Wrangling and Graphing

```
data(anscombe)

ans <- anscombe

str(ans)
```

```
'data.frame':   11 obs. of  8 variables:
 $ x1: num  10 8 13 9 11 14 6 4 12 7 ...
 $ x2: num  10 8 13 9 11 14 6 4 12 7 ...
 $ x3: num  10 8 13 9 11 14 6 4 12 7 ...
 $ x4: num  8 8 8 8 8 8 8 19 8 8 ...
 $ y1: num  8.04 6.95 7.58 8.81 8.33 ...
 $ y2: num  9.14 8.14 8.74 8.77 9.26 8.1 6.13 3.1 9.13 7.26 ...
 $ y3: num  7.46 6.77 12.74 7.11 7.81 ...
 $ y4: num  6.58 5.76 7.71 8.84 8.47 7.04 5.25 12.5 5.56 7.91 ...
```

```
ans <- as_tibble(anscombe)
```

```
glimpse(ans)
```

```
Observations: 11
Variables: 8
$ x1 <dbl> 10, 8, 13, 9, 11, 14, 6, 4, 12, 7, 5
$ x2 <dbl> 10, 8, 13, 9, 11, 14, 6, 4, 12, 7, 5
$ x3 <dbl> 10, 8, 13, 9, 11, 14, 6, 4, 12, 7, 5
$ x4 <dbl> 8, 8, 8, 8, 8, 8, 8, 19, 8, 8, 8
$ y1 <dbl> 8.04, 6.95, 7.58, 8.81, 8.33, 9.96, 7.24, 4.26, 10.84, 4.82, 5.68
$ y2 <dbl> 9.14, 8.14, 8.74, 8.77, 9.26, 8.10, 6.13, 3.10, 9.13, 7.26, 4.74
$ y3 <dbl> 7.46, 6.77, 12.74, 7.11, 7.81, 8.84, 6.08, 5.39, 8.15, 6.42, 5.73
$ y4 <dbl> 6.58, 5.76, 7.71, 8.84, 8.47, 7.04, 5.25, 12.50, 5.56, 7.91, 6.89
```

```
ans %>%
   summarize(mean.x1 = mean(x1),
             mean.x2 = mean(x2),
             mean.y1 = mean(y1),
             mean.y2 = mean(y2))
```

```
# A tibble: 1 x 4
  mean.x1 mean.x2 mean.y1 mean.y2
    <dbl>   <dbl>   <dbl>   <dbl>
1       9       9    7.50    7.50
```

```
ans %>%
   summarize(sd.x1 = sd(x1),
             sd.x2 = sd(x2),
```

Table 1: Regressions of y1 on x1 and y2 on x2

	mod1	mod2
(Intercept)	3.00*	3.00*
	(1.12)	(1.12)
x1	0.50**	
	(0.12)	
x2		0.50**
		(0.12)
R^2	0.67	0.67
Adj. R^2	0.63	0.63
Num. obs.	11	11
RMSE	1.24	1.24

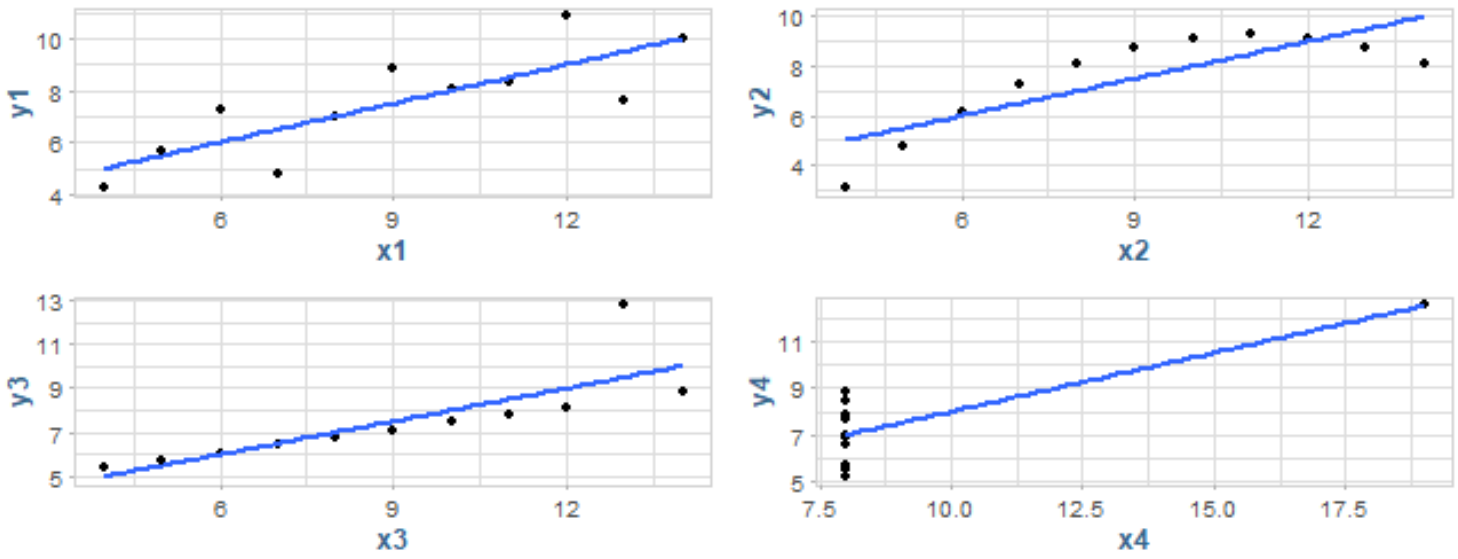
$^{***}p < 0.001, ^{**}p < 0.01, ^{*}p < 0.05$

```
            sd.y1 = sd(y1),
            sd.y2 = sd(y2))
```

```
# A tibble: 1 x 4
  sd.x1 sd.x2 sd.y1 sd.y2
  <dbl> <dbl> <dbl> <dbl>
1  3.32  3.32  2.03  2.03
```

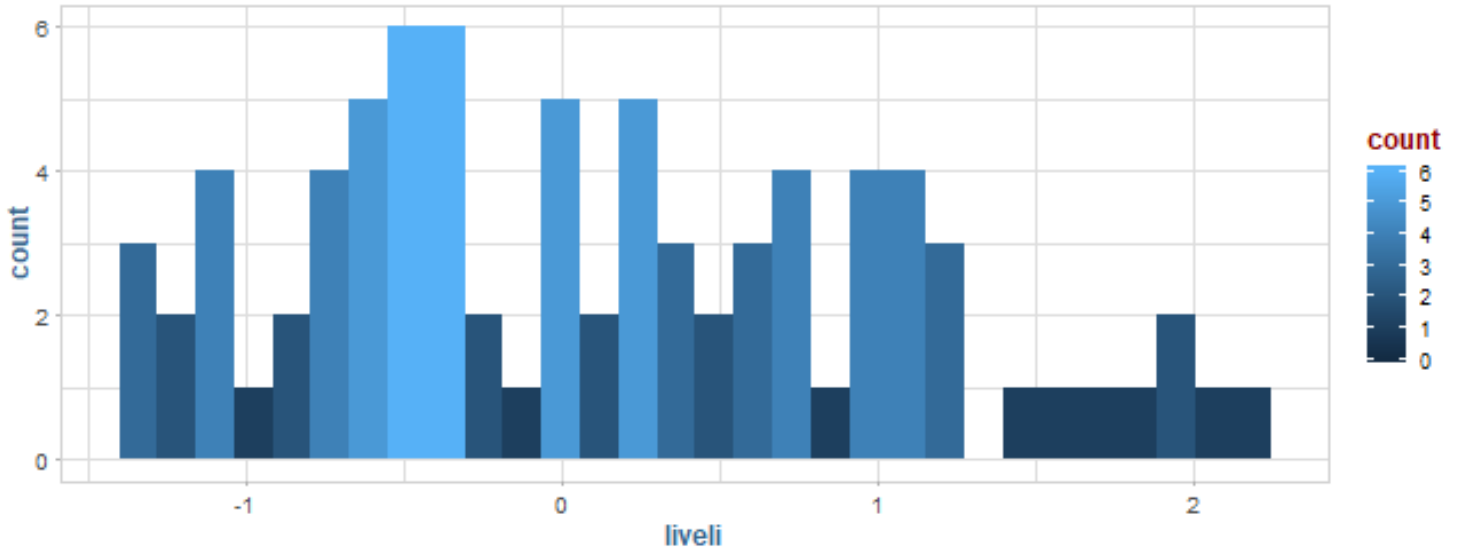
```
mod1 <- lm(y1 ~ x1, data = ans)

mod2 <- lm(y1 ~ x2, data = ans)
```

```
p1 <- ggplot(ans, aes(x = x1, y = y1)) +
   geom_point() +
   geom_smooth(method = "lm", se = F)

p2 <- ggplot(ans, aes(x = x2, y = y2)) +
   geom_point() +
   geom_smooth(method = "lm", se = F)

p3 <- ggplot(ans, aes(x = x3, y = y3)) +
   geom_point() +
   geom_smooth(method = "lm", se = F)

p4 <- ggplot(ans, aes(x = x4, y = y4)) +
   geom_point() +
   geom_smooth(method = "lm", se = F)

gridExtra::grid.arrange(p1, p2, p3, p4, ncol = 2)
```

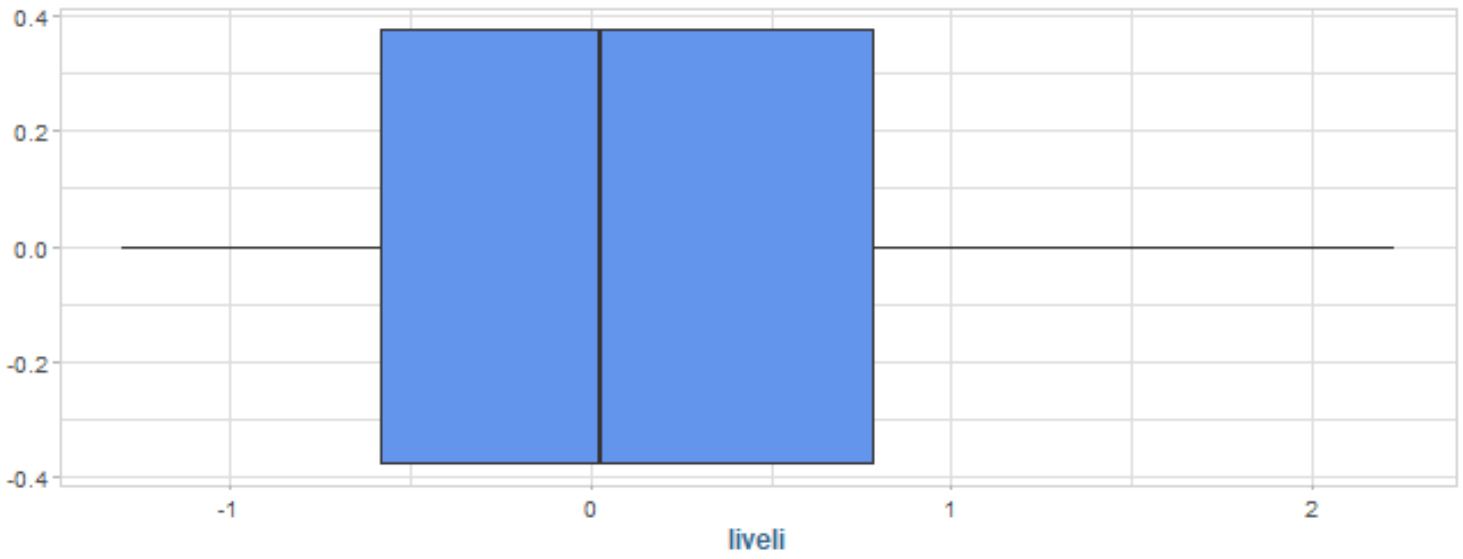



```
ifri <- get_csv("ifri_car_liv.csv")

ifri <- ifri[1:80,]

ifri <- ifri %>%
   rename(carbon = zbio, liveli = zliv)
```

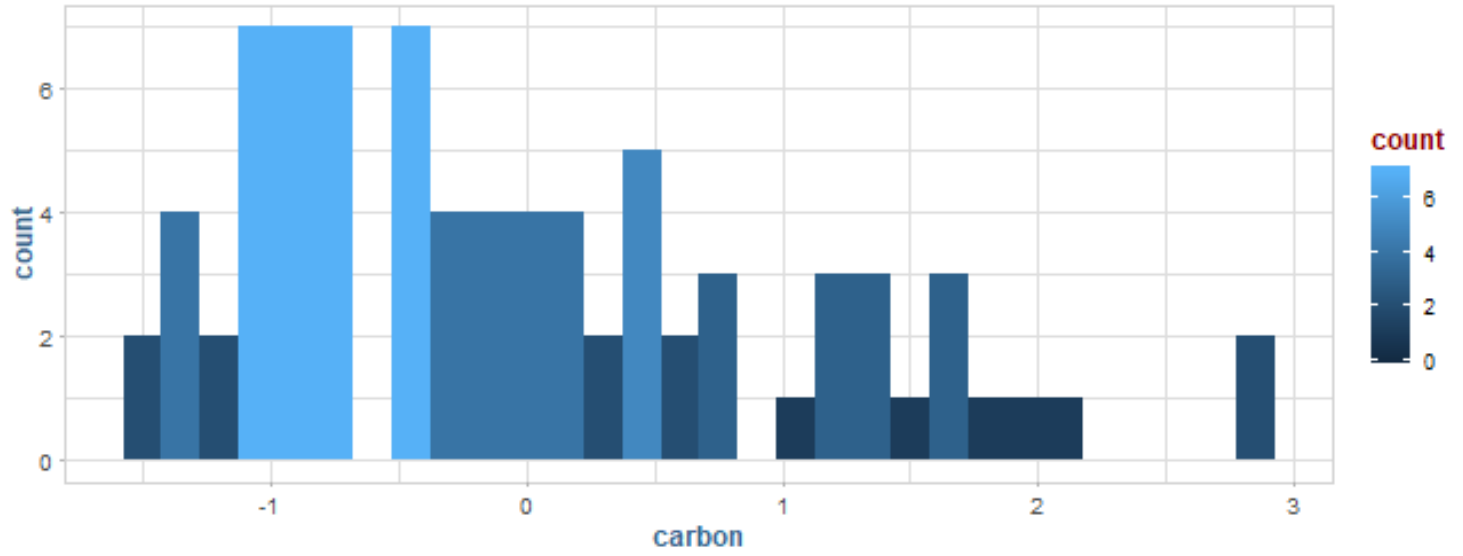
```
ggplot(ifri, aes(x = liveli)) +
   geom_histogram(aes(fill = ..count..), bins = 30)
```



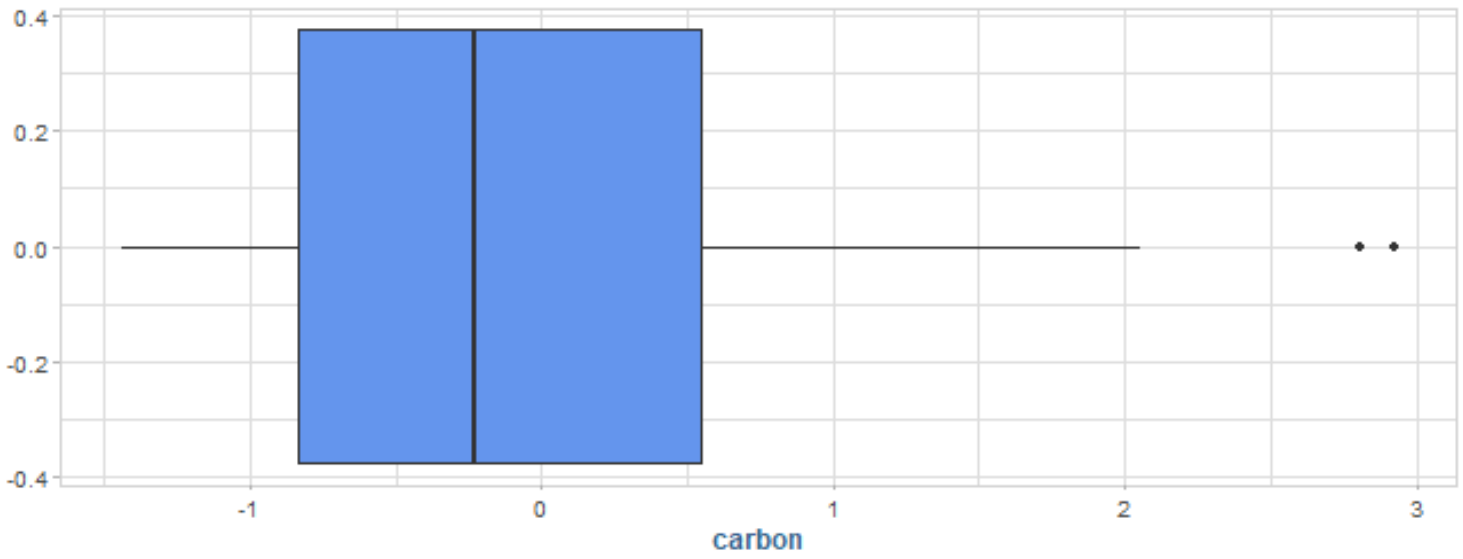

```
ggplot(ifri, aes(y = liveli)) +
   geom_boxplot(fill = "cornflowerblue") +
   coord_flip()
```



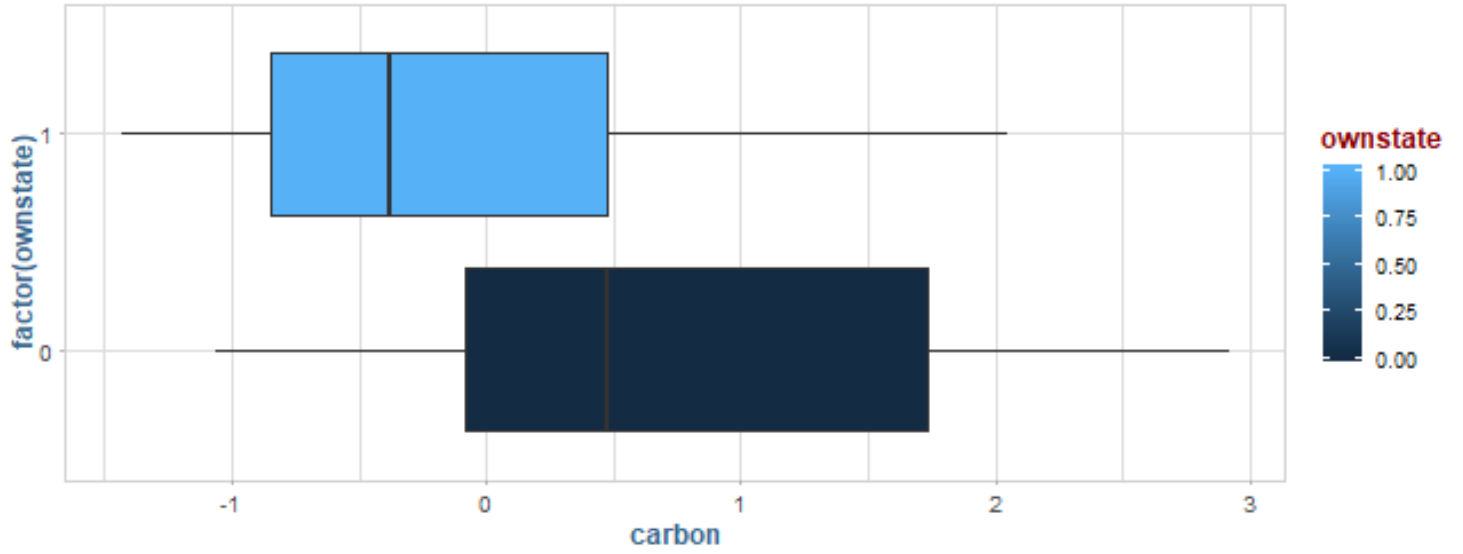

```
ggplot(ifri, aes(x = carbon)) +
   geom_histogram(aes(fill = ..count..), bins = 30)
```




```
ggplot(ifri, aes(y = carbon)) +
   geom_boxplot(fill = "cornflowerblue") +
   coord_flip()
```

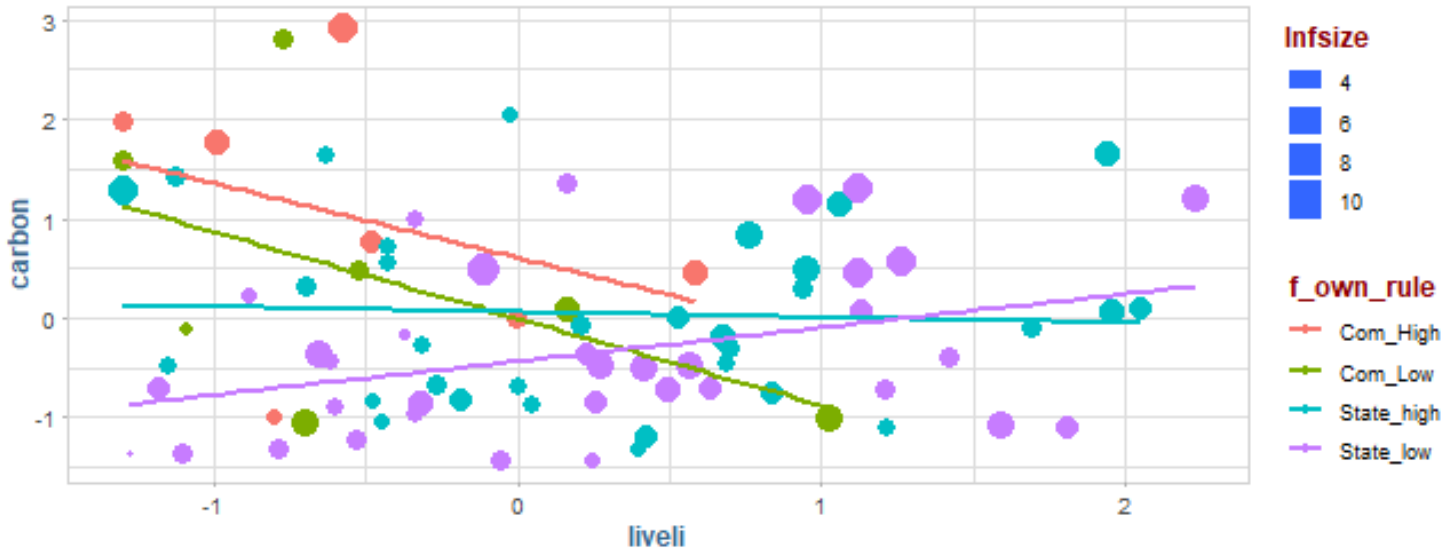



```
ggplot(ifri, aes(x= factor(ownstate),
                 y = carbon)) +
   geom_boxplot(aes(fill = ownstate)) +
   coord_flip()
```




```
ifri2 <- mutate(ifri, f_own_rule =
                  ifelse(ownstate == 1 & rulematch == 0, "State_low",
                  ifelse(ownstate == 1 & rulematch == 1, "State_high",
                  ifelse(ownstate == 0 & rulematch == 1, "Com_High",
                         "Com_Low" ))))

ggplot(ifri2, aes(x = liveli,
                  y = carbon,
                  size = lnfsize,
```

```
                colour = f_own_rule)) +
  geom_point() +
  geom_smooth(method = "lm", se = F)
```




```
WDIsearch("gdp.*capita.*PPP")
```

```
     indicator
[1,] "6.0.GDPpc_constant"
[2,] "NY.GDP.PCAP.PP.KD.ZG"
[3,] "NY.GDP.PCAP.PP.KD.87"
[4,] "NY.GDP.PCAP.PP.KD"
[5,] "NY.GDP.PCAP.PP.CD"
     name
[1,] "GDP per capita, PPP (constant 2011 international $) "
[2,] "GDP per capita, PPP annual growth (%)"
[3,] "GDP per capita, PPP (constant 1987 international $)"
[4,] "GDP per capita, PPP (constant 2011 international $)"
[5,] "GDP per capita, PPP (current international $)"
```

```
WDIsearch("Co2.*capita")
```

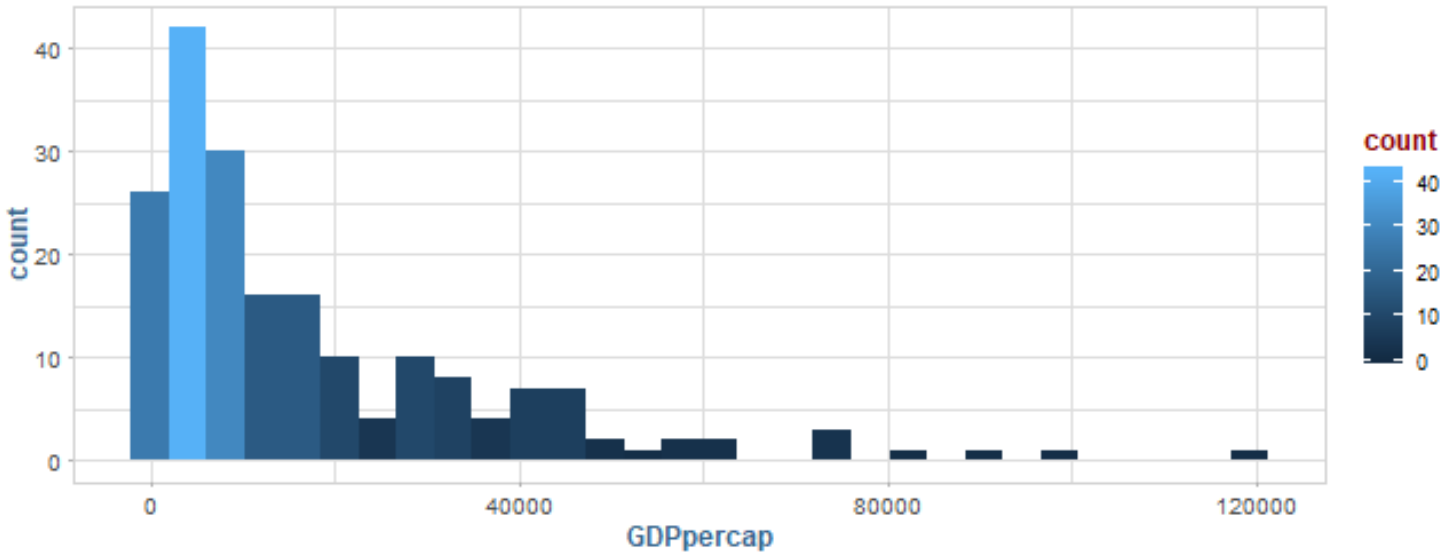
```
     indicator
[1,] "EN.ATM.CO2E.PC"
[2,] "EN.ATM.NOXE.PC"
[3,] "EN.ATM.METH.PC"
     name
[1,] "CO2 emissions (metric tons per capita)"
[2,] "Nitrous oxide emissions (metric tons of CO2 equivalent per capita)"
[3,] "Methane emissions (kt of CO2 equivalent per capita)"
```

```
wdi_data <- WDI(indicator =
                    c("NY.GDP.PCAP.PP.KD",
                      "EN.ATM.CO2E.PC"),
                start = 2010,
                end = 2010,
                extra = T)

wdi_data <- wdi_data %>%
   filter(region != "Aggregates")

wdi <- wdi_data %>%
   rename(GDPpercap =
             NY.GDP.PCAP.PP.KD,
          Emit_CO2percap =
             EN.ATM.CO2E.PC)
```

```
ggplot(wdi, aes(x = GDPpercap)) +
   geom_histogram(aes(fill = ..count..))
```

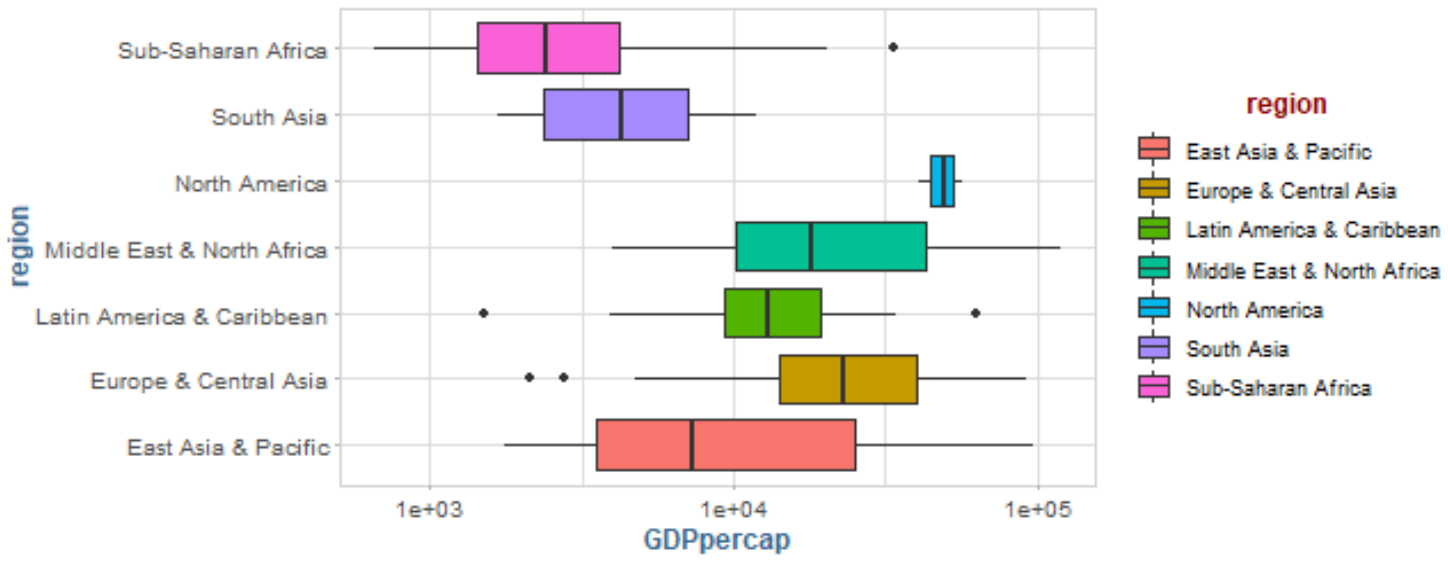
```
`stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

```
Warning: Removed 21 rows containing non-finite values (stat_bin).
```



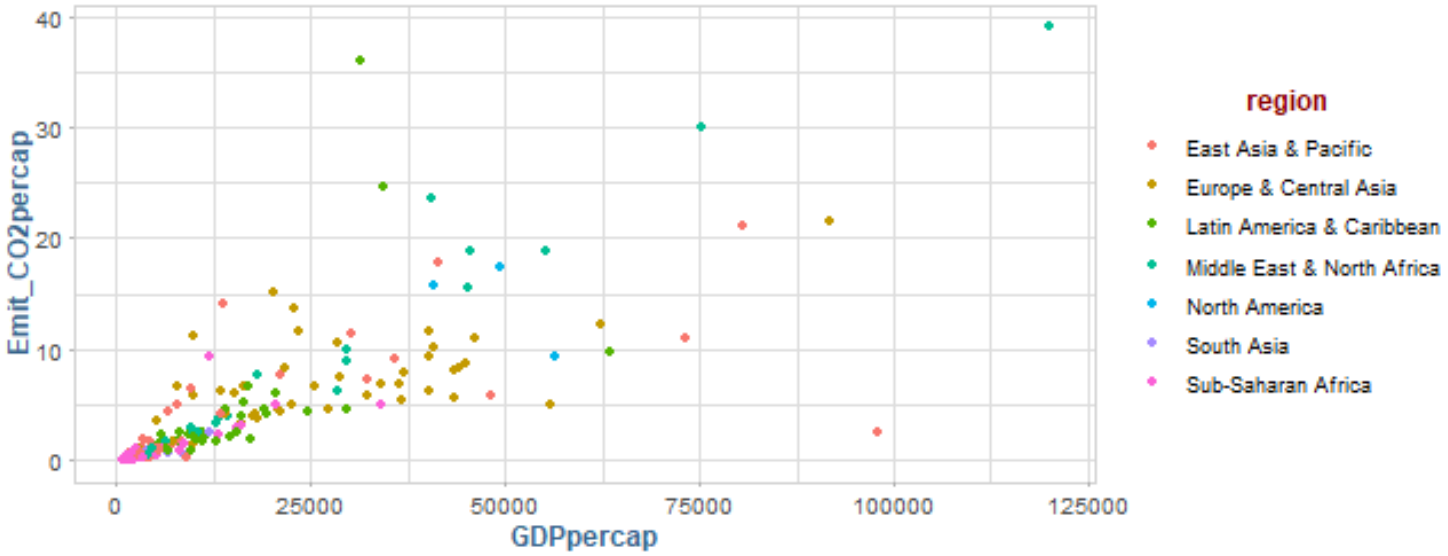

```
ggplot(wdi, aes(y = GDPpercap,
                x = region)) +
   geom_boxplot(aes(fill = region)) +
   coord_flip() +
   scale_y_log10()
```

```
Warning: Removed 21 rows containing non-finite values (stat_boxplot).
```



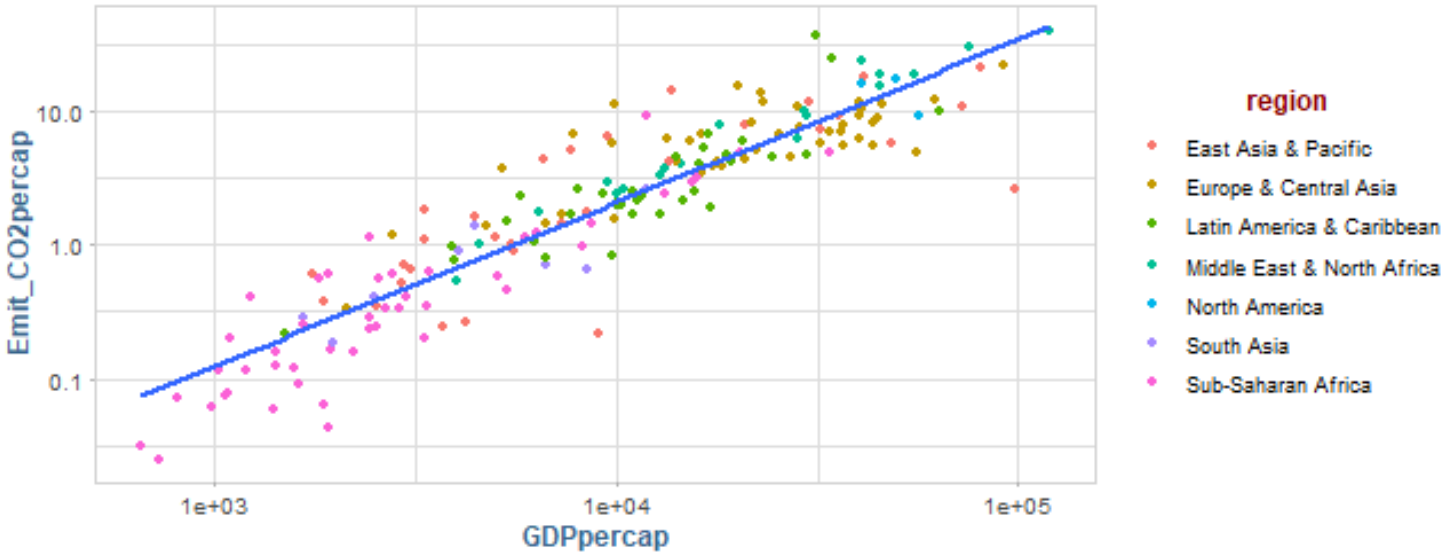

```
ggplot(wdi, aes(x = GDPpercap, y = Emit_CO2percap)) +
   geom_point(aes(color = region))
```

```
Warning: Removed 27 rows containing missing values (geom_point).
```




```
ggplot(wdi, aes(x = GDPpercap, y = Emit_CO2percap)) +
   geom_point(aes(color = region)) +
   scale_x_log10() +
   scale_y_log10() +
   geom_smooth(method = "lm", se = F)
```

```
Warning: Removed 27 rows containing non-finite values (stat_smooth).
Warning: Removed 27 rows containing missing values (geom_point).
```



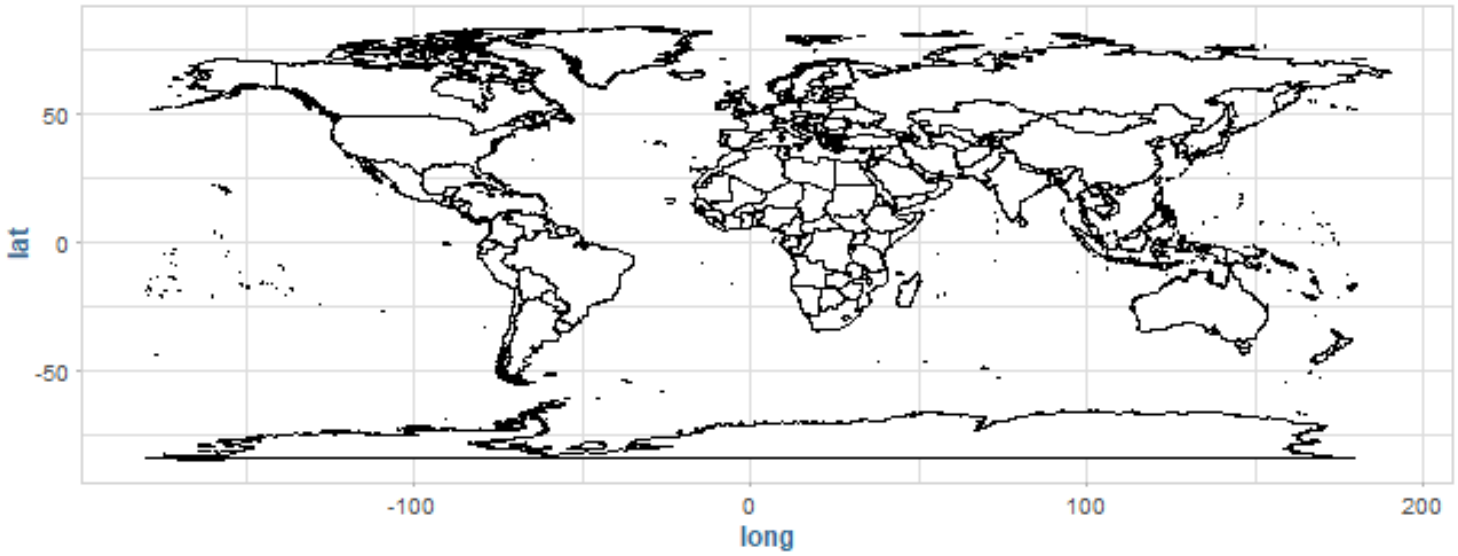

```
dat_map <- map_data("world")

dim(dat_map)
```

```
[1] 99338     6
```

```
head(dat_map)
```

```
       long      lat group order region subregion
1 -69.89912 12.45200     1     1  Aruba      <NA>
2 -69.89571 12.42300     1     2  Aruba      <NA>
3 -69.94219 12.43853     1     3  Aruba      <NA>
4 -70.00415 12.50049     1     4  Aruba      <NA>
5 -70.06612 12.54697     1     5  Aruba      <NA>
6 -70.05088 12.59707     1     6  Aruba      <NA>
```

```
ggplot(dat_map, aes(x = long, y = lat, group = group)) +
   geom_polygon(fill = "white", color = "black")
```

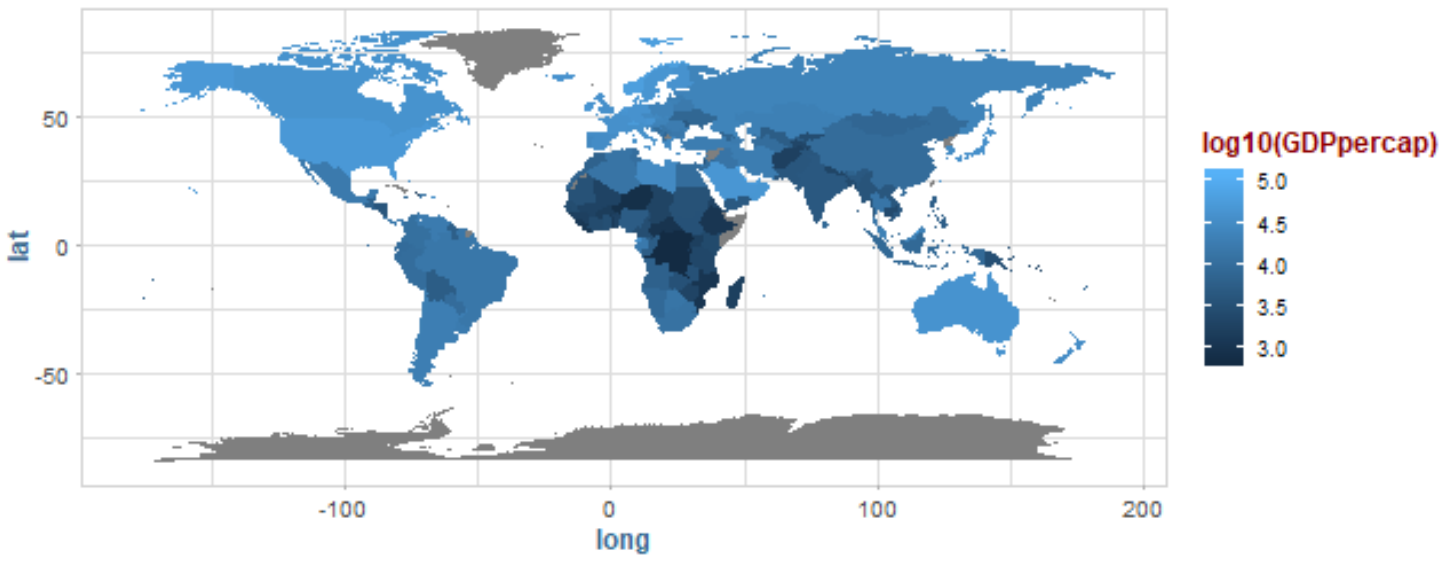



```
dat_map$ccode <- countrycode(dat_map$region,
                             origin = "country.name",
                             destination = "wb")
```

```
Warning in countrycode(dat_map$region, origin = "country.name", destination = "wb"): Some value
```

```
wdi$ccode <- countrycode(wdi$country,
                         origin = "country.name",
                         destination = "wb")

merged <- full_join(dat_map, wdi, by = "ccode")
```

```
ggplot(merged, aes(x = long, y = lat,
                   group = group, fill = log10(GDPpercap))) +
   geom_polygon()
```




```
ggplot(merged, aes(x = long, y = lat,
                   group = group,
                   fill = log10(Emit_CO2percap))) +
   geom_polygon() +
   scale_fill_gradient(low = "green",
                       high = "red")
```