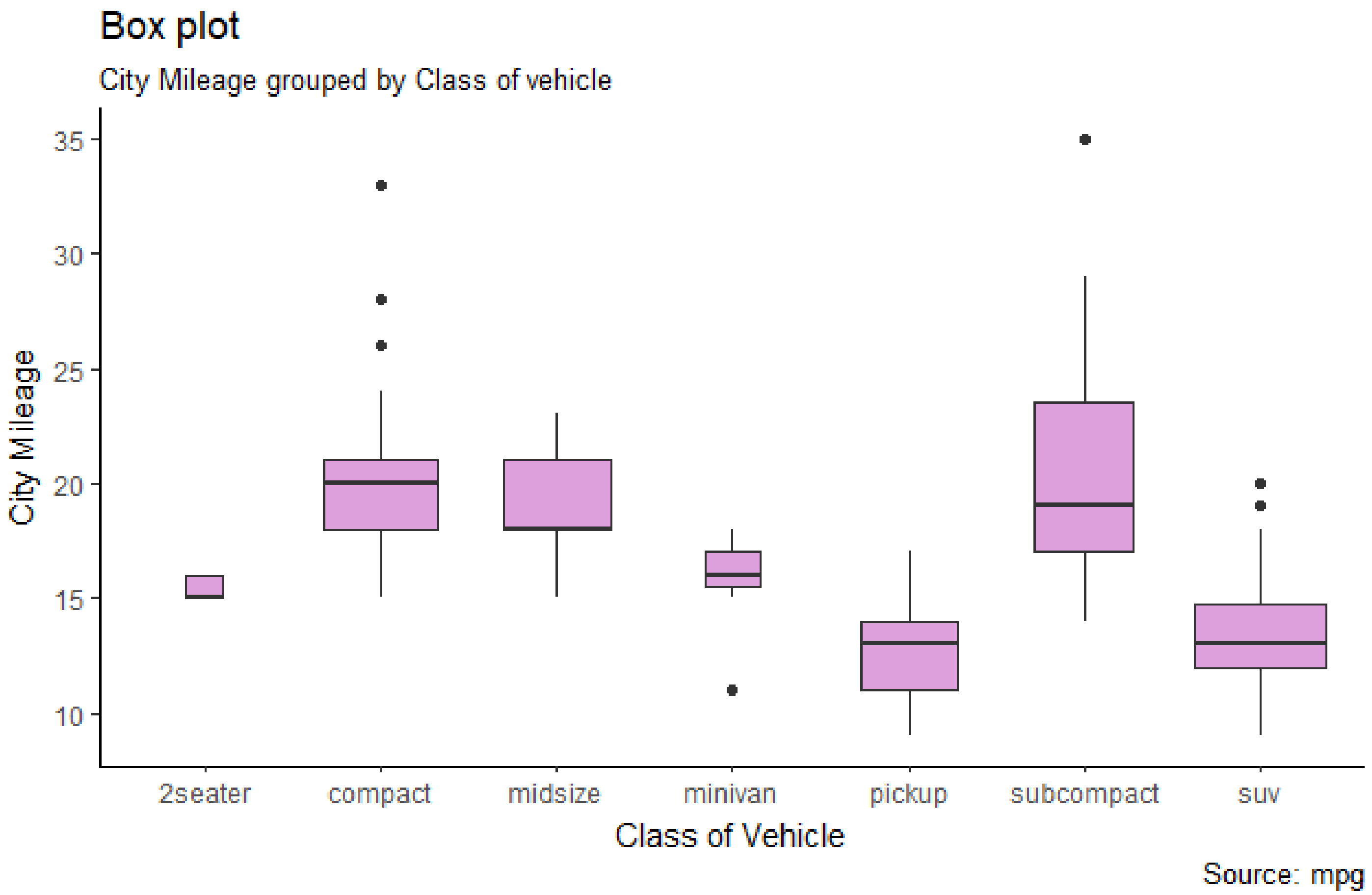
```
g <- ggplot(mpg, aes(cty))

g + geom_density(aes(fill=factor(cyl)), alpha=0.8) +

  labs(title="Density plot",

       subtitle="City Mileage Grouped by Number of cylinders",

       caption="Source: mpg",

       x="City Mileage",

       fill="# Cylinders")
```



PLOT 22

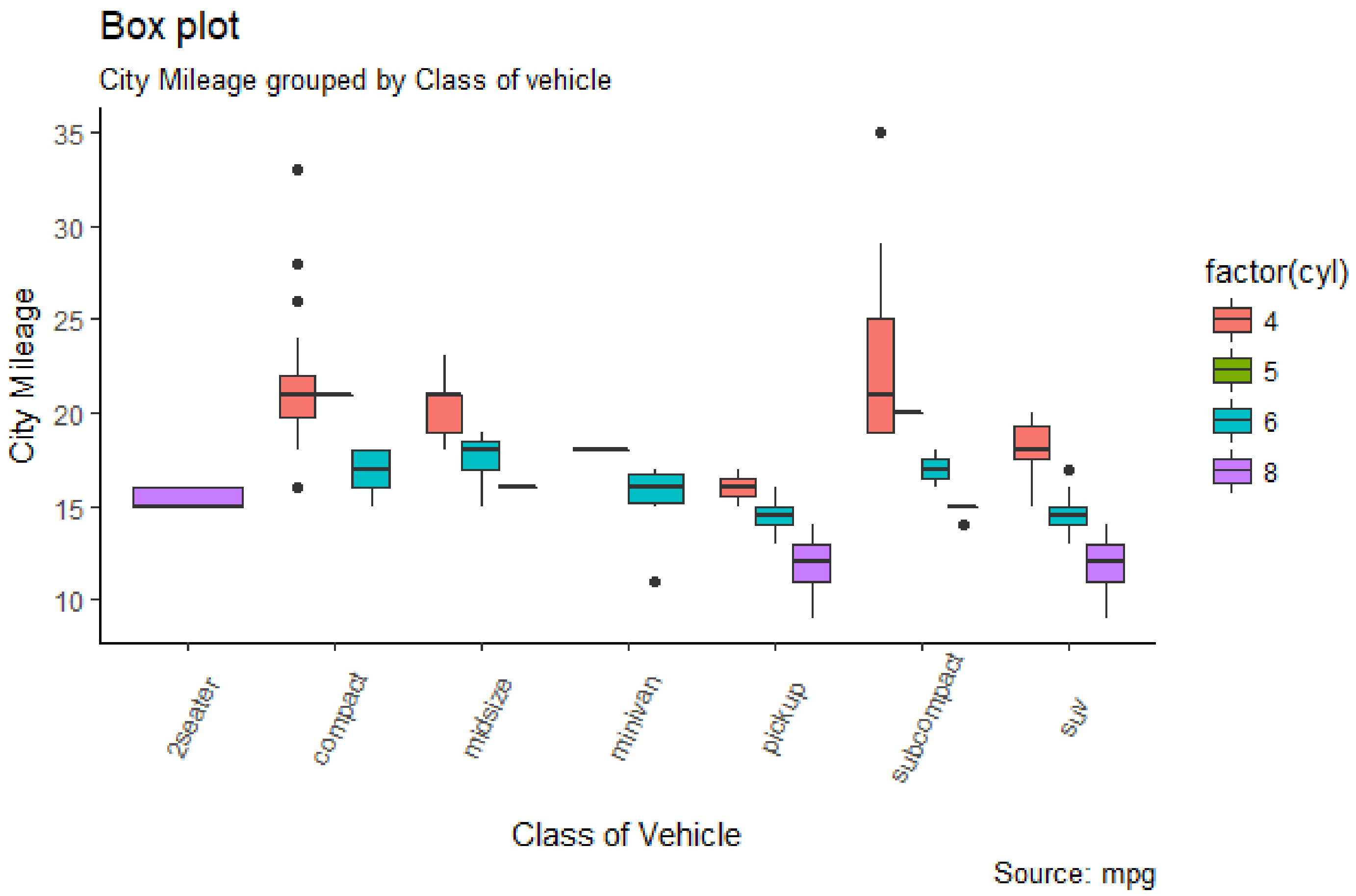
Box Plot

```
library(ggplot2)

theme_set(theme_classic())

# Plot

g <- ggplot(mpg, aes(class, cty))

g + geom_boxplot(varwidth=T, fill="plum") +

  labs(title="Box plot",

       subtitle="City Mileage grouped by Class of vehicle",

       caption="Source: mpg",

       x="Class of Vehicle",

       y="City Mileage")
```



PLOT 23

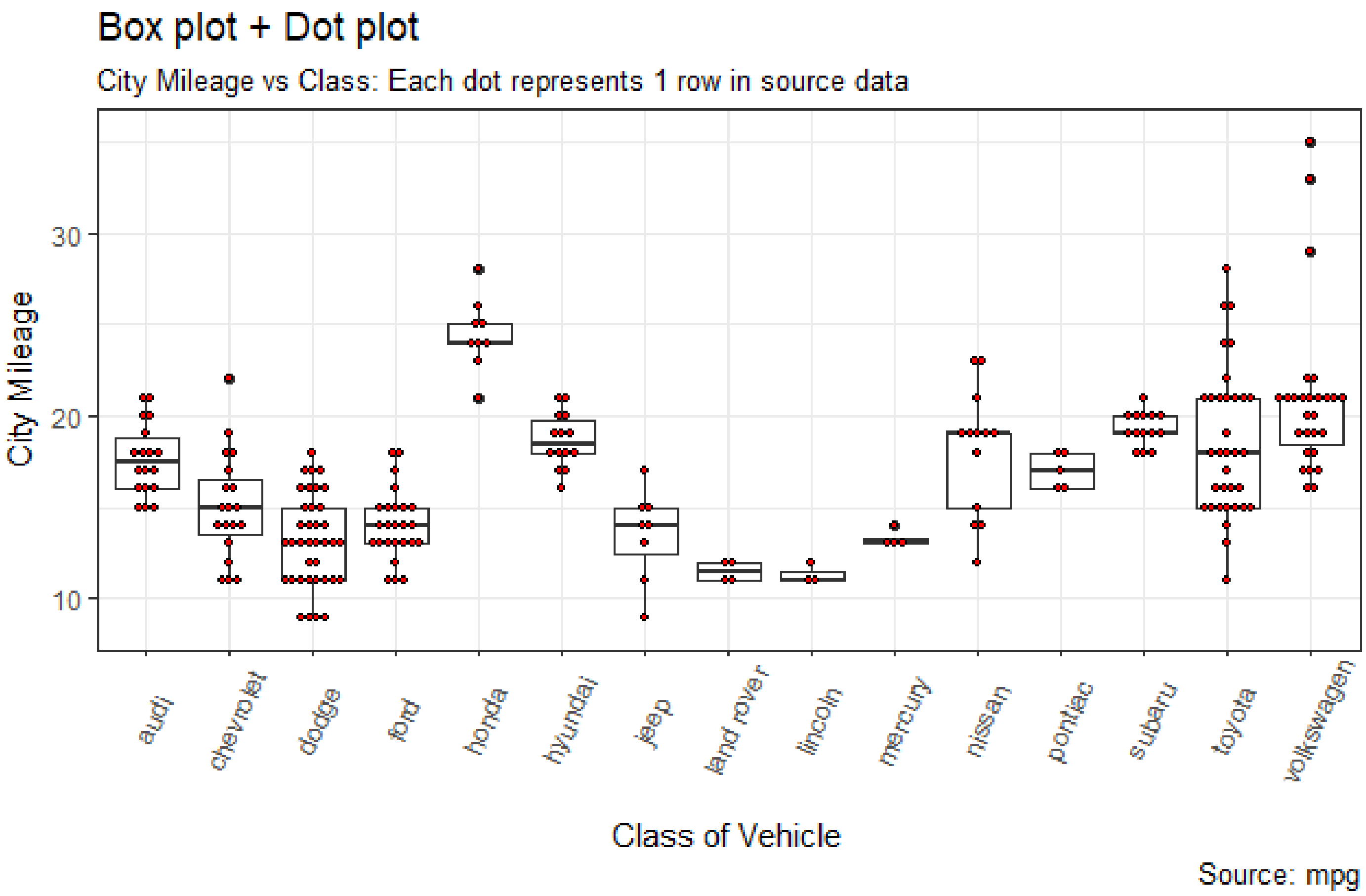
```
library(ggthemes)

g <- ggplot(mpg, aes(class, cty))

g + geom_boxplot(aes(fill=factor(cyl))) +

  theme(axis.text.x = element_text(angle=65, vjust=0.6)) +

  labs(title="Box plot",

       subtitle="City Mileage grouped by Class of vehicle",

       caption="Source: mpg",

       x="Class of Vehicle",

       y="City Mileage")
```



PLOT 24

Boxplot + dotplot

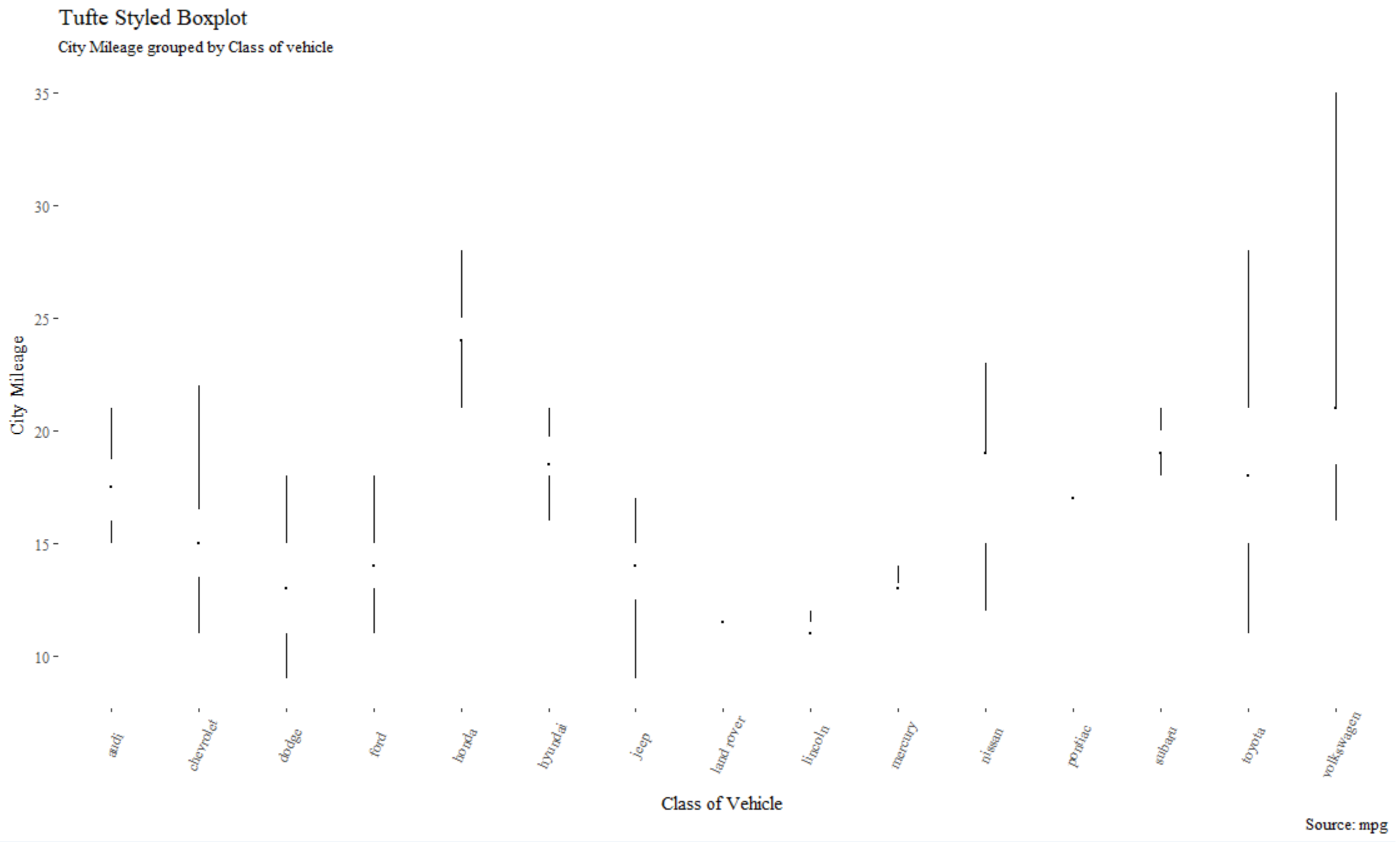
```
library(ggplot2)

theme_set(theme_bw())

# plot

g <- ggplot(mpg, aes(manufacturer, cty))

g + geom_boxplot() +

  geom_dotplot(binaxis='y',

            stackdir='center',

            dotsize = .5,

            fill="red") +

  theme(axis.text.x = element_text(angle=65, vjust=0.6)) +

  labs(title="Box plot + Dot plot",

      subtitle="City Mileage vs Class: Each dot represents 1 row in source data",

      caption="Source: mpg",
      x="Class of Vehicle",
      y="City Mileage")
```



PLOT 25

Tufte boxplot

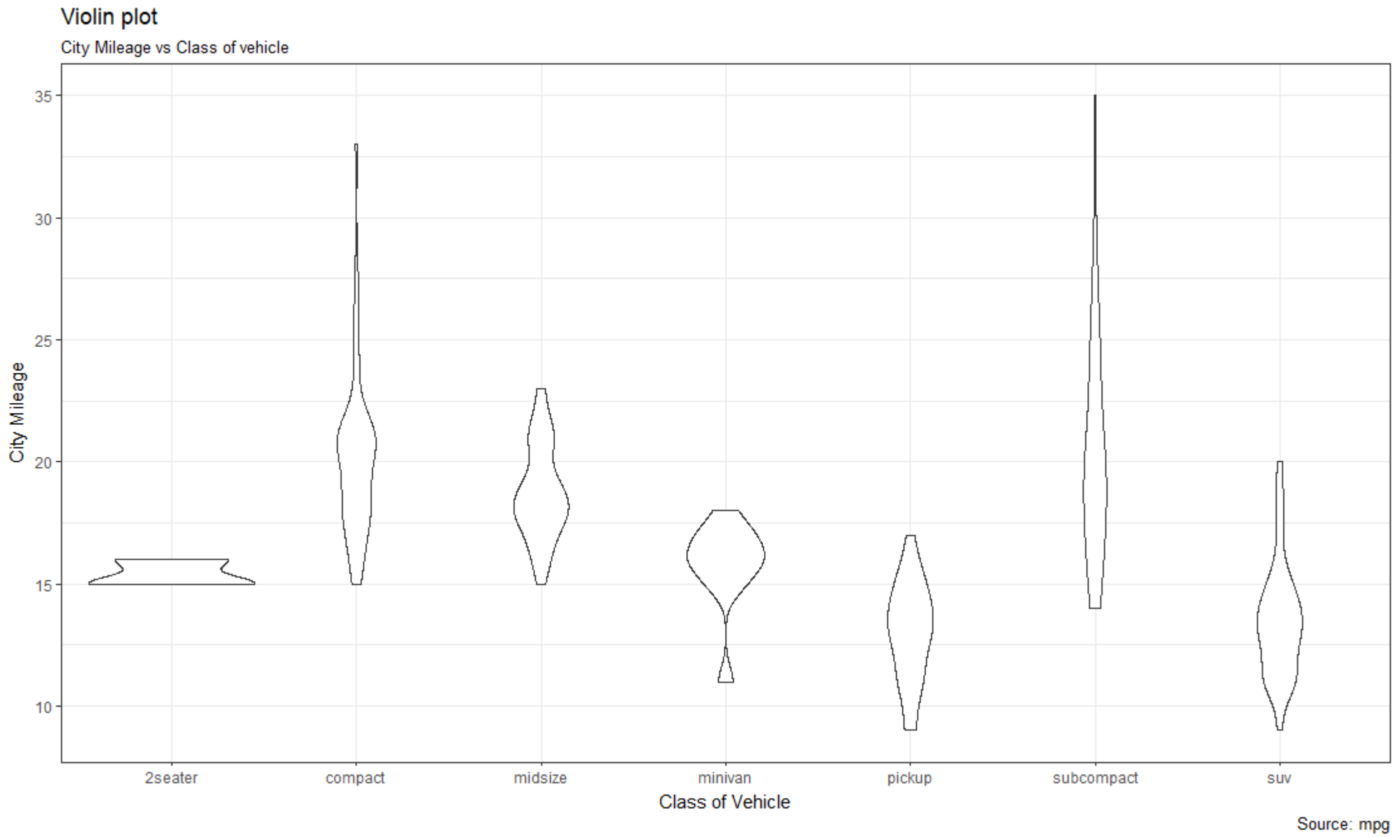
```
> library(ggthemes)
> library(ggplot2)
> theme_set(theme_tufte())  # from ggthemes
> # plot
> g <- ggplot(mpg, aes(manufacturer, cty))
> g + geom_tufteboxplot() +
+   theme(axis.text.x = element_text(angle=65, vjust=0.6)) +
+   labs(title="Tufte Styled Boxplot",
+        subtitle="City Mileage grouped by Class of vehicle",
+        caption="Source: mpg",
+        x="Class of Vehicle",
+        y="City Mileage")
```



PLOT 26

Violin plot

```
> theme_set(theme_bw())

> g <- ggplot(mpg, aes(class, cty))

> g + geom_violin() +

+   labs(title="Violin plot",

+       subtitle="City Mileage vs Class of vehicle",

+       caption="Source: mpg",

+       x="Class of Vehicle",

+       y="City Mileage")
```



PLOT 27

Population pyramid

library(ggplot2)

library(ggthemes)

options(scipen = 999) # turns of scientific notations like 1e+40

# Read data

email_campaign_funnel <- read.csv("https://raw.githubusercontent.com/selva86/datasets/master/email_campaign_funnel.csv")

# X Axis Breaks and Labels

brks <- seq(-15000000, 15000000, 5000000)

lbls = paste0(as.character(c(seq(15, 0, -5), seq(5, 15, 5))), "m")

# Plot

ggplot(email_campaign_funnel, aes(x = Stage, y = Users, fill = Gender)) +   # Fill column   geom_bar(stat = "identity", width = .6) +   # draw the bars

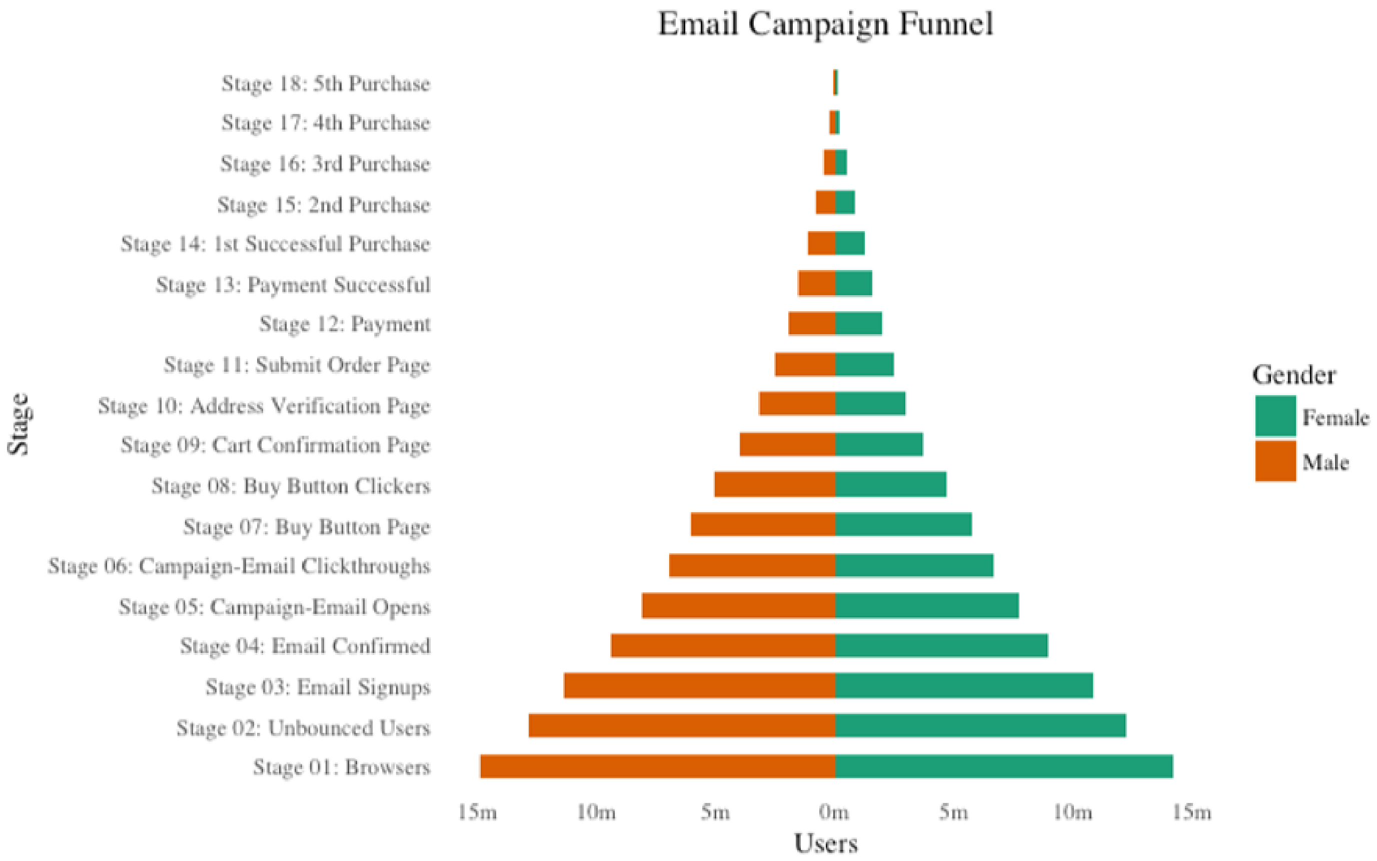
scale_y_continuous(breaks = brks,   # Breaks

labels = lbls) + # Labels

coord_flip() + # Flip axes

labs(title="Email Campaign Funnel") +

```
theme_tufte() +  # Tufte theme from ggfortify

theme(plot.title = element_text(hjust = .5),

axis.ticks = element_blank()) +   # Centre plot title

scale_fill_brewer(palette = "Dark2")  # Color palette
```

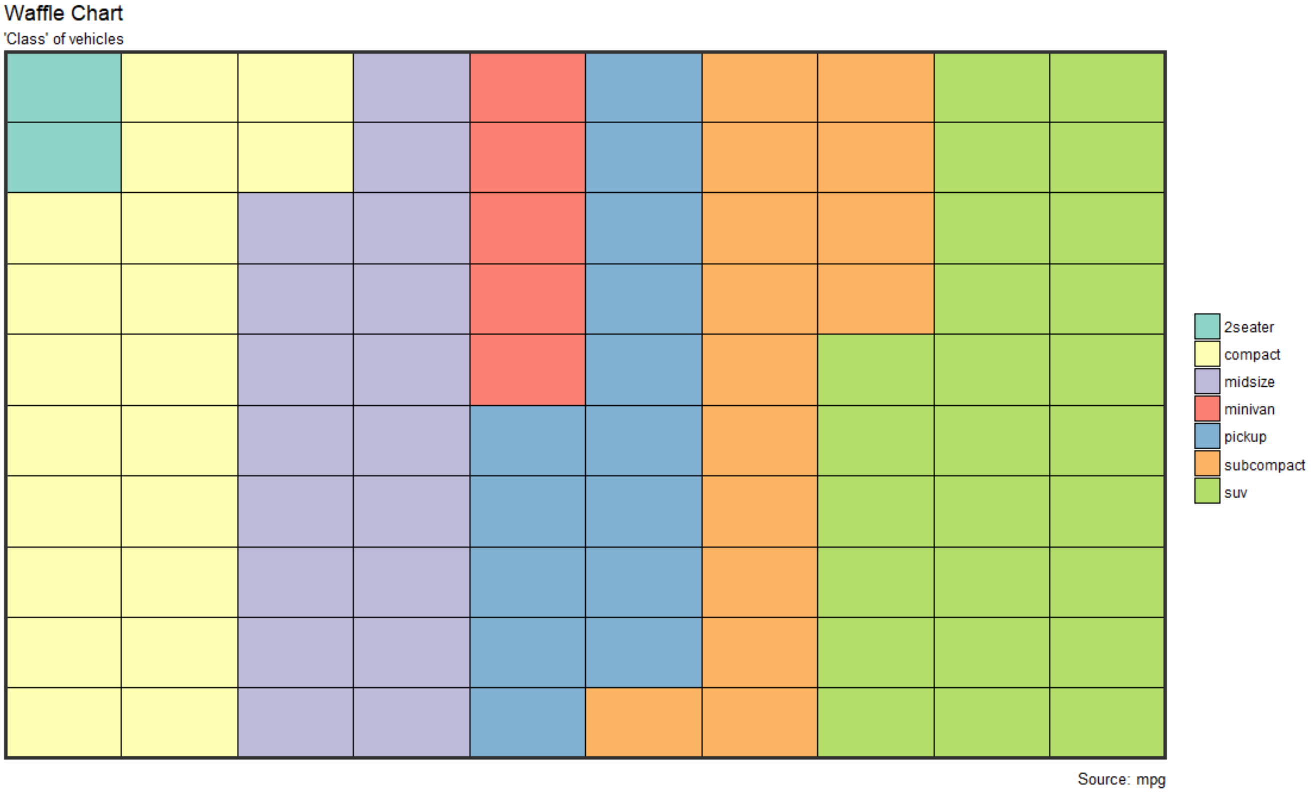


COMPOSITION

PLOT 28

Waffle chart

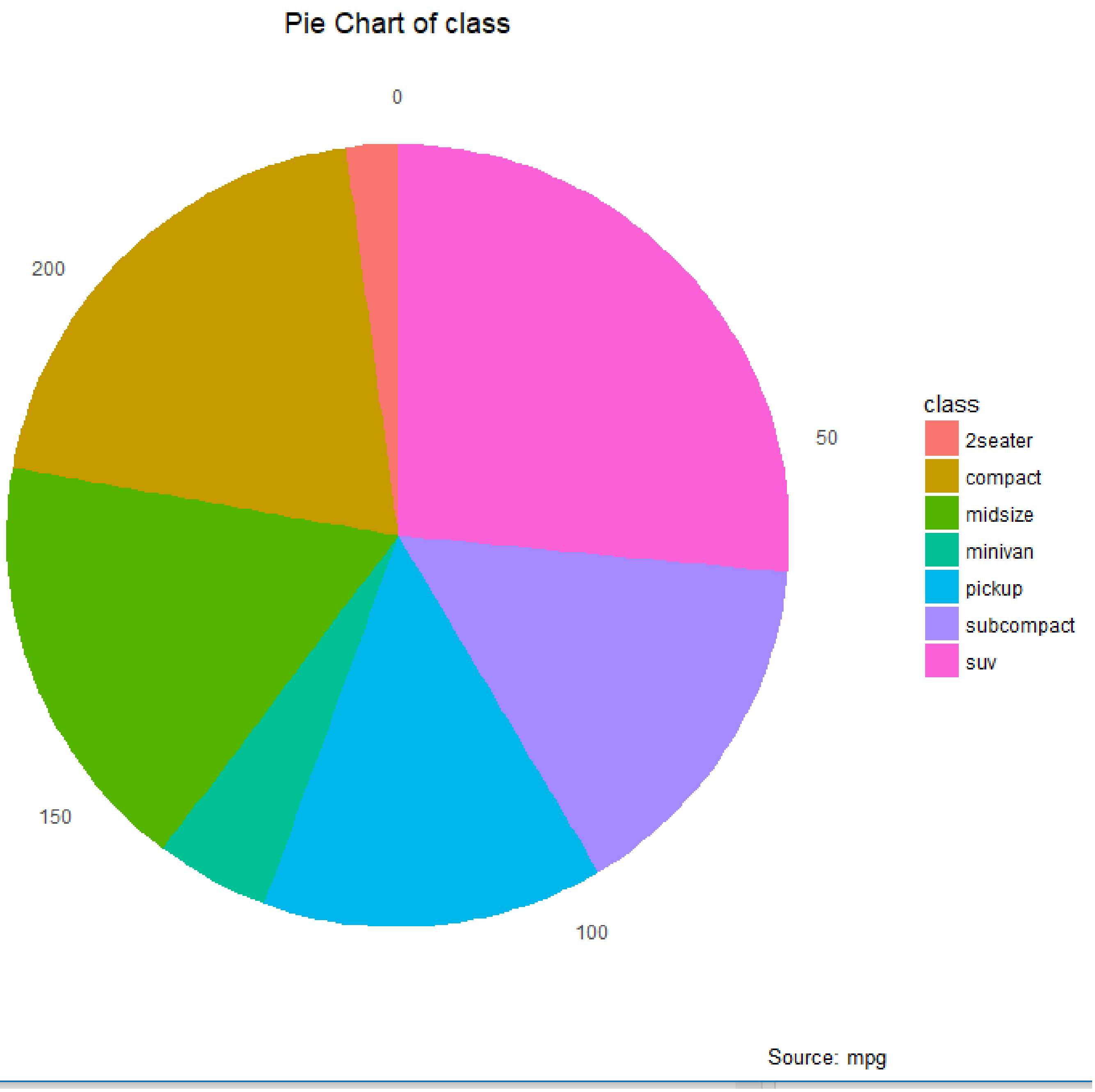
```
var <- mpg$class  # the categorical data

## Prep data (nothing to change here)

nrows <- 10

df <- expand.grid(y = 1:nrows, x = 1:nrows)

categ_table <- round(table(var) * ((nrows*nrows)/(length(var))))

categ_table

#>   2seater    compact    midsize    minivan     pickup subcompact        suv
#>       2      20      18       5      14      15      26

df$category <- factor(rep(names(categ_table), categ_table))

# NOTE: if sum(categ_table) is not 100 (i.e. nrows^2), it will need adjustment to make the sum to 100.

## Plot

ggplot(df, aes(x = x, y = y, fill = category)) +
  geom_tile(color = "black", size = 0.5) +
  scale_x_continuous(expand = c(0, 0)) +
  scale_y_continuous(expand = c(0, 0), trans = 'reverse') +
  scale_fill_brewer(palette = "Set3") +
  labs(title="Waffle Chart", subtitle="'Class' of vehicles",
       caption="Source: mpg") +
  theme(panel.border = element_rect(size = 2),
        plot.title = element_text(size = rel(1.2)),
        axis.text = element_blank(),
        axis.title = element_blank(),
        axis.ticks = element_blank(),
        legend.title = element_blank(),
        legend.position = "right")
```



PLOT 29

Pie chart

```
library(ggplot2)
theme_set(theme_classic())
# Source: Frequency table
df <- as.data.frame(table(mpg$class))
colnames(df) <- c("class", "freq")
pie <- ggplot(df, aes(x = "", y=freq, fill = factor(class))) +
  geom_bar(width = 1, stat = "identity") +  theme(axis.line = element_blank(),
plot.title = element_text(hjust=0.5)) +
  labs(fill="class",
       x=NULL,
       y=NULL,
       title="Pie Chart of class",
       caption="Source: mpg")
pie + coord_polar(theta = "y", start=0)
# Source: Categorical variable.
# mpg$class
pie <- ggplot(mpg, aes(x = "", fill = factor(class))) +
  geom_bar(width = 1) +
  theme(axis.line = element_blank(),
        plot.title = element_text(hjust=0.5)) +
  labs(fill="class",
       x=NULL,
       y=NULL,
       title="Pie Chart of class",
       caption="Source: mpg")
pie + coord_polar(theta = "y", start=0)
```

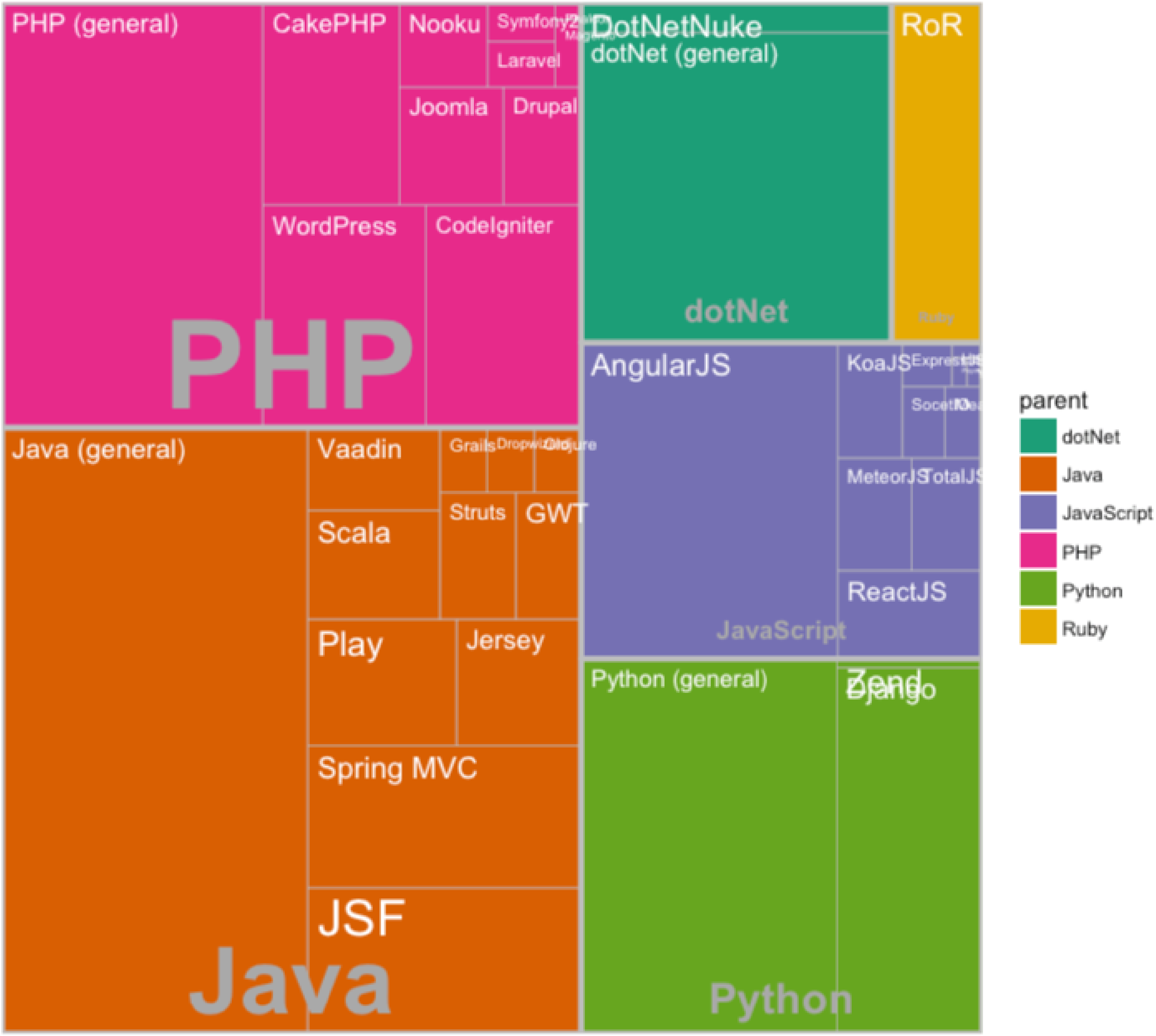

Pie Chart of class

Source: mpg

PLOT 30

Treemap

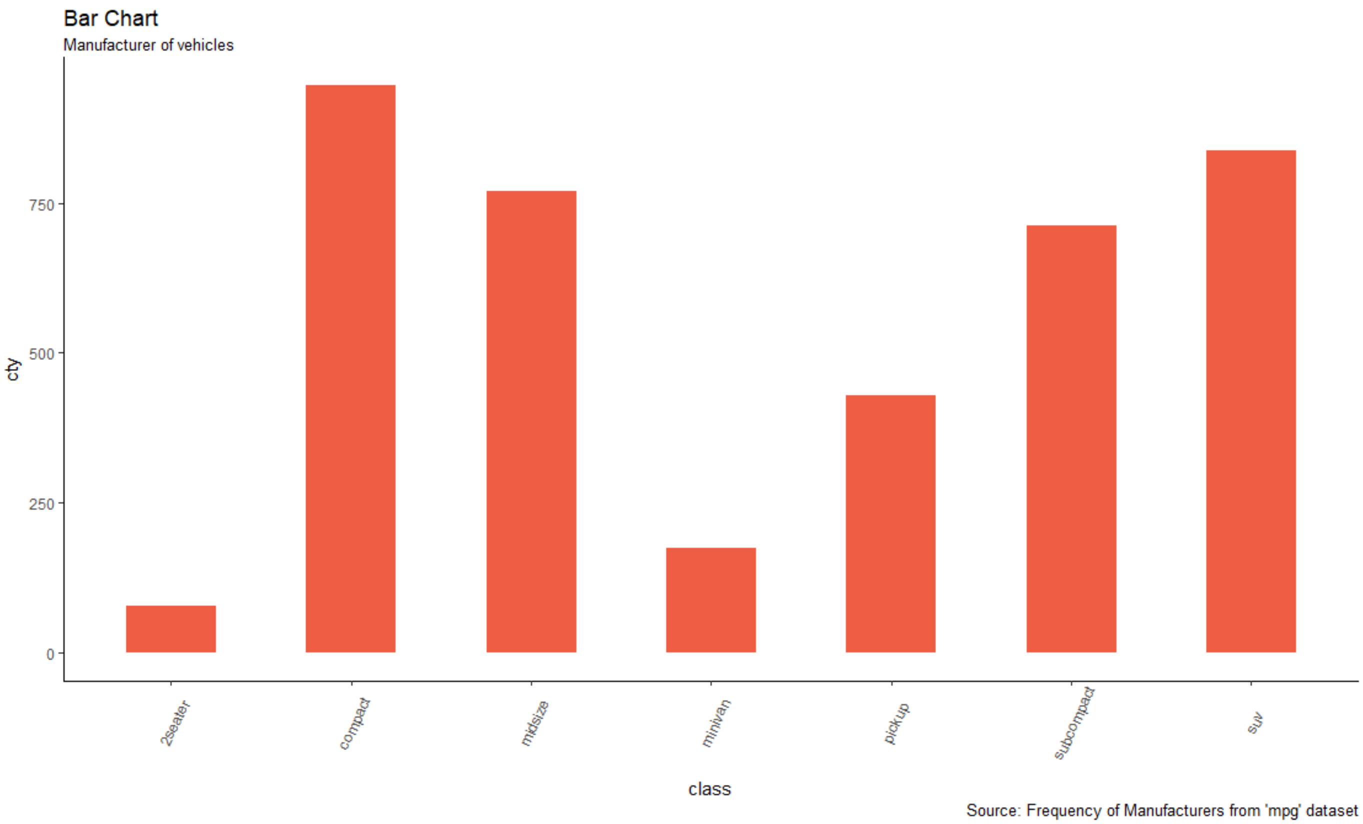
```
library(ggplot2)

library(treemapify)

proglangs <- read.csv("https://raw.githubusercontent.com/selva86/datasets/master/proglanguages.csv")

# plot

treeMapCoordinates <- treemapify(proglangs,

                     area = "value",
                        fill = "parent",
                        label = "id",
                        group = "parent")
treeMapPlot <- geom_treemap(treeMapCoordinates) +
  scale_x_continuous(expand = c(0, 0)) +
  scale_y_continuous(expand = c(0, 0)) +
  scale_fill_brewer(palette = "Dark2")
print(treeMapPlot)
```



PLOT 31

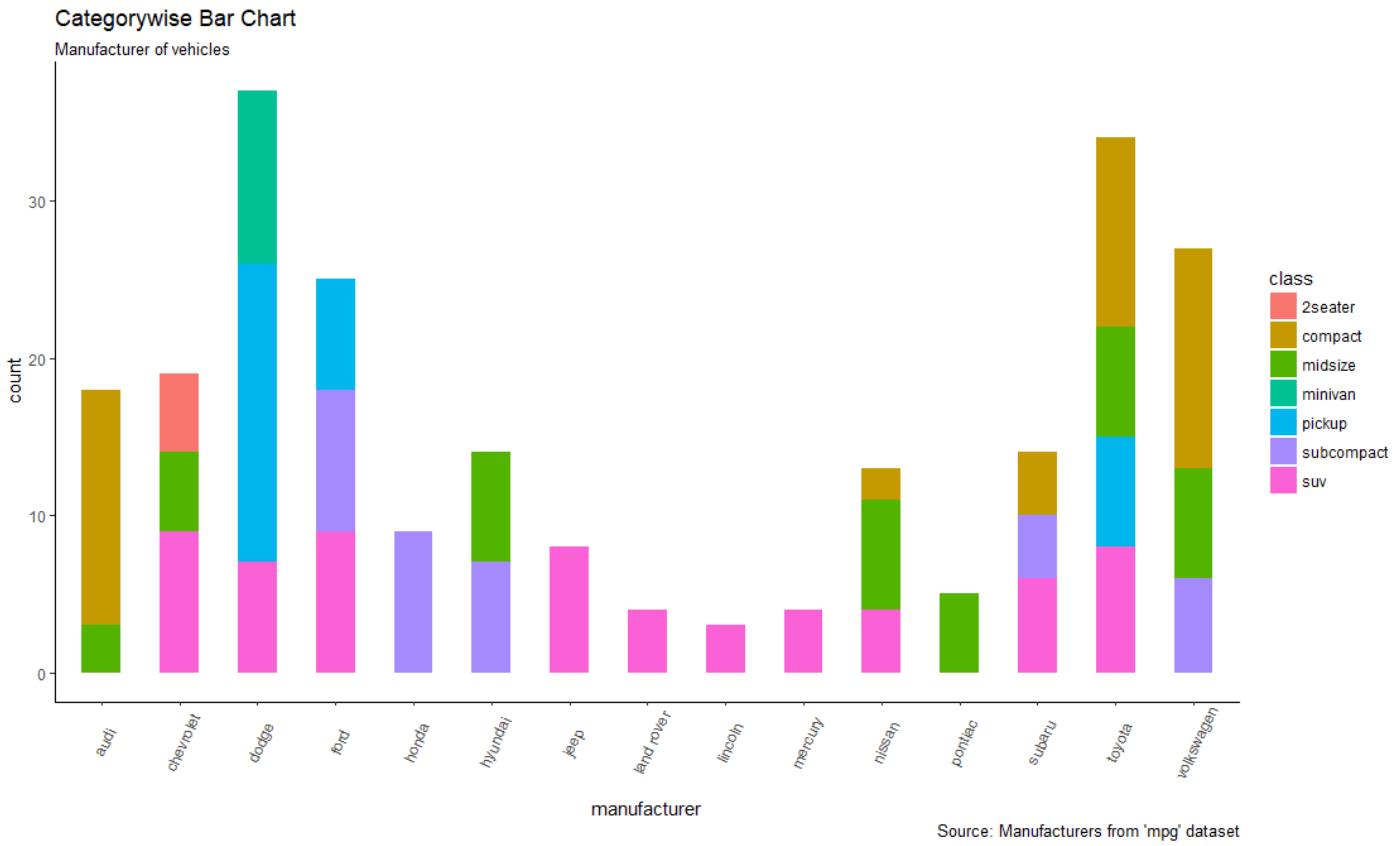
Bar chart

```
# prep frequency table
freqtable <- table(mpg$manufacturer)
df <- as.data.frame.table(freqtable)
head(df)
#>         Var1 Freq
#> 1       audi   18
#> 2   chevrolet   19
#> 3      dodge   37
#> 4       ford   25
#> 5      honda    9
#> 6     hyundai   14
# plot
library(ggplot2)
theme_set(theme_classic())
# Plot
g <- ggplot(df, aes(Var1, Freq))
g + geom_bar(stat="identity", width = 0.5, fill="tomato2") +
  labs(title="Bar Chart",
       subtitle="Manufacturer of vehicles",
       caption="Source: Frequency of Manufacturers from 'mpg' dataset") +
  theme(axis.text.x = element_text(angle=65, vjust=0.6))
```



PLOT 32

```
g <- ggplot(mpg, aes(manufacturer))

g + geom_bar(aes(fill=class), width = 0.5) +

  theme(axis.text.x = element_text(angle=65, vjust=0.6)) +

  labs(title="Categorywise Bar Chart",

       subtitle="Manufacturer of vehicles",

       caption="Source: Manufacturers from 'mpg' dataset")
```



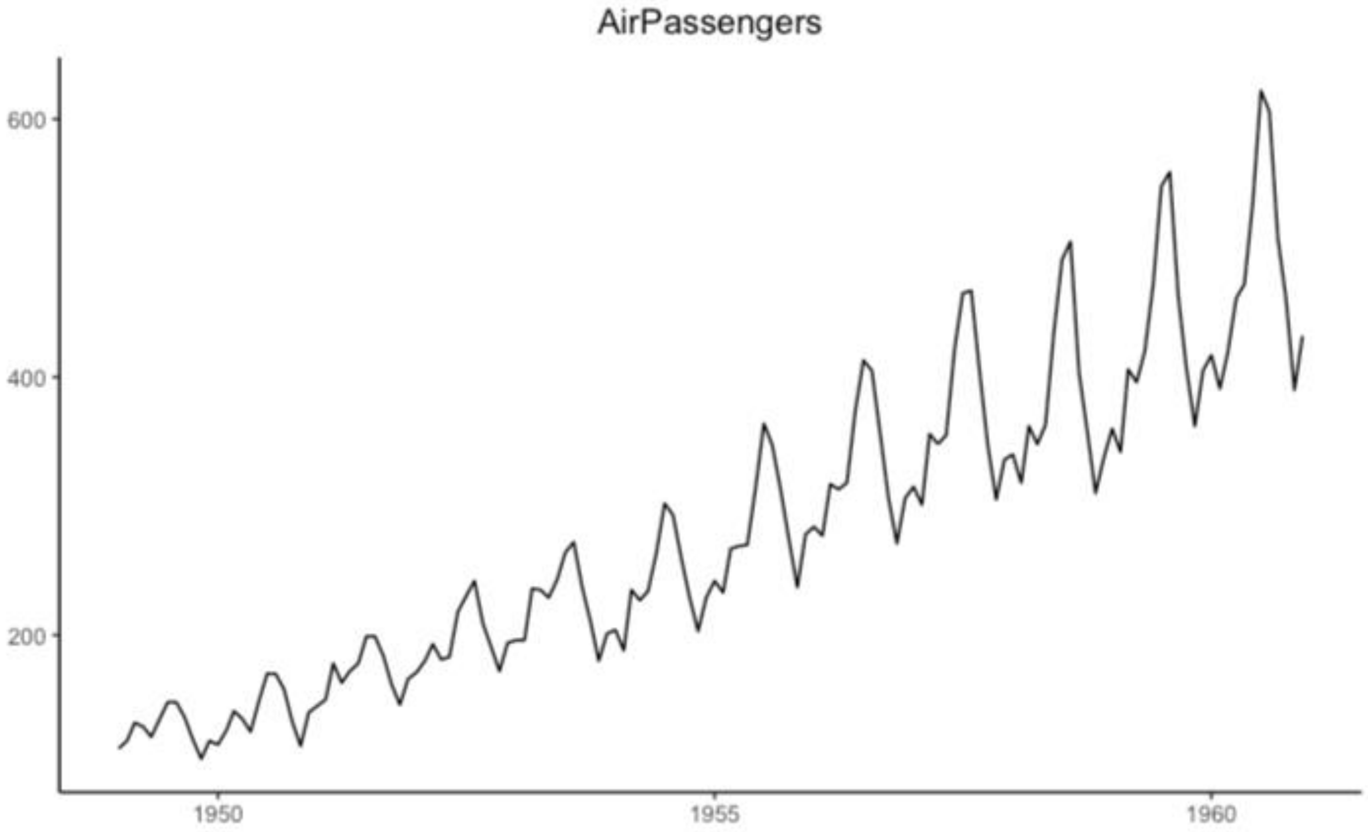
Source: Manufacturers from 'mpg' dataset

CHANGE

PLOT 33

Time series plot from a time series object

```
## From Timeseries object (ts)

library(ggplot2)

library(ggfortify)

theme_set(theme_classic())

# Plot

autoplot(AirPassengers) +

  labs(title="AirPassengers") +

  theme(plot.title = element_text(hjust=0.5))
```

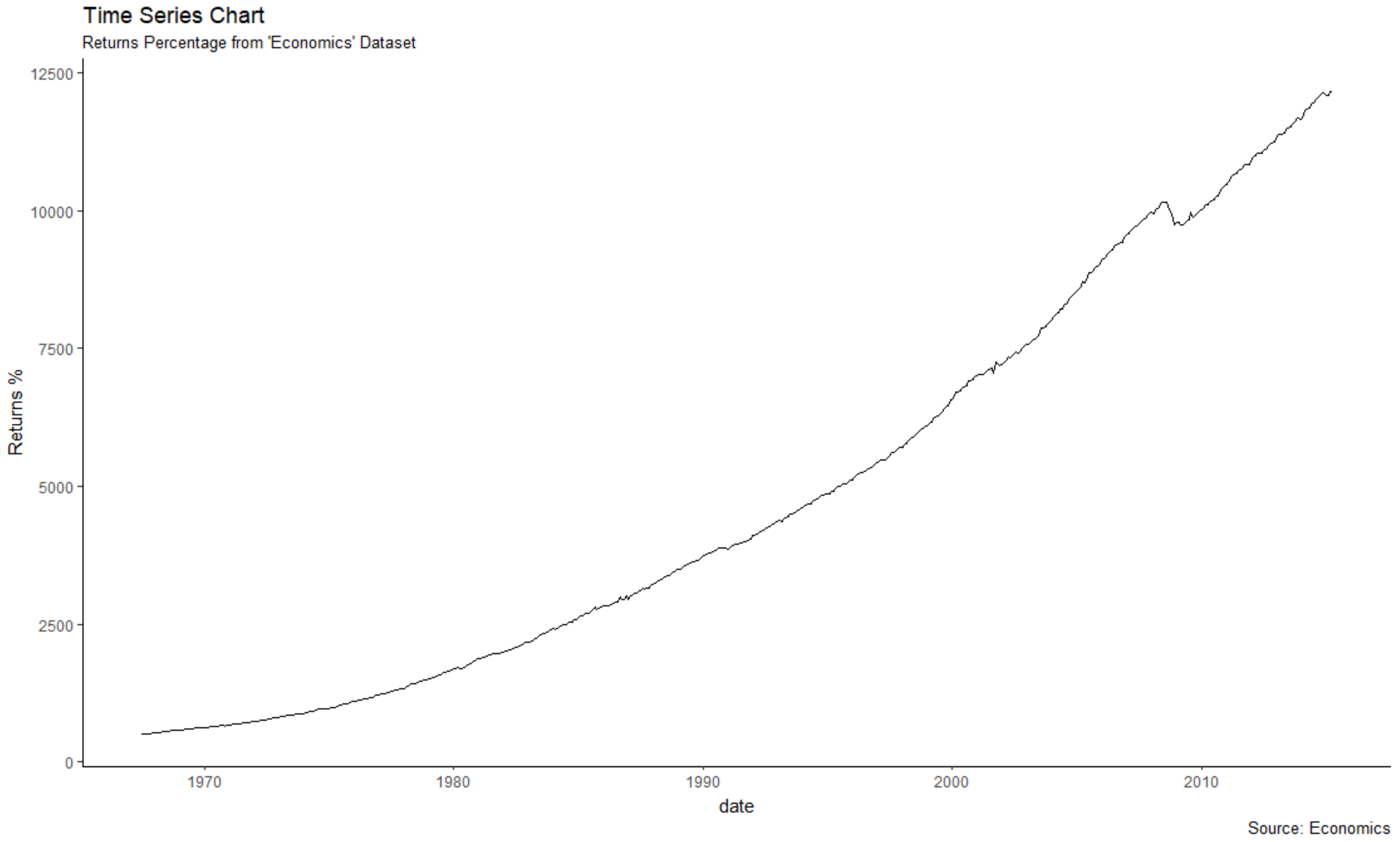


PLOT 34

Time series plot from a data frame

Default X axis labels

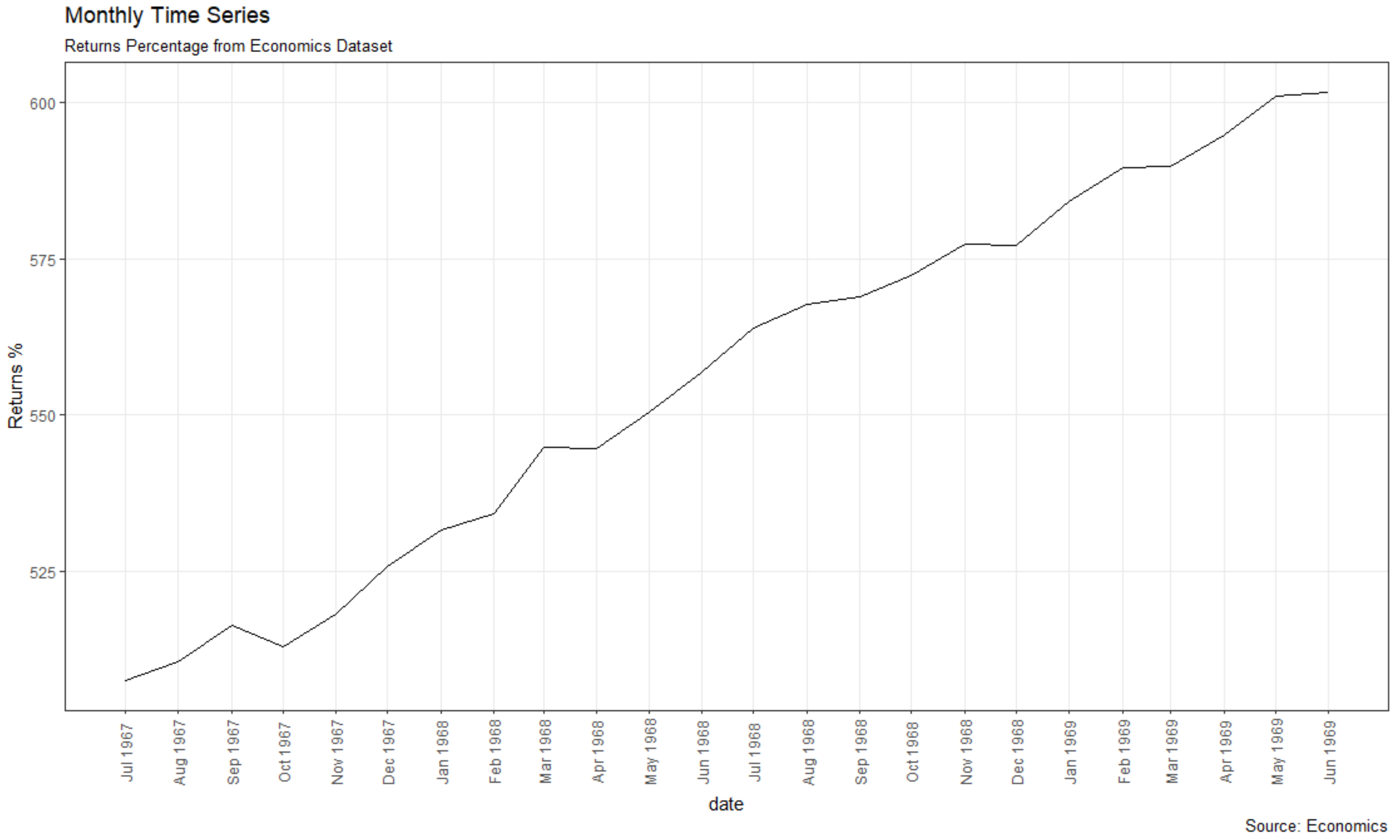
```
library(ggplot2)

theme_set(theme_classic())

# Allow Default X Axis Labels

ggplot(economics, aes(x=date)) +

  geom_line(aes(y=pce)) +

  labs(title="Time Series Chart",

       subtitle="Returns Percentage from 'Economics' Dataset",

       caption="Source: Economics",

       y="Returns %")
```



PLOT 35

Time series plot for monthly time series

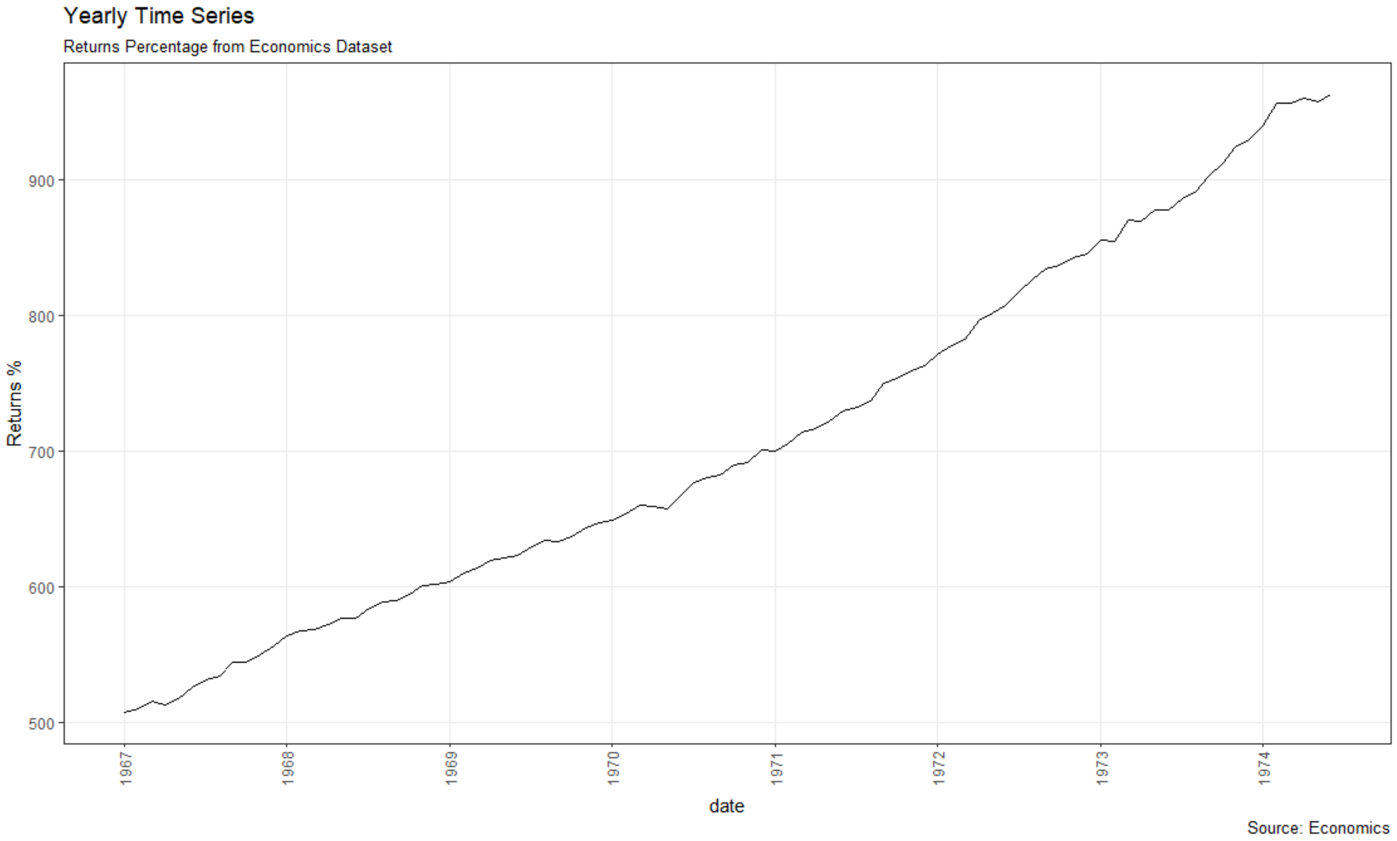
```
library(ggplot2)

library(lubridate)

theme_set(theme_bw())

economics_m <- economics[1:24, ]

# labels and breaks for X axis text

lbls <- paste0(month.abb[month(economics_m$date)], " ",

            lubridate::year(economics_m$date))

brks <- economics_m$date

# plot

ggplot(economics_m, aes(x=date)) +

  geom_line(aes(y=pce)) +

  labs(title="Monthly Time Series",

      subtitle="Returns Percentage from Economics Dataset",

      caption="Source: Economics",

      y="Returns %") +  # title and caption
  scale_x_date(labels = lbls,

               breaks = brks) +  # change to monthly ticks and labels

  theme(axis.text.x = element_text(angle = 90, vjust=0.5),  # rotate x axis text

     panel.grid.minor = element_blank())  # turn off minor grid
```



PLOT 36

Time series plot for yearly time series

```
library(ggplot2)

library(lubridate)

theme_set(theme_bw())

economics_y <- economics[1:90, ]

# labels and breaks for X axis text

brks <- economics_y$date[seq(1, length(economics_y$date), 12)]

lbls <- lubridate::year(brks)

# plot

ggplot(economics_y, aes(x=date)) +

  geom_line(aes(y=pce)) +
  labs(title="Yearly Time Series",
      subtitle="Returns Percentage from Economics Dataset",
      caption="Source: Economics",
      y="Returns %") +  # title and caption
  scale_x_date(labels = lbls,
            breaks = brks) +  # change to monthly ticks and labels
  theme(axis.text.x = element_text(angle = 90, vjust=0.5),  # rotate x axis text
       panel.grid.minor = element_blank())  # turn off minor grid
```

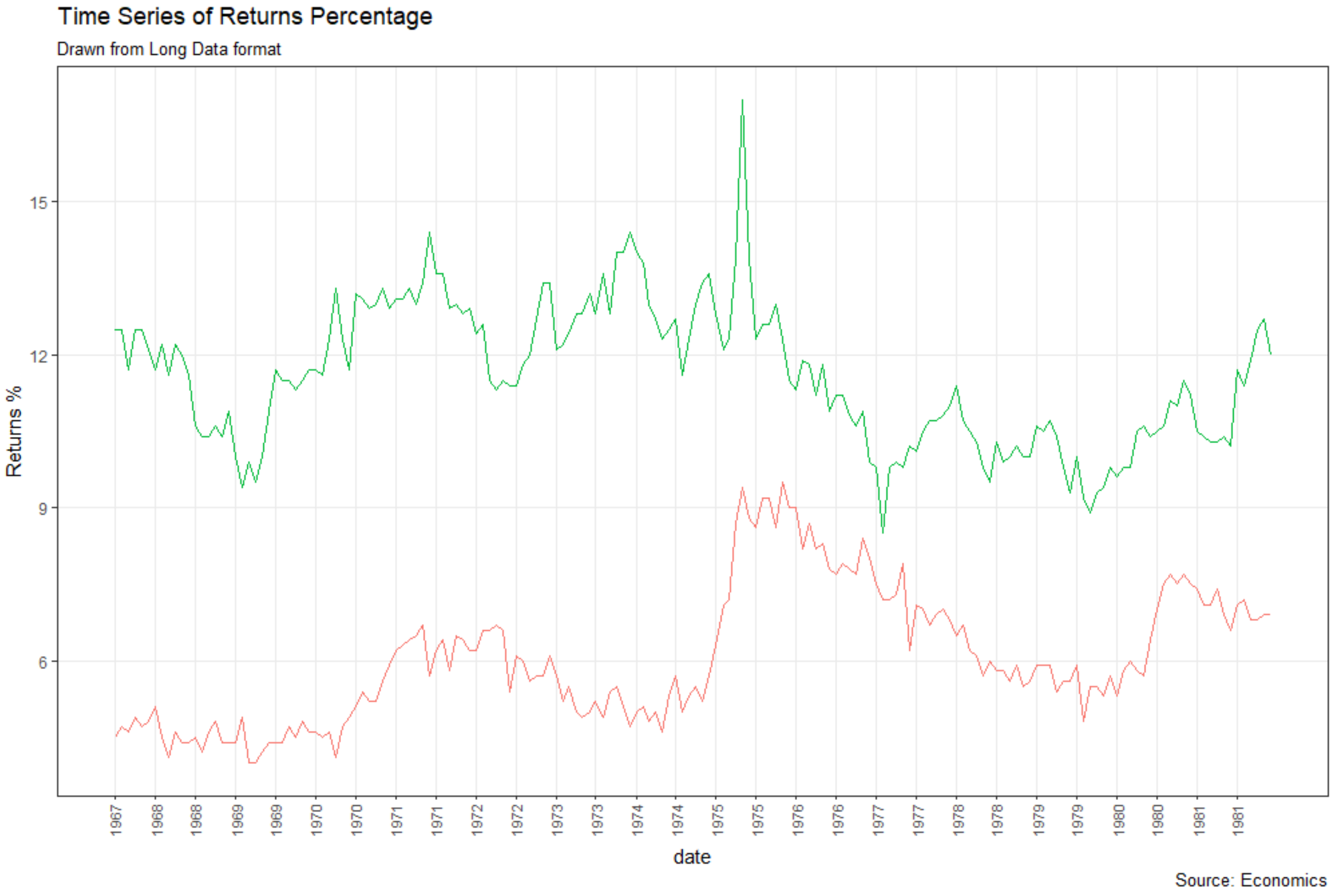


PLOT 37

Time Series Plot From Long Data Format: Multiple Time Series in Same Dataframe Column

```
library(ggplot2)
library(lubridate)
theme_set(theme_bw())
df <- economics_long[economics_long$variable %in% c("psavert", "uempmed"), ]
df <- df[lubridate::year(df$date) %in% c(1967:1981), ]
# labels and breaks for X axis text
```

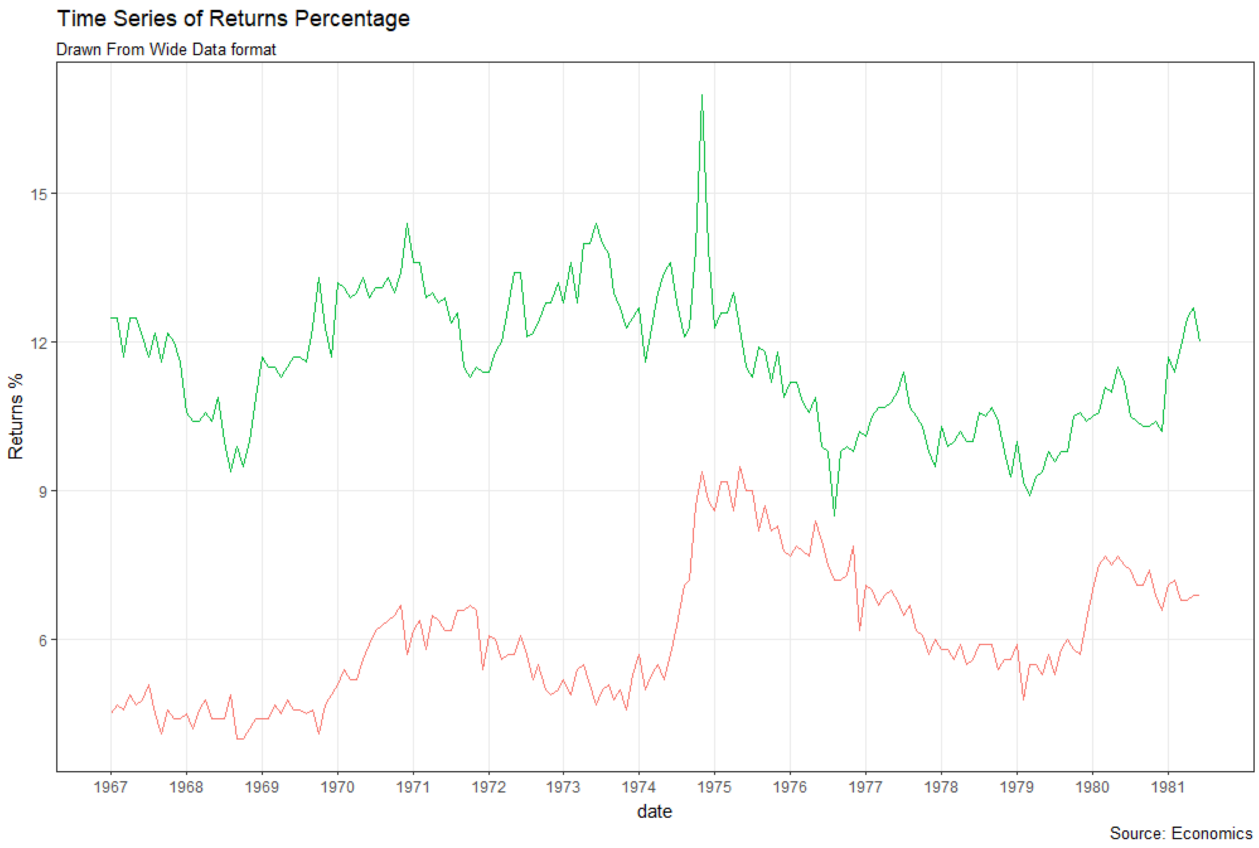
```
brks <- df$date[seq(1, length(df$date), 12)]

lbls <- lubridate::year(brks)

# plot

ggplot(df, aes(x=date)) +

  geom_line(aes(y=value, col=variable)) +

  labs(title="Time Series of Returns Percentage",

       subtitle="Drawn from Long Data format",

       caption="Source: Economics",

       y="Returns %",

       color=NULL) +  # title and caption

  scale_x_date(labels = lbls, breaks = brks) +  # change to monthly ticks and labels

  scale_color_manual(labels = c("psavert", "uempmed"),

                     values = c("psavert"="#00ba38", "uempmed"="#f8766d")) +  # line color

  theme(axis.text.x = element_text(angle = 90, vjust=0.5, size = 8),  # rotate x axis text

        panel.grid.minor = element_blank())  # turn off minor grid
```



PLOT 38

Time Series Plot From Wide Data Format: Data in Multiple Columns of Dataframe

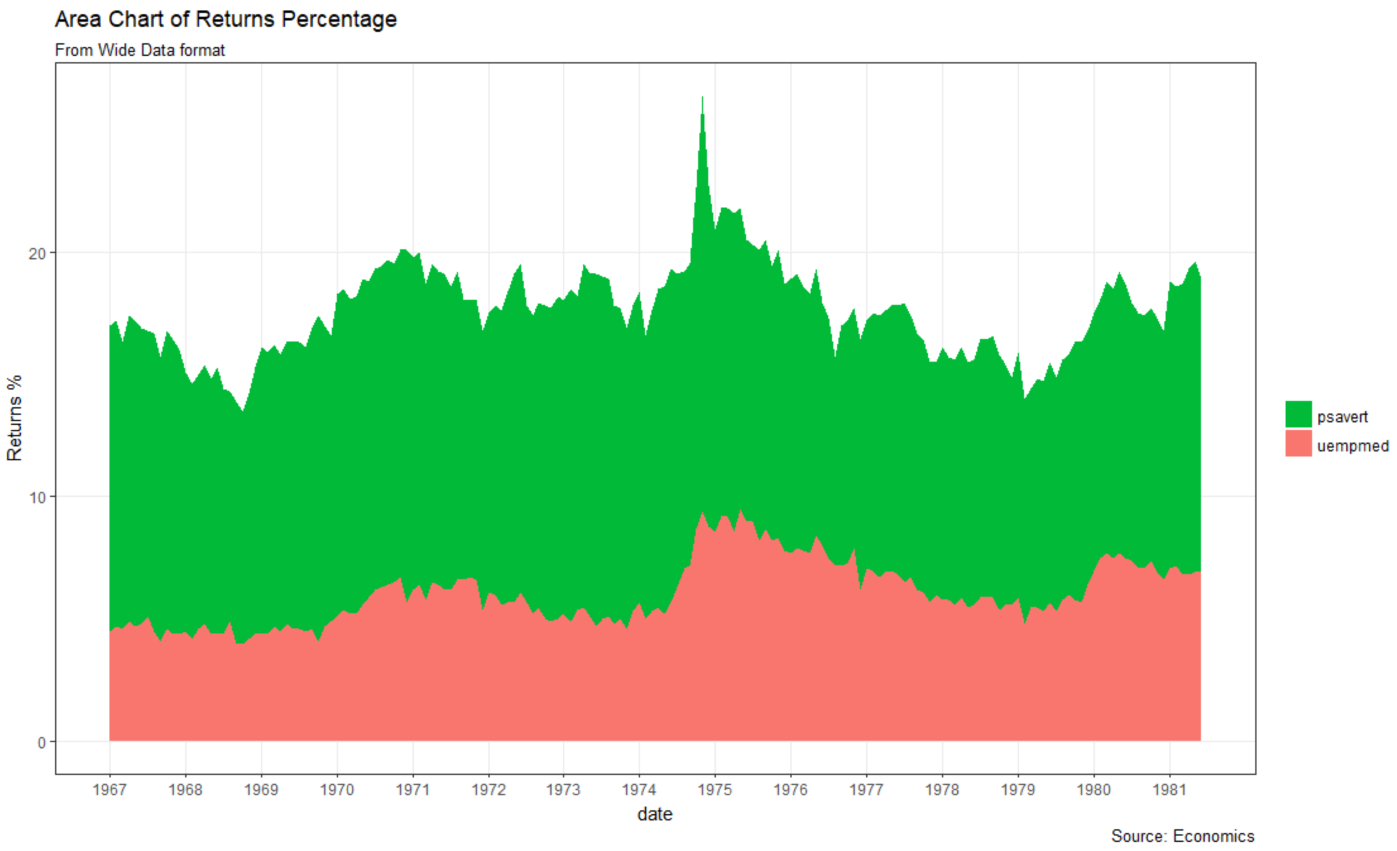
```
library(ggplot2)

library(lubridate)

theme_set(theme_bw())

df <- economics[, c("date", "psavert", "uempmed")]

df <- df[lubridate::year(df$date) %in% c(1967:1981), ]

# labels and breaks for X axis text

brks <- df$date[seq(1, length(df$date), 12)]

lbls <- lubridate::year(brks)

# plot

ggplot(df, aes(x=date)) +

  geom_line(aes(y=psavert, col="psavert")) +

  geom_line(aes(y=uempmed, col="uempmed")) +

  labs(title="Time Series of Returns Percentage",

        subtitle="Drawn From Wide Data format",

        caption="Source: Economics", y="Returns %") +  # title and caption

  scale_x_date(labels = lbls, breaks = brks) +  # change to monthly ticks and labels

  scale_color_manual(name="",

                        values = c("psavert"="#00ba38", "uempmed"="#f8766d")) +  # line color

  theme(panel.grid.minor = element_blank())  # turn off minor grid
```



PLOT 39

Stacked area chart

```
library(ggplot2)

library(lubridate)

theme_set(theme_bw())

df <- economics[, c("date", "psavert", "uempmed")]

df <- df[lubridate::year(df$date) %in% c(1967:1981), ]

# labels and breaks for X axis text

brks <- df$date[seq(1, length(df$date), 12)]

lbls <- lubridate::year(brks)

# plot

ggplot(df, aes(x=date)) +

  geom_area(aes(y=psavert+uempmed, fill="psavert")) +

  geom_area(aes(y=uempmed, fill="uempmed")) +

  labs(title="Area Chart of Returns Percentage",

       subtitle="From Wide Data format",

       caption="Source: Economics",
       y="Returns %") +  # title and caption
  scale_x_date(labels = lbls, breaks = brks) +  # change to monthly ticks and labels
  scale_fill_manual(name="",
                    values = c("psavert"="#00ba38", "uempmed"="#f8766d")) +  # line color
  theme(panel.grid.minor = element_blank())  # turn off minor grid
```



Area Chart of Returns Percentage

From Wide Data format

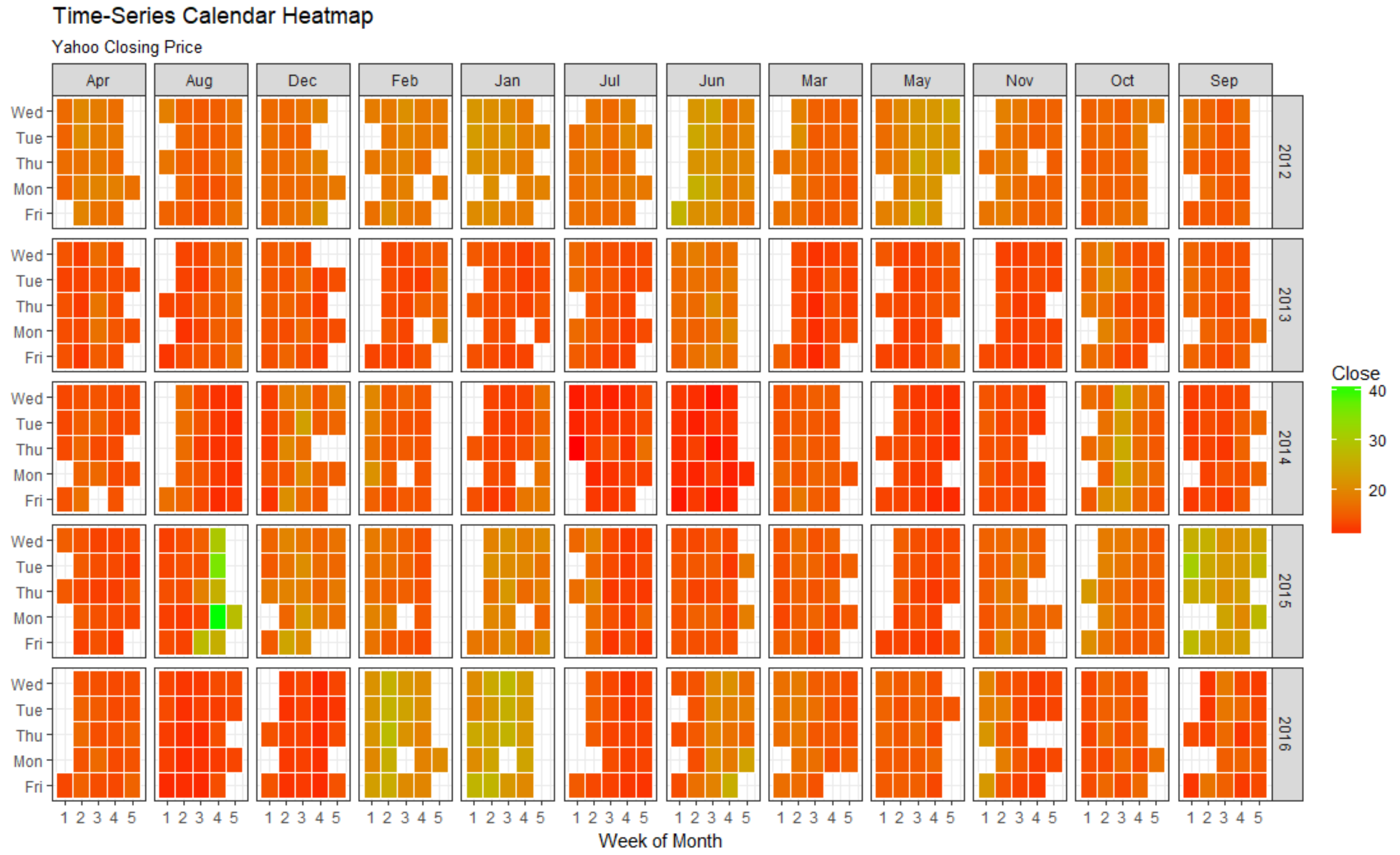
Source: Economics

PLOT 40

Calendar heat map

```
library(ggplot2)
library(plyr)
library(scales)
library(zoo)
df <- read.csv("https://raw.githubusercontent.com/selva86/datasets/master/yahoo.csv")
df$date <- as.Date(df$date)  # format date
df <- df[df$year >= 2012, ]  # filter reqd years
# Create Month Week
df$yearmonth <- as.yearmon(df$date)
```

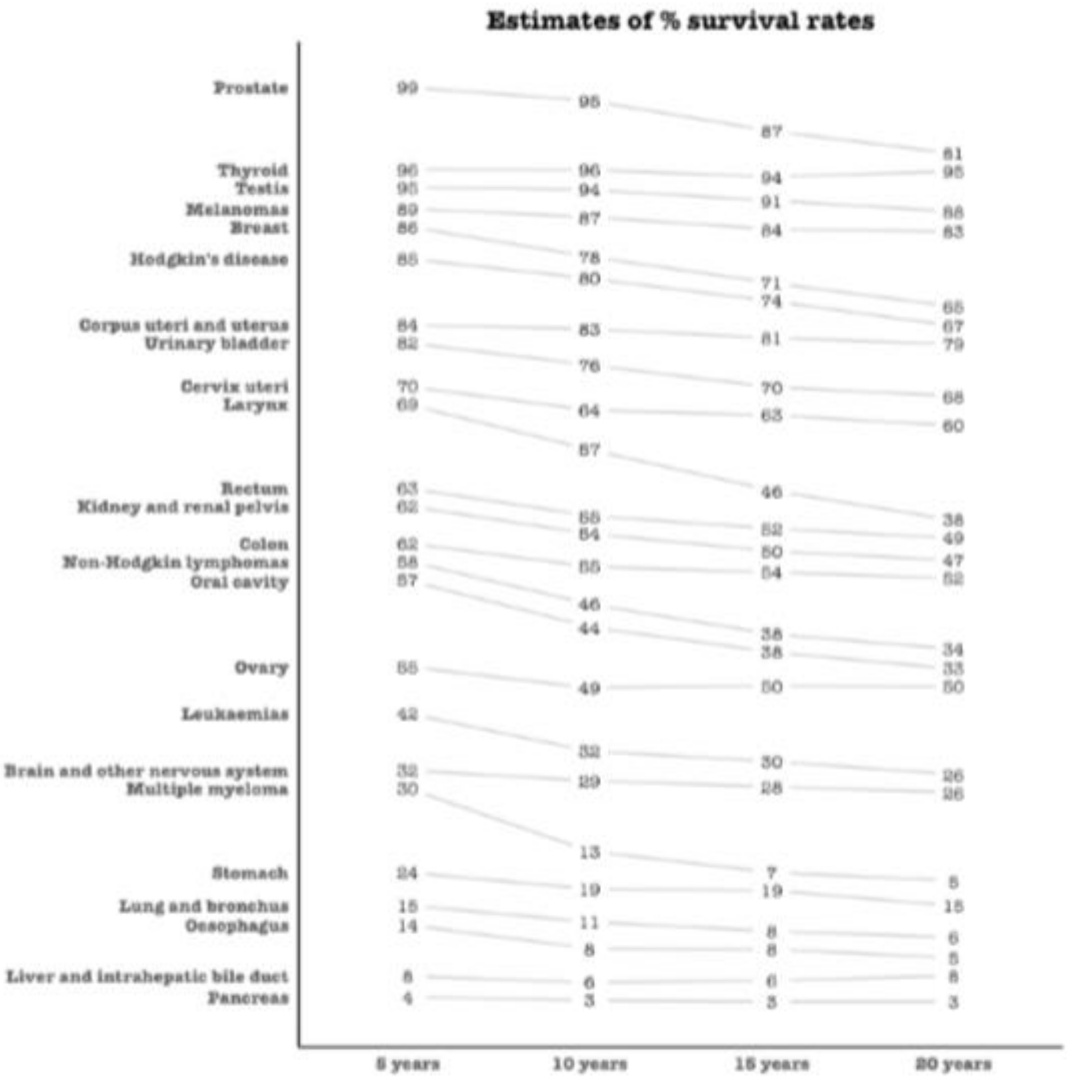
```
df$yearmonthf <- factor(df$yearmonth)

df <- ddply(df,.(yearmonthf), transform, monthweek=1+week-min(week))  # compute week number of month

df <- df[, c("year", "yearmonthf", "monthf", "week", "monthweek", "weekdayf", "VIX.Close")]

head(df)

#>   year yearmonthf monthf week monthweek weekdayf VIX.Close

#> 1 2012   Jan 2012    Jan    1        1     Tue     22.97

#> 2 2012   Jan 2012    Jan    1        1     Wed      22.22

#> 3 2012   Jan 2012    Jan    1        1     Thu     21.48

#> 4 2012   Jan 2012    Jan    1        1     Fri     20.63

#> 5 2012   Jan 2012    Jan    2        2     Mon      21.07

#> 6 2012   Jan 2012    Jan    2        2     Tue     20.69

# Plot

ggplot(df, aes(monthweek, weekdayf, fill = VIX.Close)) +

 geom_tile(colour = "white") +

 facet_grid(year~monthf) +

 scale_fill_gradient(low="red", high="green") +

 labs(x="Week of Month",

     y="",

     title = "Time-Series Calendar Heatmap",

     subtitle="Yahoo Closing Price",

     fill="Close")
```



PLOT 41

Slope chart

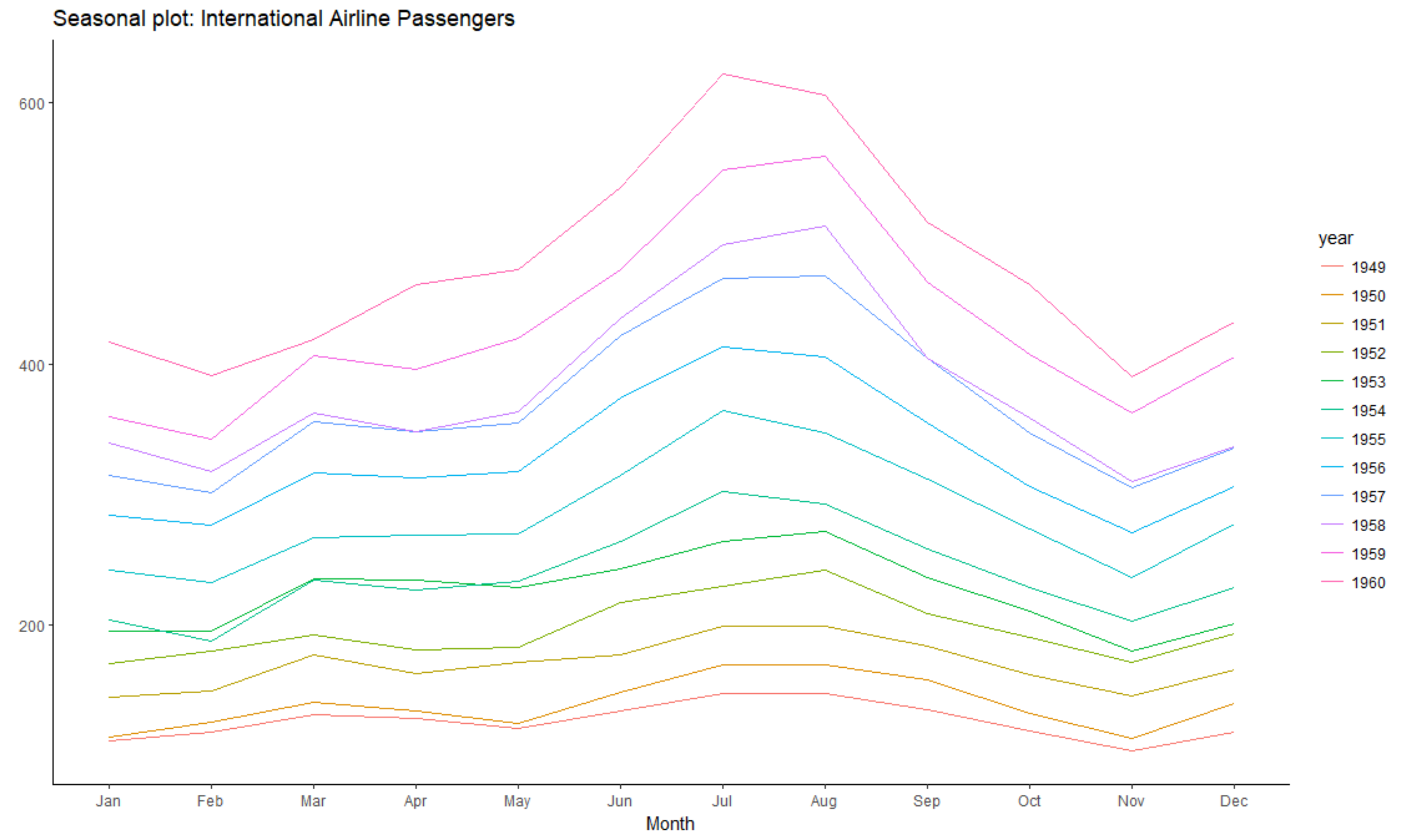
```
library(dplyr)

theme_set(theme_classic())

source_df <- read.csv("https://raw.githubusercontent.com/jkeirstead/rslopegraph/master/cancer_survival_rates.csv")

# Define functions. Source: https://github.com/jkeirstead/r-slopegraph

tufte_sort <- function(df, x="year", y="value", group="group",

                      method="tufte", min.space=0.05) {

  ## First rename the columns for consistency

  ids <- match(c(x, y, group), names(df))

  df <- df[,ids]    names(df) <- c("x", "y", "group")

## Expand grid to ensure every combination has a defined value

  tmp <- expand.grid(x=unique(df$x), group=unique(df$group))

  tmp <- merge(df, tmp, all.y=TRUE)

  df <- mutate(tmp, y=ifelse(is.na(y), 0, y))      ## Cast into a matrix shape and arrange by first column

  require(reshape2)
  tmp <- dcast(df, group ~ x, value.var="y")
  ord <- order(tmp[,2])
  tmp <- tmp[ord,]
min.space <- min.space*diff(range(tmp[,-1]))
yshift <- numeric(nrow(tmp))    ## Start at "bottom" row
## Repeat for rest of the rows until you hit the top
for (i in 2:nrow(tmp)) {
  ## Shift subsequent row up by equal space so gap between
  ## two entries is >= minimum
  mat <- as.matrix(tmp[(i-1):i, -1])
  d.min <- min(diff(mat))
  yshift[i] <- ifelse(d.min < min.space, min.space - d.min, 0)    }
tmp <- cbind(tmp, yshift=cumsum(yshift))
scale <- 1
tmp <- melt(tmp, id=c("group", "yshift"),
            variable.name="x", value.name="y")
## Store these gaps in a separate variable so that they can be scaled
ypos = a*yshift + y
tmp <- transform(tmp, ypos=y + scale*yshift)
return(tmp)   }
plot_slopegraph <- function(df)
{
  ylabs <- subset(df, x==head(x,1))$group
  yvals <- subset(df, x==head(x,1))$ypos
  fontSize <- 3
  gg <- ggplot(df,aes(x=x,y=ypos)) +
    geom_line(aes(group=group),colour="grey80") +
    geom_point(colour="white",size=8) +
    geom_text(aes(label=y),
              size=fontSize,
              family="American Typewriter") +
  scale_y_continuous(name="", breaks=yvals, labels=ylabs)
 return(gg)
 }
## Prepare data
df <- tufte_sort(source_df,
         x="year",
         y="value",
         group="group",
         method="tufte",
         min.space=0.05)
df <- transform(df,
        x=factor(x, levels=c(5,10,15,20),
             labels=c("5 years","10 years","15 years","20 years")),
        y=round(y))
## Plot
plot_slopegraph(df) + labs(title="Estimates of % survival rates") +
 theme(axis.title=element_blank(),
    axis.ticks = element_blank(),
    plot.title = element_text(hjust=0.5,
                 family = "American Typewriter",
                 face="bold"),
    axis.text = element_text(family = "American Typewriter",
                face="bold"))
```



PLOT 42

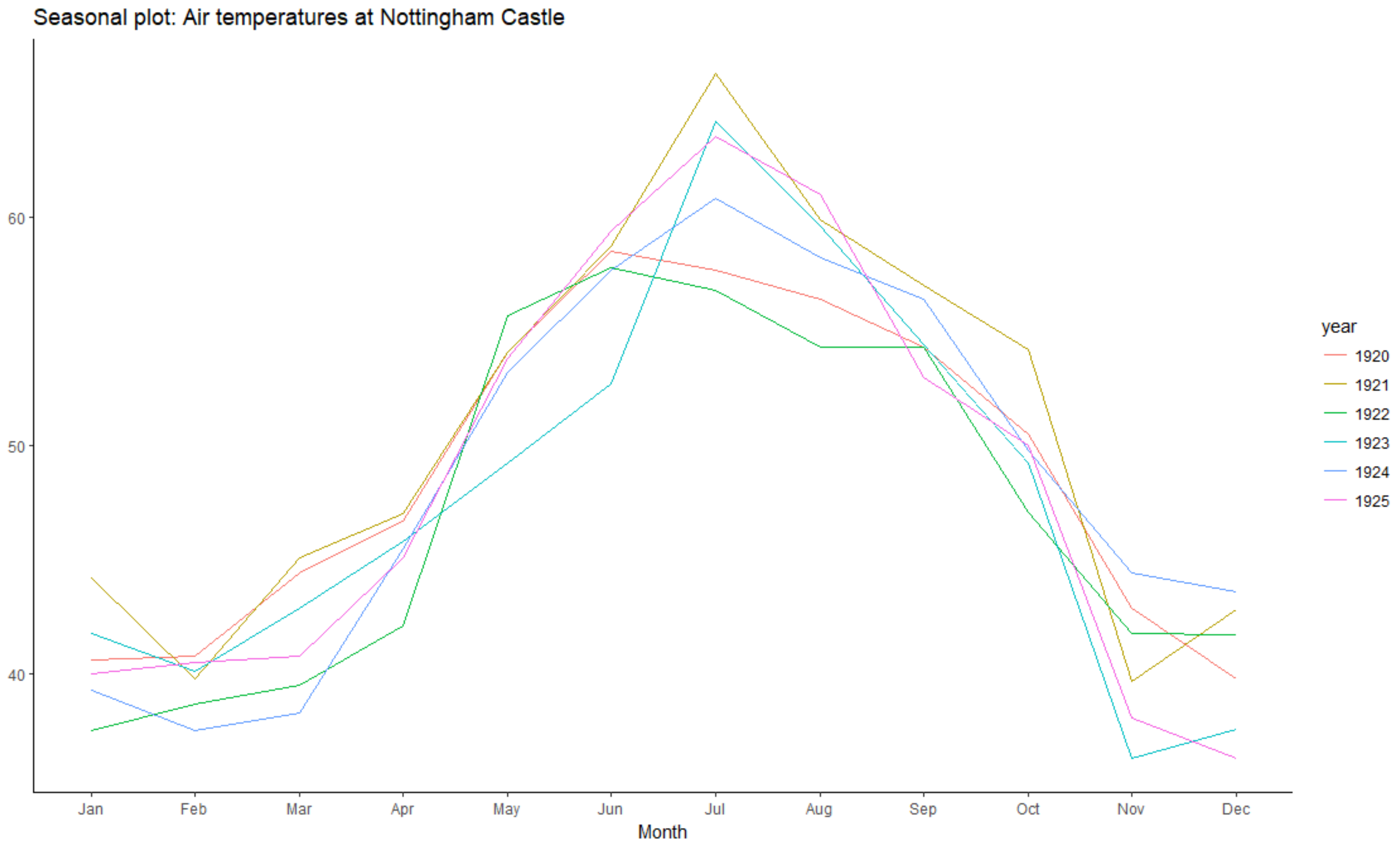
Seasonal plot

```
library(ggplot2)

library(forecast)

theme_set(theme_classic())

# Subset data

nottem_small <- window(nottem, start=c(1920, 1), end=c(1925, 12))

# subset a smaller timewindow


# Plot

ggseasonplot(AirPassengers) +

  labs(title="Seasonal plot: International Airline Passengers")
```



PLOT 43

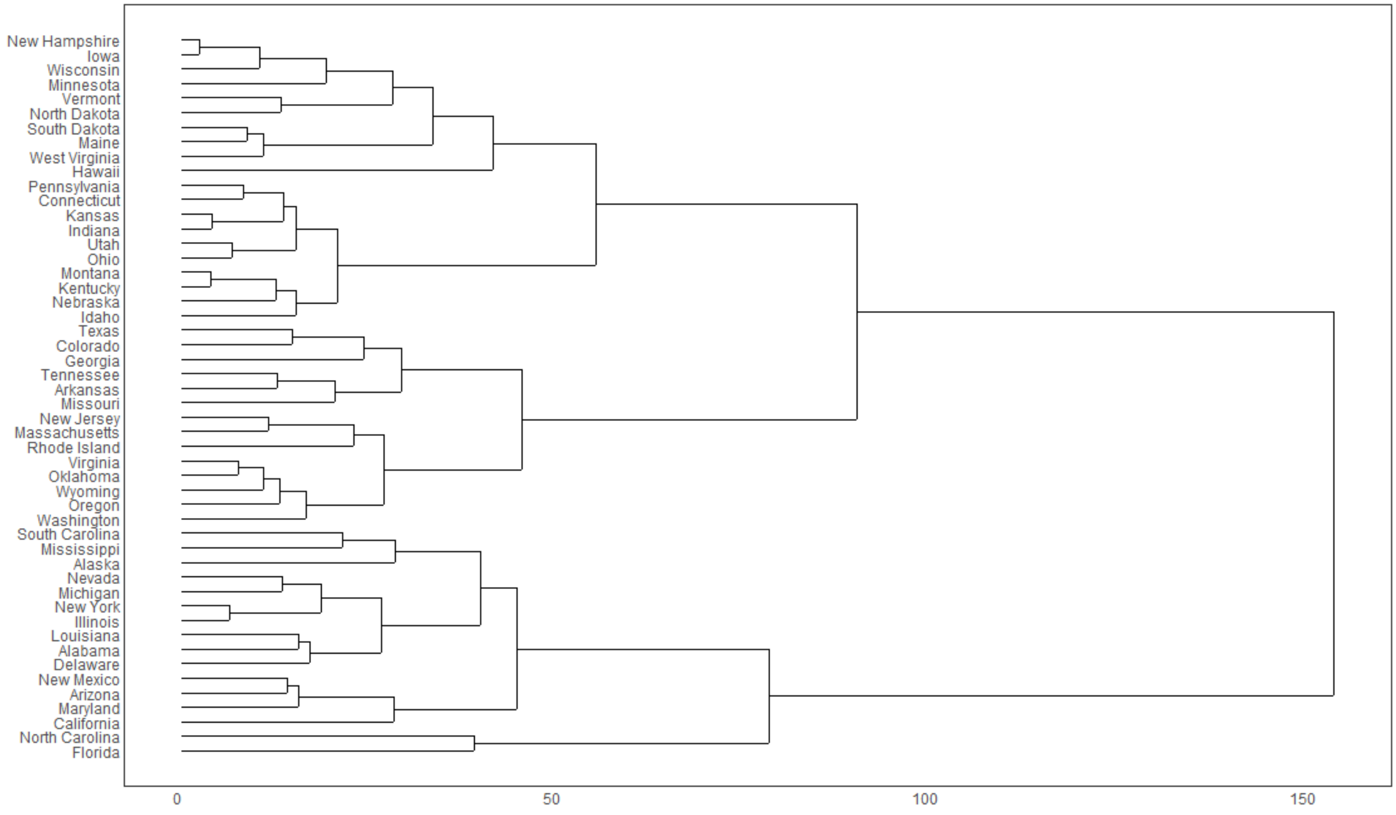
```
ggseasonplot(nottem_small) +
  labs(title="Seasonal plot: Air temperatures at Nottingham Castle")
```



PLOT 44

Hierarchial Dendogram

```
library(ggplot2)

library(ggdendro)

theme_set(theme_bw())

hc <- hclust(dist(USArrests), "ave")  # hierarchical clustering

# plot

ggdendrogram(hc, rotate = TRUE, size = 2)
```

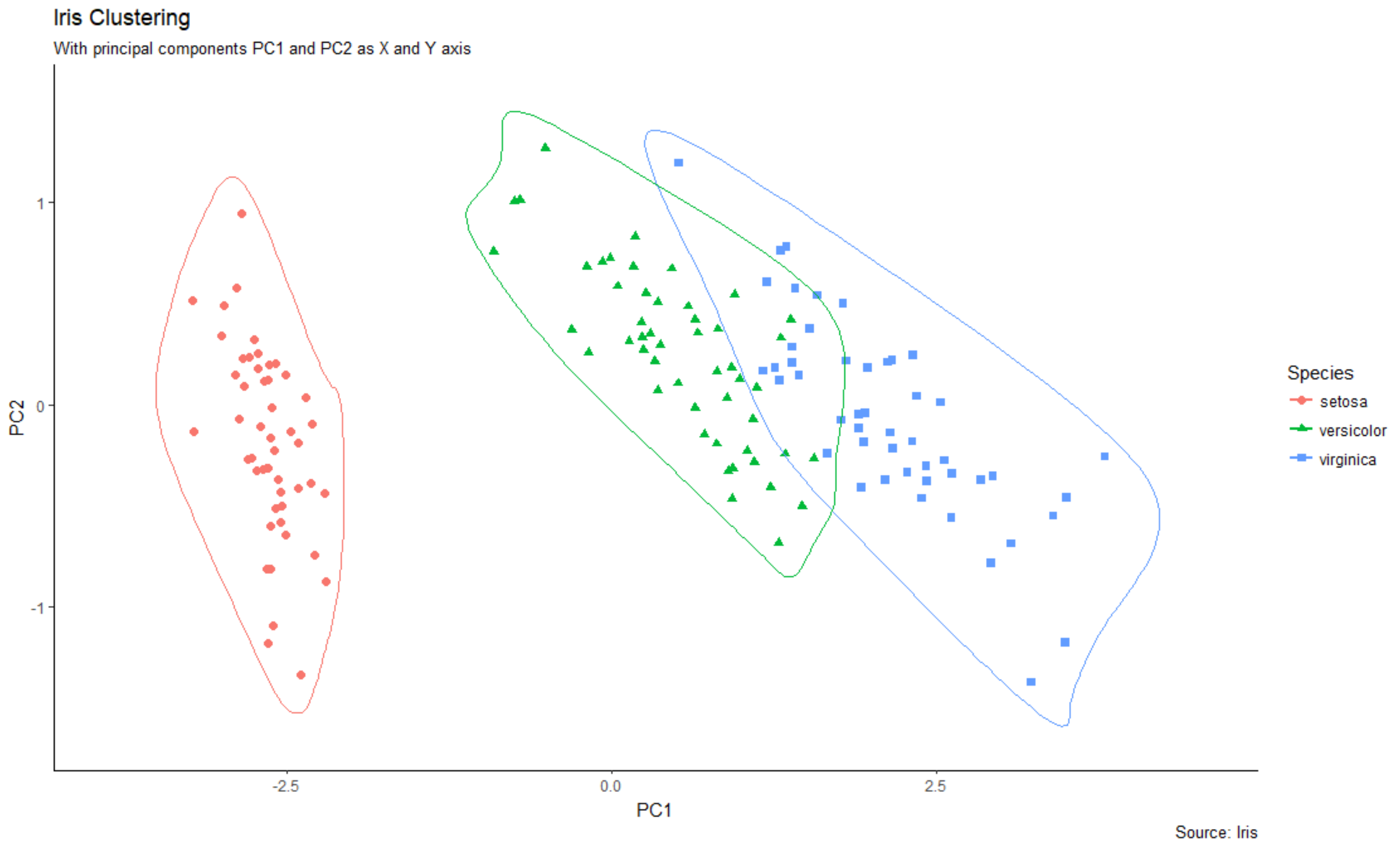


PLOT 45

Clustering

```
library(ggplot2)

library(ggalt)

library(ggfortify)

theme_set(theme_classic())

# Compute data with principal components ------------------

df <- iris[c(1, 2, 3, 4)]

pca_mod <- prcomp(df)  # compute principal components

# Data frame of principal components ----------------------

df_pc <- data.frame(pca_mod$x, Species=iris$Species)

# dataframe of principal components

df_pc_vir <- df_pc[df_pc$Species == "virginica", ]

# df for 'virginica'

df_pc_set <- df_pc[df_pc$Species == "setosa", ]

# df for 'setosa'
```

```
df_pc_ver <- df_pc[df_pc$Species == "versicolor", ]

# df for 'versicolor'

# Plot ---------------------------------------------------

 ggplot(df_pc, aes(PC1, PC2, col=Species)) +

 geom_point(aes(shape=Species), size=2) +   # draw points

 labs(title="Iris Clustering",

      subtitle="With principal components PC1 and PC2 as X and Y axis",

      caption="Source: Iris") +

 coord_cartesian(xlim = 1.2 * c(min(df_pc$PC1), max(df_pc$PC1)),

                 ylim = 1.2 * c(min(df_pc$PC2), max(df_pc$PC2))) +   # change axis limits

 geom_encircle(data = df_pc_vir, aes(x=PC1, y=PC2)) +   # draw circles

 geom_encircle(data = df_pc_set, aes(x=PC1, y=PC2)) +

 geom_encircle(data = df_pc_ver, aes(x=PC1, y=PC2))
```

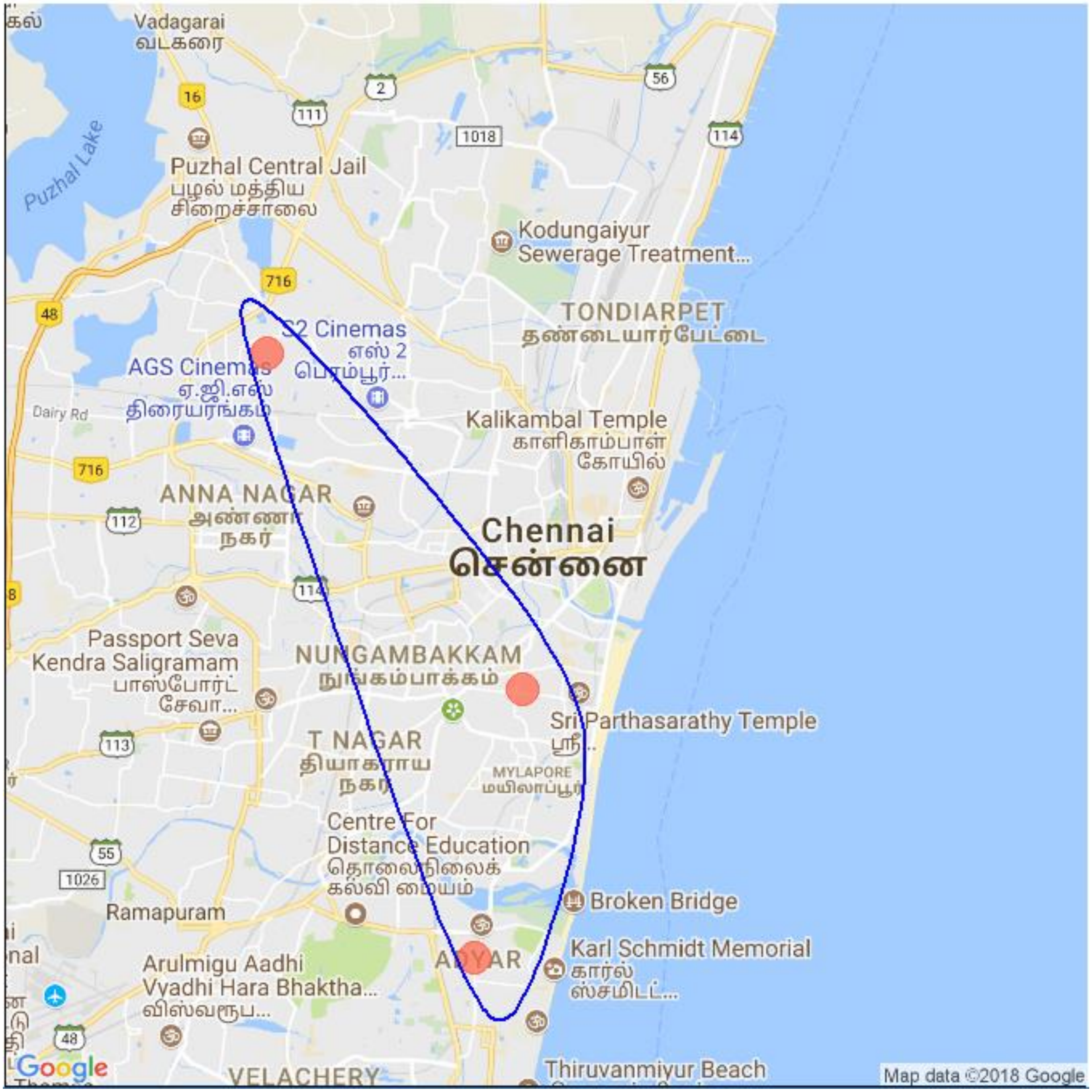


PLOT 46

Spatial

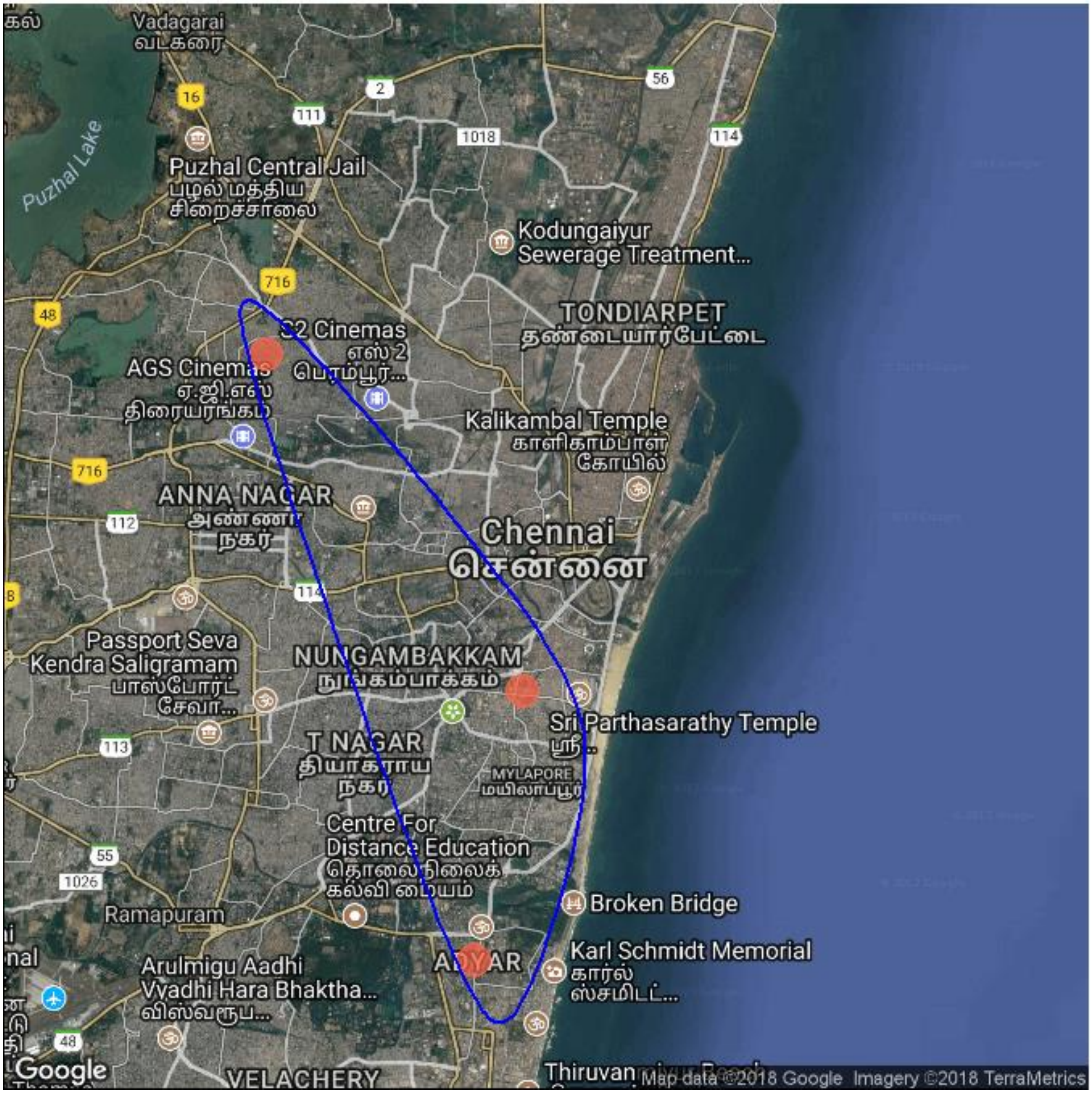
```
library(ggplot2)

library(ggmap)
library(ggalt)

# Get Chennai's Coordinates --------------------------------

chennai <-  geocode("Chennai")  # get longitude and latitude

# Get the Map ----------------------------------------------

# Google Satellite Map

chennai_ggl_sat_map <- qmap("chennai", zoom=12,

              source = "google", maptype="satellite")

# Google Road Map

chennai_ggl_road_map <- qmap("chennai", zoom=12,

              source = "google", maptype="roadmap")

# Google Hybrid Map

chennai_ggl_hybrid_map <- qmap("chennai", zoom=12,

               source = "google", maptype="hybrid")

# Open Street Map

chennai_osm_map <- qmap("chennai", zoom=12, source = "osm")

# Get Coordinates for Chennai's Places --------------------

chennai_places <- c("Kolathur",

          "Washermanpet",

          "Royapettah",

          "Adyar",

          "Guindy")

places_loc <- geocode(chennai_places)  # get longitudes and latitudes

# Plot Open Street Map -------------------------------------

chennai_osm_map + geom_point(aes(x=lon, y=lat),

              data = places_loc,

              alpha = 0.7,

              size = 7,

              color = "tomato") +

  geom_encircle(aes(x=lon, y=lat),

        data = places_loc, size = 2, color = "blue")

# Plot Google Road Map -------------------------------------
```

```
chennai_ggl_road_map + geom_point(aes(x=lon, y=lat),

                         data = places_loc,

                         alpha = 0.7,

                         size = 7,

                         color = "tomato") +

 geom_encircle(aes(x=lon, y=lat),

            data = places_loc, size = 2, color = "blue")
```



PLOT 47

```
# Google Hybrid Map ---------------------------------------

chennai_ggl_hybrid_map + geom_point(aes(x=lon, y=lat),

                                   data = places_loc,

                                   alpha = 0.7,

                                   size = 7,

                                   color = "tomato") +

  geom_encircle(aes(x=lon, y=lat),

                data = places_loc, size = 2, color = "blue")
```


Vadagarai
வடகரை
Puzhal Lake
16
2
111
1018
56
114
Puzhal Central Jail
புழல் மத்திய
சிறைச்சாலை
Kodungaiyur
Sewerage Treatment...
716
48
S2 Cinemas
எஸ் 2
பெரம்பூர்...
TONDIARPET
தண்டையார்பேட்டை
AGS Cinemas
ஏ.ஜி.எஸ்
திரையரங்கம்
Kalikambal Temple
காளிகாம்பாள்
கோயில்
716
ANNA NAGAR
அண்ணா
நகர்
112
Chennai
சென்னை
114
Passport Seva
Kendra Saligramam
பாஸ்போர்ட்
சேவா...
NUNGAMBAKKAM
நுங்கம்பாக்கம்
Sri Parthasarathy Temple
ஸ்ரீ...
113
T NAGAR
தியாகராய
நகர்
MYLAPORE
மயிலாப்பூர்
Centre For
Distance Education
தொலைநிலைக்
கல்வி மையம்
55
1026
Ramapuram
Broken Bridge
Karl Schmidt Memorial
கார்ல்
ஸ்சமிடட்...
Arulmigu Aadhi
Vyadhi Hara Bhaktha...
விஸ்வரூப...
ADYAR
48
Google
VELACHERY
Thiruvanmiyur Beach
Map data ©2018 Google Imagery ©2018 TerraMetrics