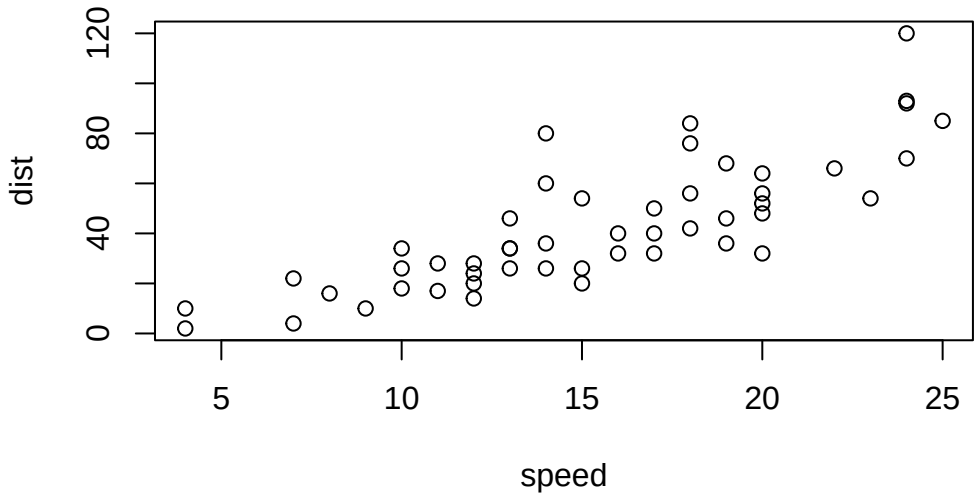
class 5

Anqi Feng (PID:A16243334)

```
plot(cars)
```



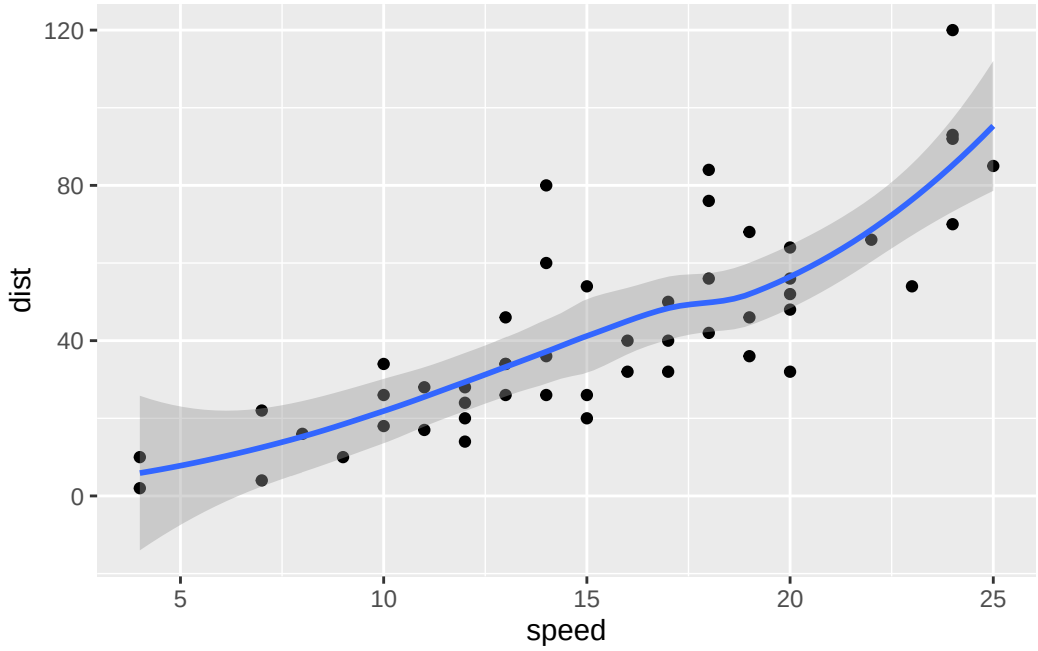
A very popular package in this area is called **ggplot2**.

Before I can use any add-on package like this I must install it with the `install.packages("ggplot2")` command/function

Then to use the package I need to load it with a `library(ggplot2)` call.

```
library(ggplot2)
ggplot(cars) +
  aes(x=speed, y=dist) +
  geom_point() +
  geom_smooth()
```

```
`geom_smooth()` using method = 'loess' and formula = 'y ~ x'
```



for "simple" plots like this one base R code will be much shorter than ggplot Every ggplot has at least 3 layers - **data** (data.frame with the numbers and the numbers of stuff you want to plot) - **aes**thetics (mapping of your columns in a data frame to your plot) - **geoms** (there are tones of these, basics, or points: 'geom_line()', 'geom_point()', 'geom_col()')

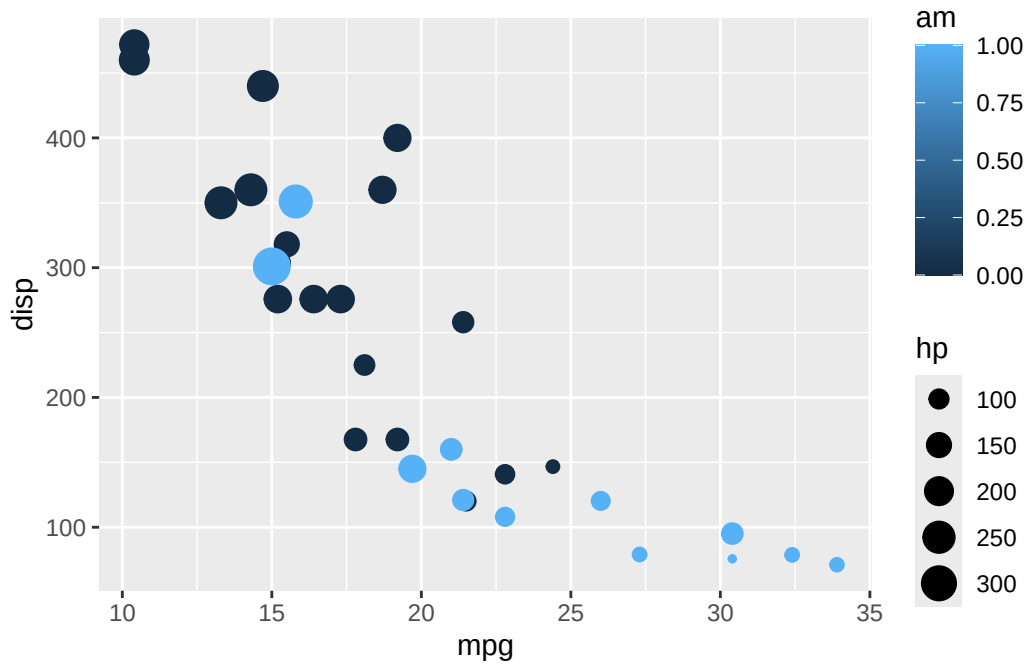
Q: make me a ggplot of the 'mtcars'data set using 'mpg' vs 'disp'and set the size of the points to the 'hp' and set the color to 'am'.

```
head(mtcars)
```

```
                   mpg cyl disp  hp drat    wt  qsec vs am gear carb
Mazda RX4         21.0   6  160 110 3.90 2.620 16.46  0  1    4    4
Mazda RX4 Wag     21.0   6  160 110 3.90 2.875 17.02  0  1    4    4
Datsun 710        22.8   4  108  93 3.85 2.320 18.61  1  1    4    1
Hornet 4 Drive    21.4   6  258 110 3.08 3.215 19.44  1  0    3    1
Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2
Valiant           18.1   6  225 105 2.76 3.460 20.22  1  0    3    1
```

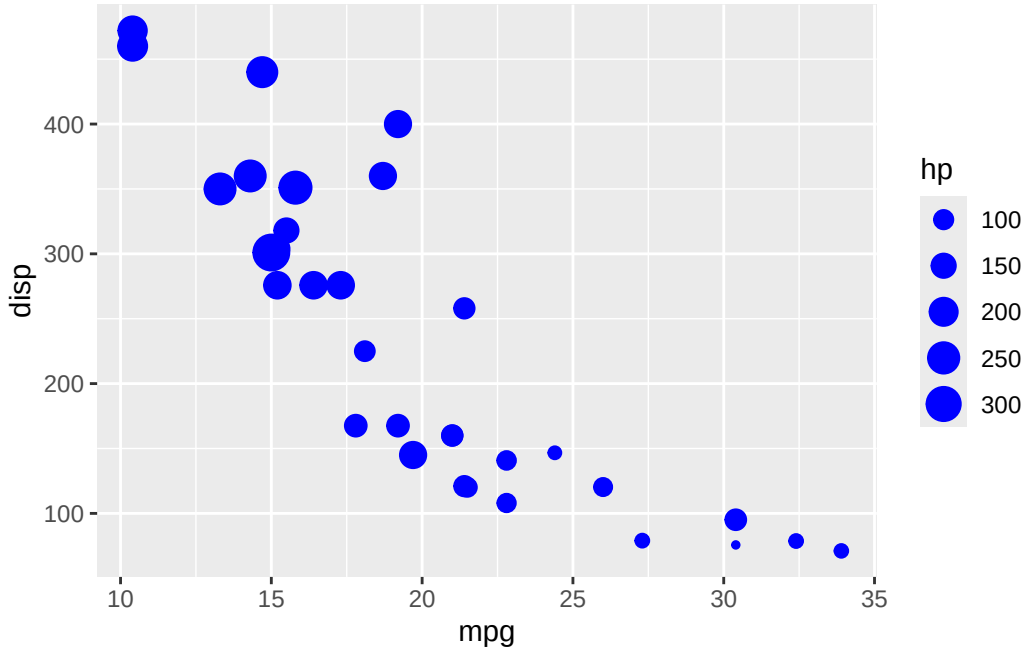
```
library(ggplot2)
ggplot(mtcars) +
```

```
  aes(x=mpg, y=disp, size=hp, col=am) +
  geom_point()
```

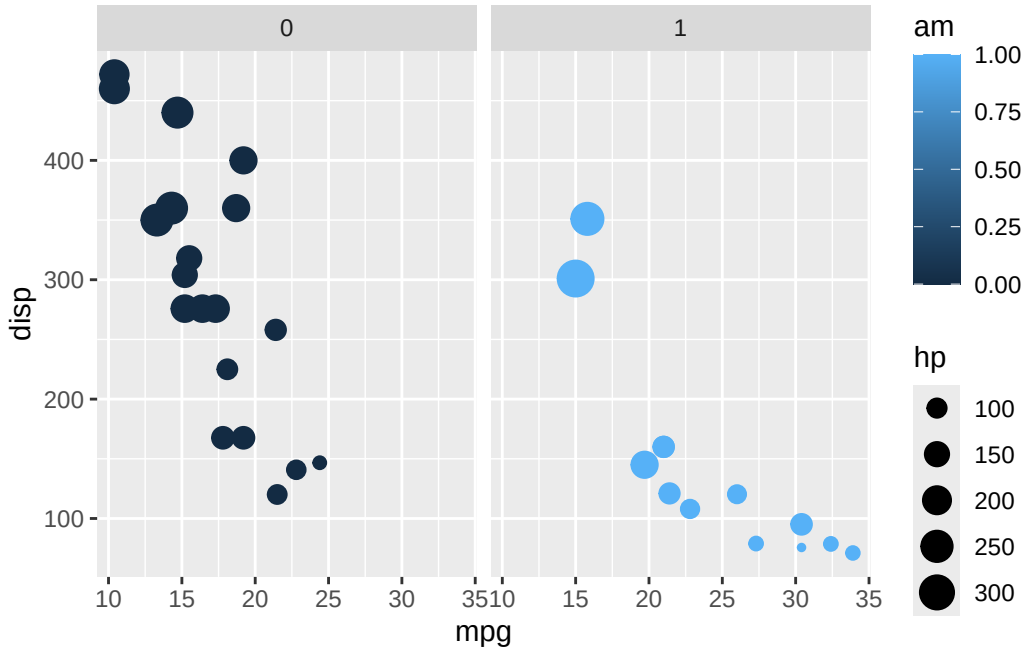


now color all points blue

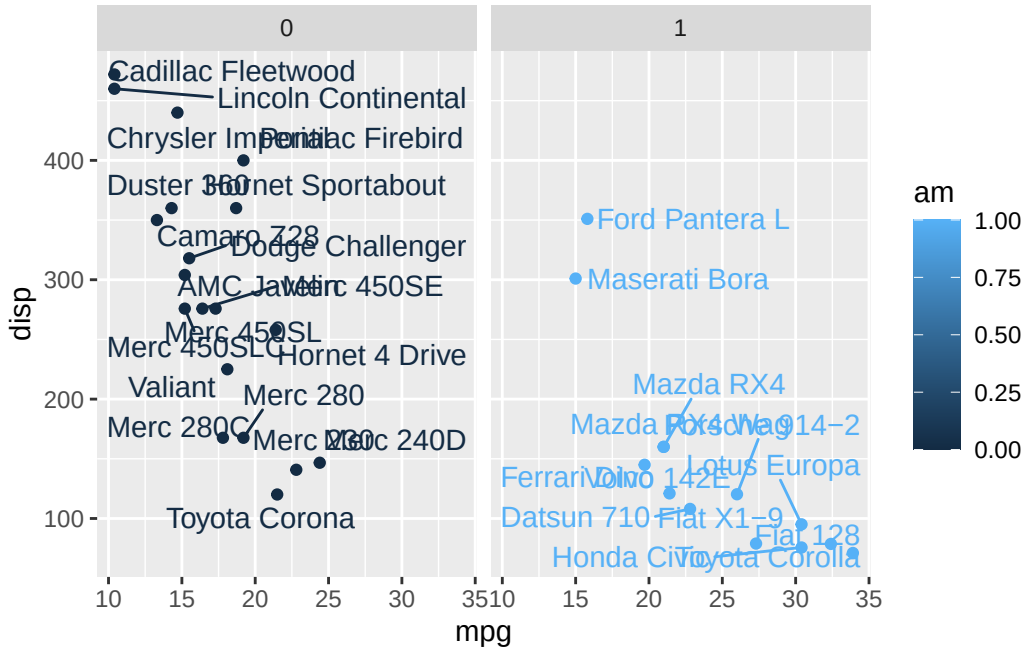
```
library(ggplot2)
ggplot(mtcars) +
  aes(x=mpg, y=disp, size=hp) +
  geom_point(color="blue")
```



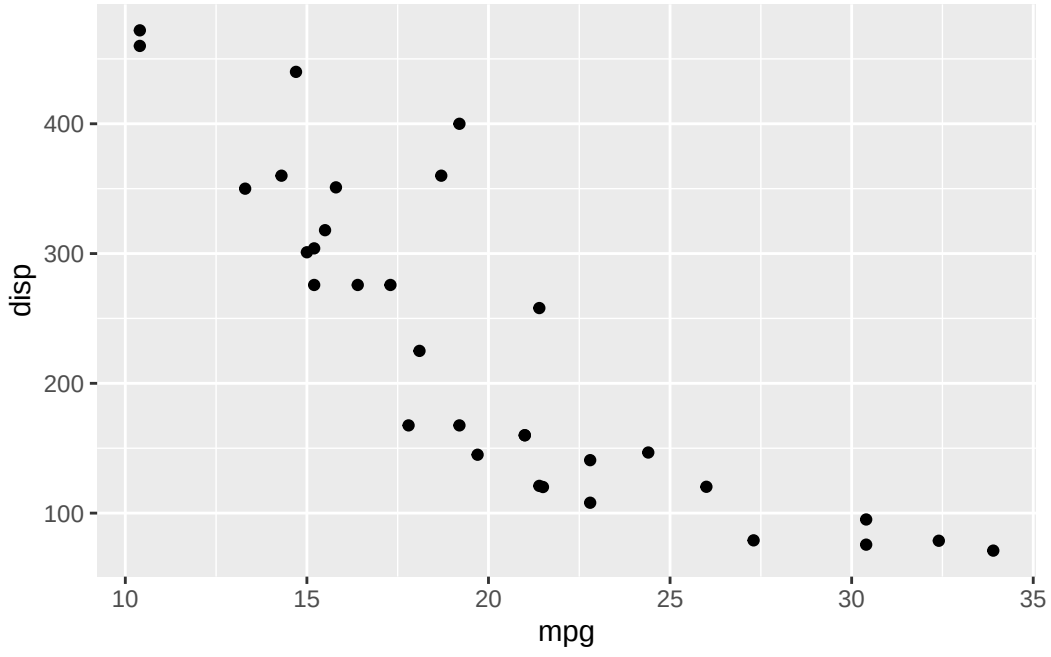

```
ggplot(mtcars) +
  aes(x=mpg, y=disp, size=hp, col = am) +
  geom_point() +
  facet_wrap(~am)
```




```
library(ggrepel)
ggplot(mtcars) +
  aes(x=mpg, y=disp, col = am, label=rownames(mtcars)) +
  geom_point() +
  facet_wrap(~am)+
  geom_text_repel()
```




```
ggplot(mtcars) +
  aes(x=mpg, y=disp) +
  geom_point()
```



```
ggsave("myplot.png")
```

```
Saving 5.5 x 3.5 in image
```

patchwork is also a good package to install (patches three graphs ex. p1 | p2 | p3) it is a little add on for ggplot

```
library(ggplot2)

url <- "https://bioboot.github.io/bimm143_S20/class-material/up_down_expression.txt"
genes <- read.delim(url)
head(genes)
```

```
        Gene Condition1 Condition2      State
1      A4GNT -3.6808610 -3.4401355 unchanging
2       AAAS  4.5479580  4.3864126 unchanging
3      AASDH  3.7190695  3.4787276 unchanging
4       AATF  5.0784720  5.0151916 unchanging
5       AATK  0.4711421  0.5598642 unchanging
6 AB015752.4 -3.6808610 -3.5921390 unchanging
```

```
nrow(genes)
```

```
[1] 5196
```

```
colnames(genes)
```

```
[1] "Gene"       "Condition1" "Condition2" "State"
```

```
ncol(genes)
```

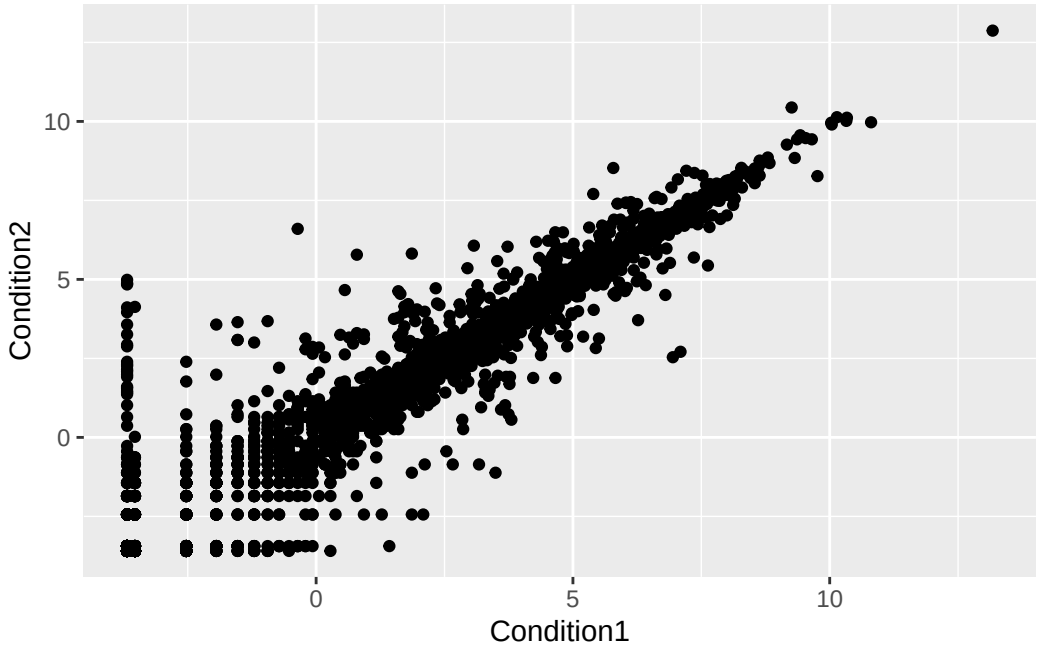
```
[1] 4
```

```
table(genes$State)
```

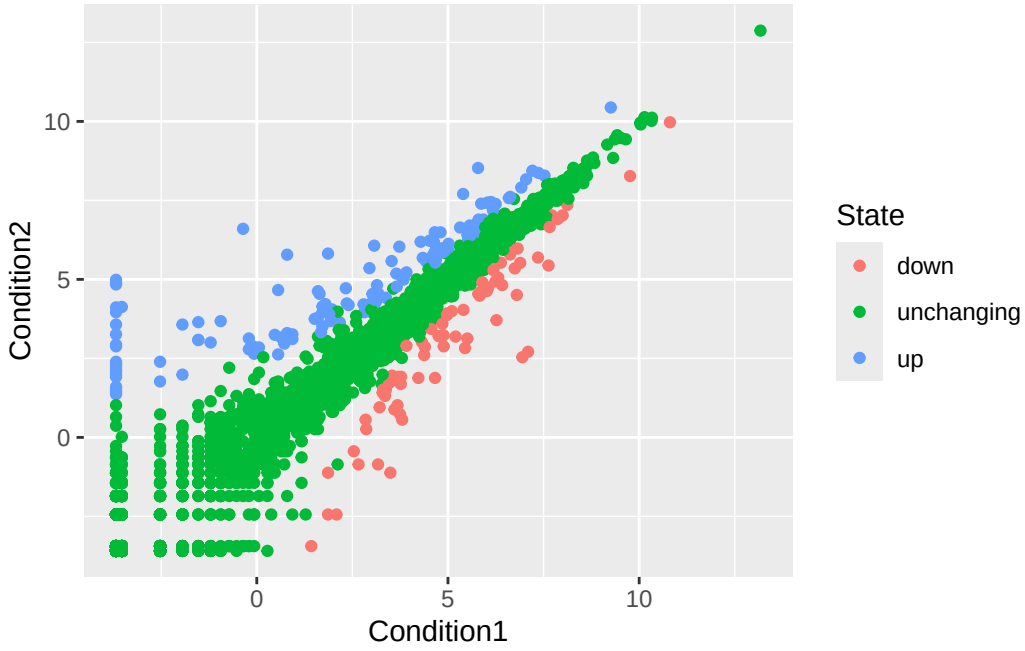
```
      down unchanging         up
        72       4997        127
```

There are 5196 genes in this dataset

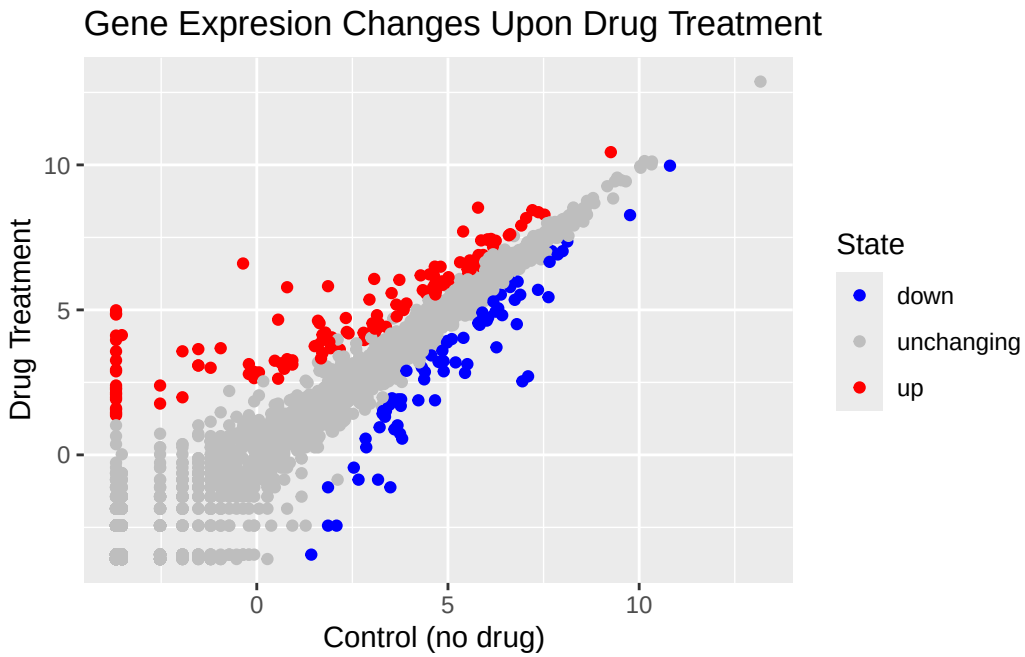
```
ggplot(genes) +
    aes(x=Condition1, y=Condition2) +
    geom_point()
```




```
p <- ggplot(genes) +
    aes(x=Condition1, y=Condition2, col=State) +
    geom_point()
p
```




```
p + scale_colour_manual( values=c("blue","gray","red") ) +
    labs(title="Gene Expresion Changes Upon Drug Treatment",
         x="Control (no drug) ",
         y="Drug Treatment")
```




```
#install.packages("dplyr")  ## un-comment to install if needed
library(dplyr)
```

```
Attaching package: 'dplyr'
```

```
The following objects are masked from 'package:stats':

    filter, lag
```

```
The following objects are masked from 'package:base':

    intersect, setdiff, setequal, union
```

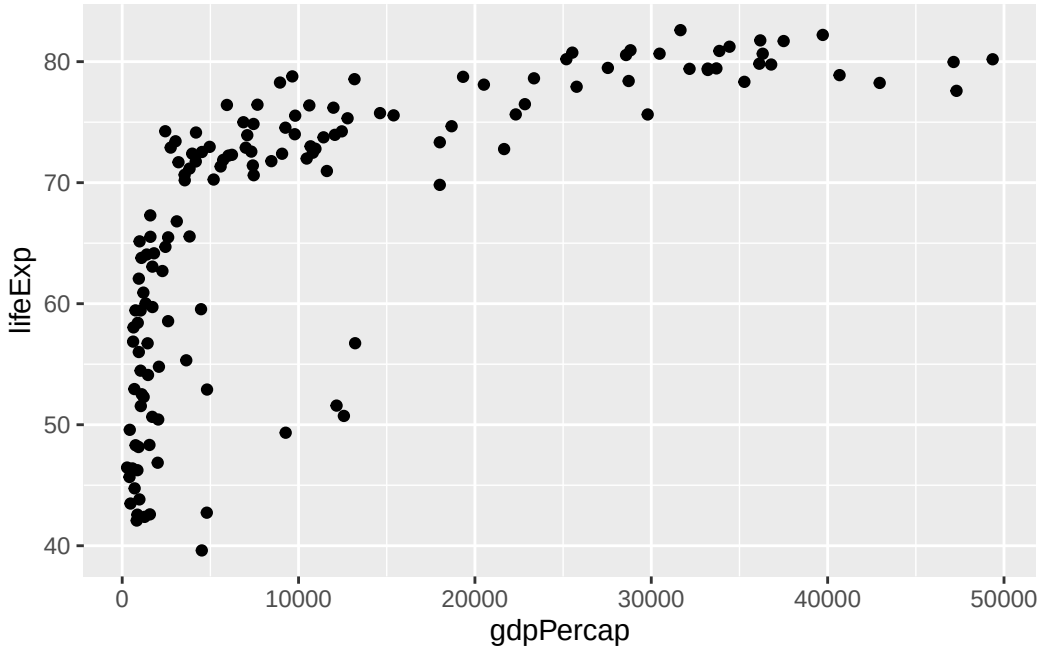
```
library(gapminder)
library(ggplot2)
head(gapminder)
```

```
# A tibble: 6 x 6
  country     continent  year lifeExp      pop gdpPercap
  <fct>       <fct>     <int>   <dbl>    <int>     <dbl>
```

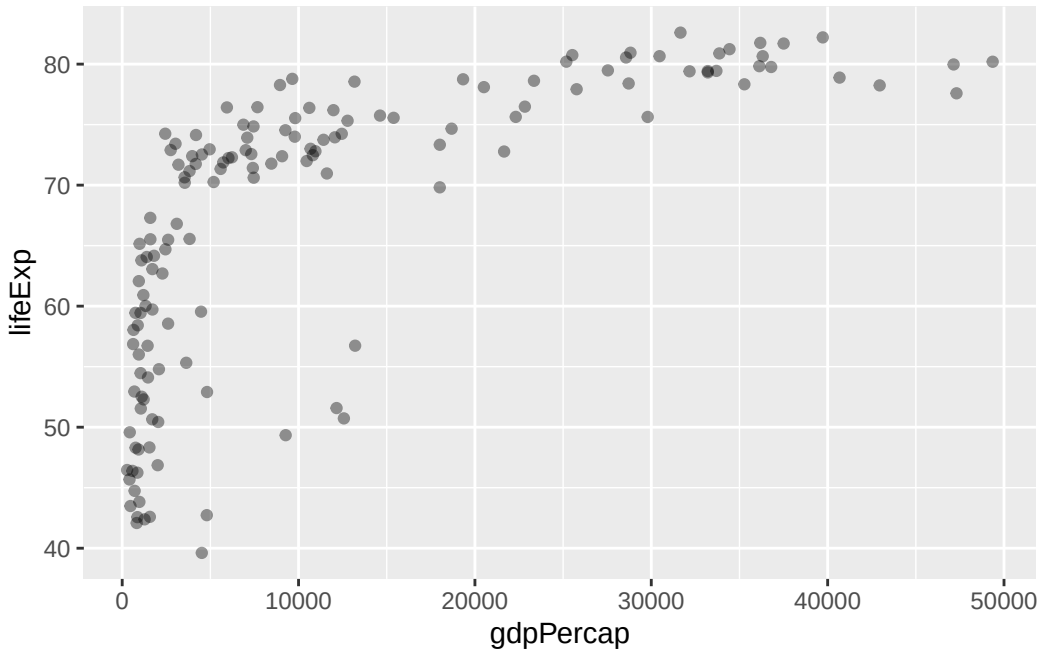
```
1 Afghanistan Asia       1952    28.8  8425333      779.
2 Afghanistan Asia       1957    30.3  9240934      821.
3 Afghanistan Asia       1962    32.0 10267083      853.
4 Afghanistan Asia       1967    34.0 11537966      836.
5 Afghanistan Asia       1972    36.1 13079460      740.
6 Afghanistan Asia       1977    38.4 14880372      786.
```

```
gapminder_2007 <- gapminder %>% filter(year==2007)
```

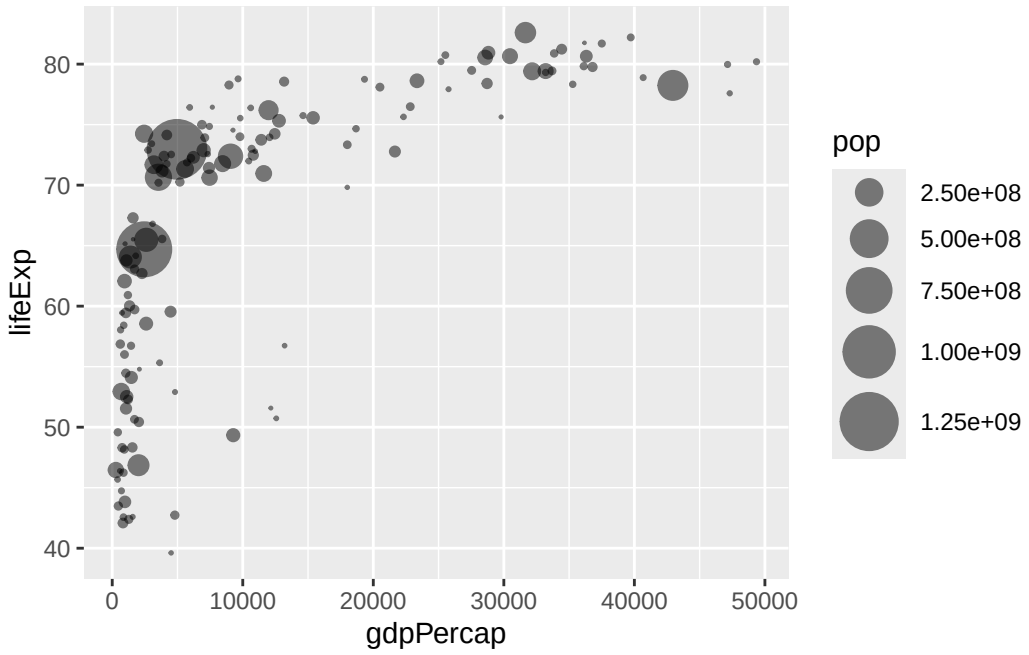
```
ggplot(gapminder_2007) +
  aes(x=gdpPercap, y=lifeExp) +
  geom_point()
```




```
ggplot(gapminder_2007) +
  aes(x=gdpPercap, y=lifeExp) +
  geom_point(alpha=0.4)
```

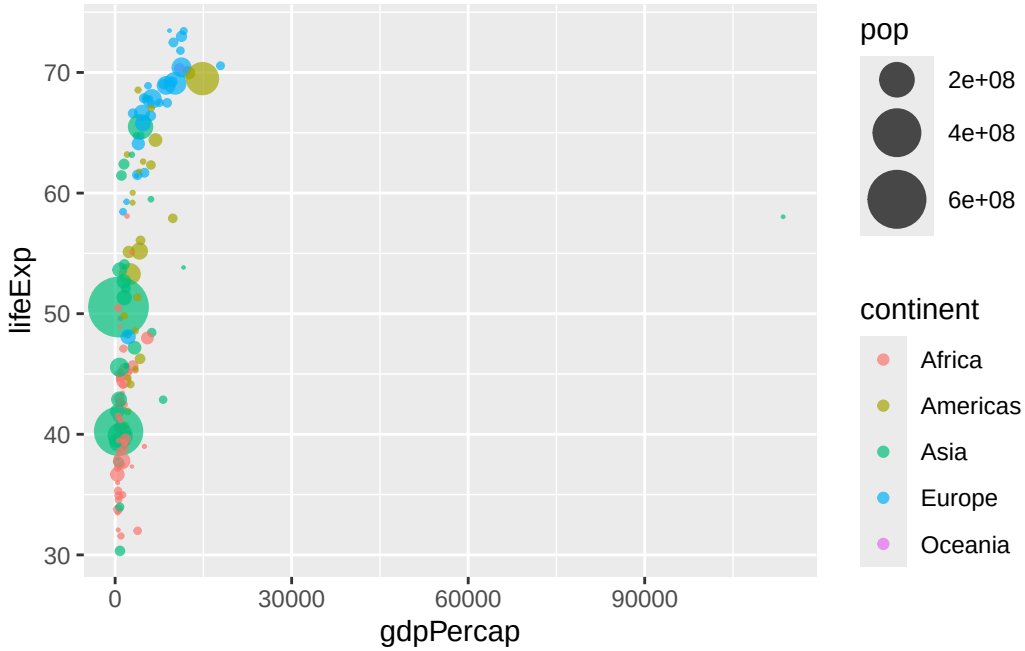



```
ggplot(gapminder_2007) +
  geom_point(aes(x = gdpPercap, y = lifeExp,
                 size = pop), alpha=0.5) +
  scale_size_area(max_size = 10)
```



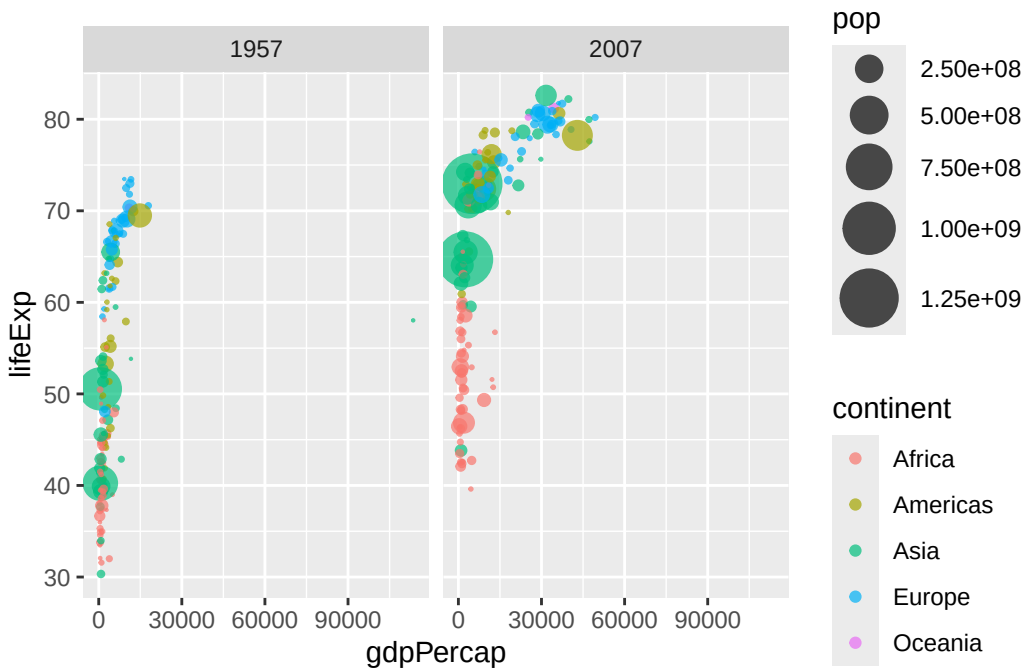

```
gapminder_1957 <- gapminder %>% filter(year==1957)

ggplot(gapminder_1957) +
  aes(x = gdpPercap, y = lifeExp, color=continent,
                  size = pop) +
  geom_point(alpha=0.7) +
  scale_size_area(max_size = 10)
```




```
gapminder_1957 <- gapminder %>% filter(year==1957 | year==2007)

ggplot(gapminder_1957) +
  geom_point(aes(x = gdpPercap, y = lifeExp, color=continent,
                 size = pop), alpha=0.7) +
  scale_size_area(max_size = 10) +
  facet_wrap(~year)
```


1957
2007
80
70
60
50
40
30
lifeExp
0
30000
60000
90000
gdpPercap
pop
2.50e+08
5.00e+08
7.50e+08
1.00e+09
1.25e+09
continent
Africa
Americas
Asia
Europe
Oceania