EDA

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Lecture notes of Exploratory Data Analysis (EDA)

```
library(plyr)

auto_data <- read.table("auto.txt", header=FALSE, sep="\t")
#auto_data

auto_data <- rename(auto_data, c(
  "V1"="MPG",
  "V2"="Cylinders",
  "V3"="Displacement",
  "V4"="Horsepower",
  "V5"="Weight",
  "V6"="Acceleration",
  "V7"="ModelYear",
  "V8"="Origin",
  "V9"="CarName"
  ))
```

```
x <- auto_data[[3]]
mean(x)
```

```
## [1] 193.4259
```

```
var(x)
```

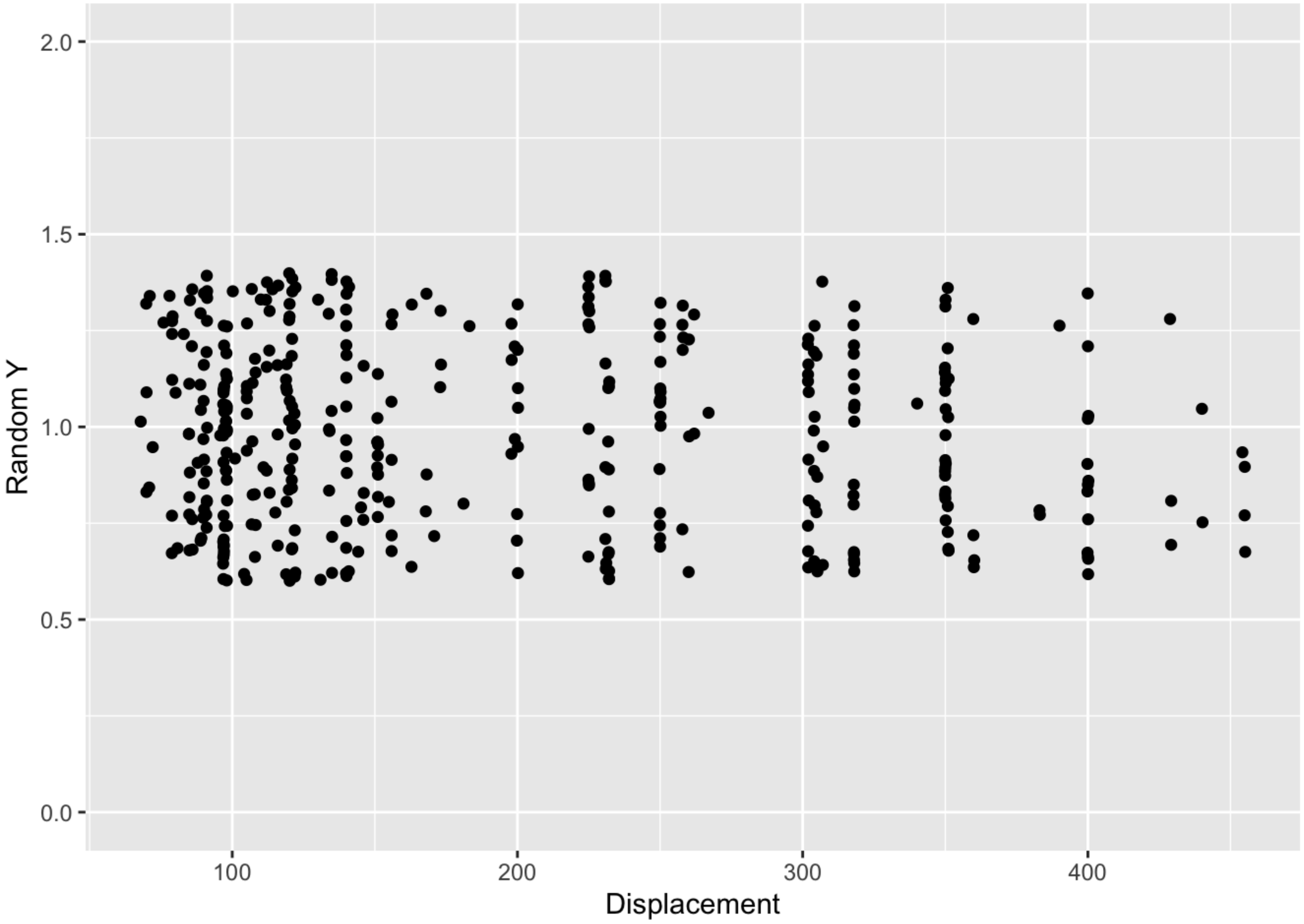
```
## [1] 10872.2
```

```
n <- length(x)
n
```

```
## [1] 398
```

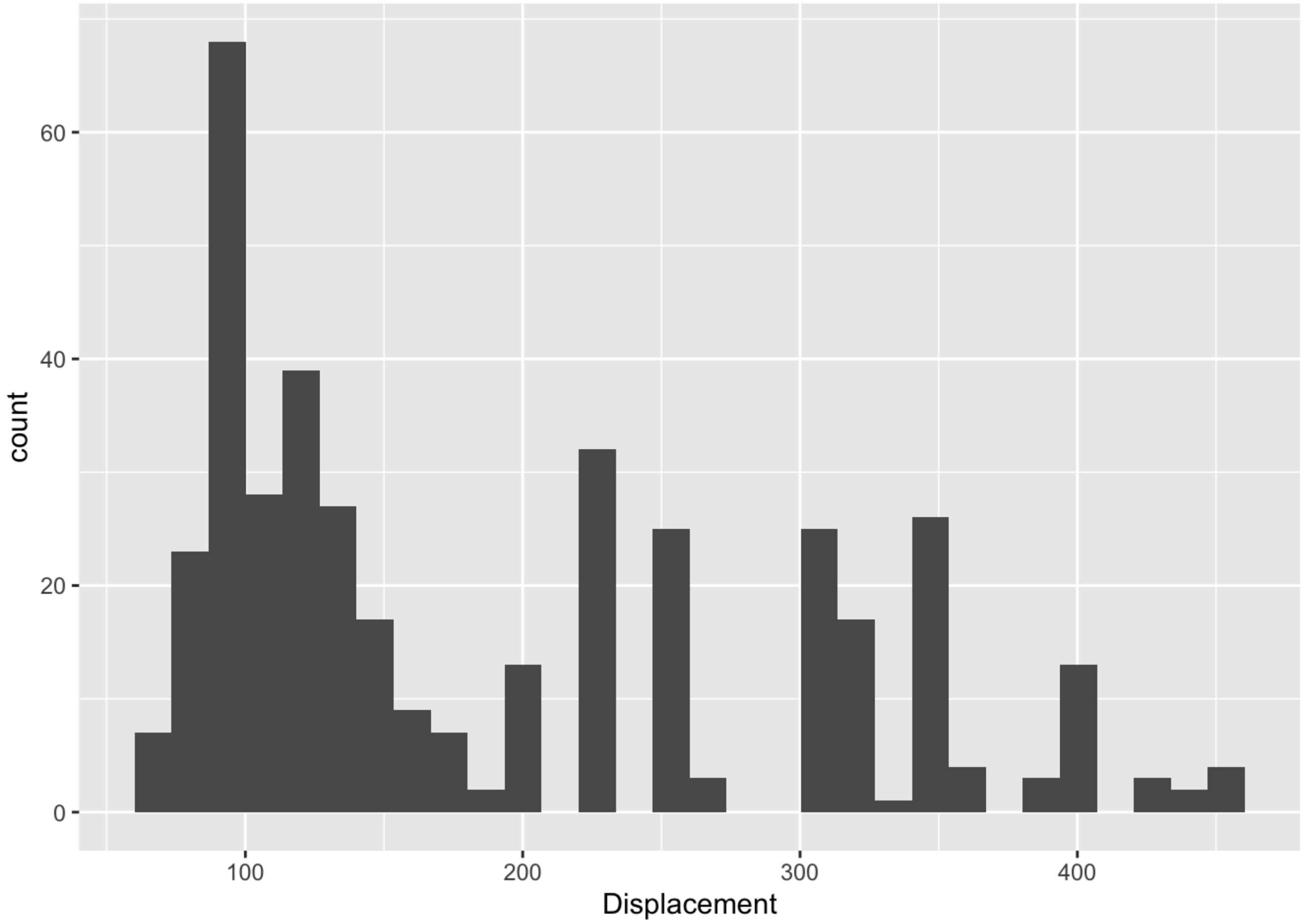
jitter plot, lossless

```
library(ggplot2)
ggplot(auto_data, aes(x=Displacement,y=rep(1,n)))+ geom_jitter() + ylim(0,2) + ylab(
"Random Y")
```

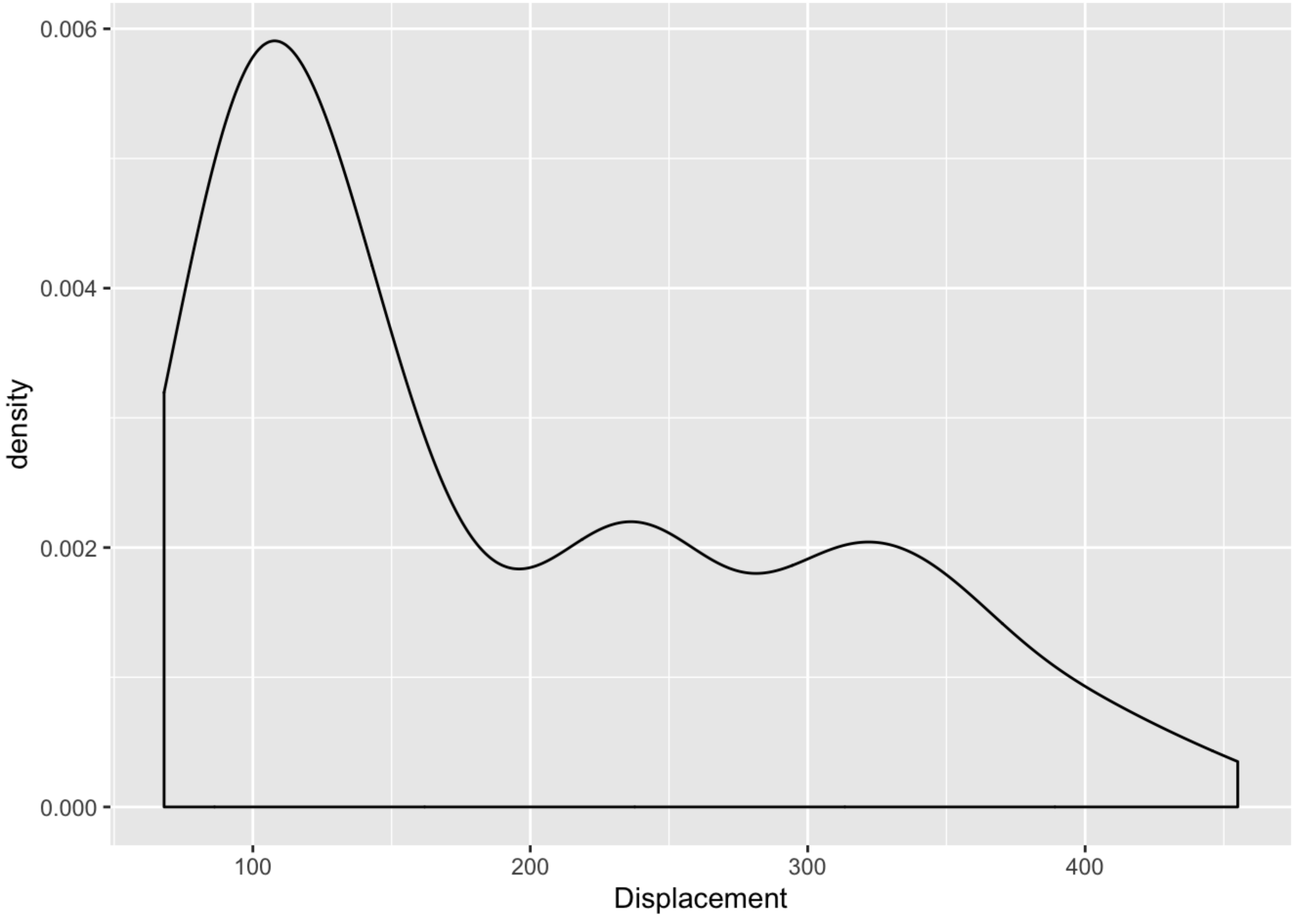


```
ggplot(auto_data, aes(x=Displacement)) + geom_histogram()
```

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



```
ggplot(auto_data, aes(x=Displacement)) + geom_density()
```



```
colMeans(auto_data[,1:7], na.rm = TRUE)
```

```
##          MPG    Cylinders Displacement   Horsepower       Weight
##    23.514573     5.454774   193.425879   104.469388  2970.424623
## Acceleration    ModelYear
##    15.568090    76.010050
```

```
cov(auto_data[,1:7], use = "na.or.complete")
```

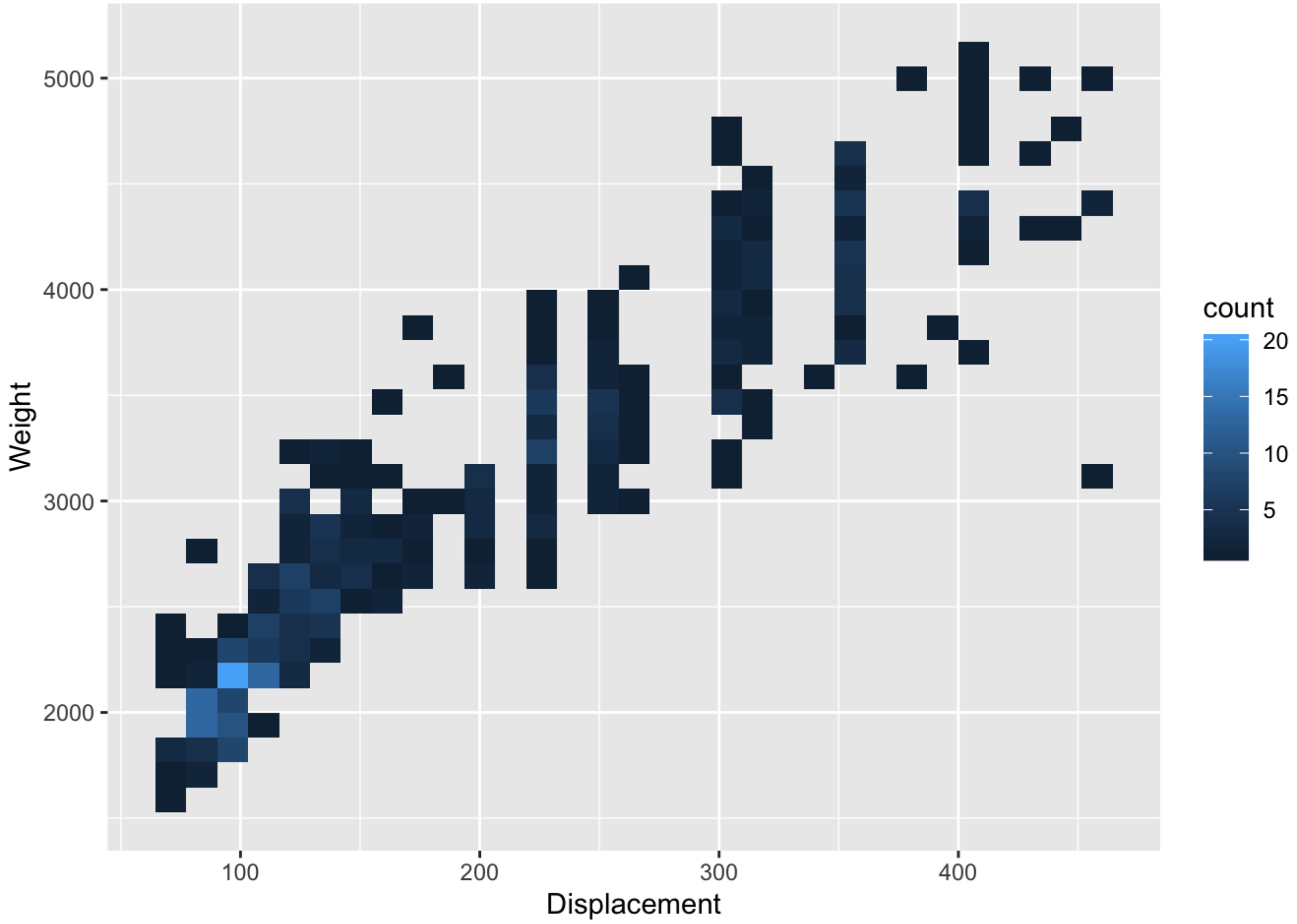
```
##                       MPG   Cylinders Displacement  Horsepower      Weight
## MPG             60.918142  -10.352928    -657.5852  -233.85793  -5517.4407
## Cylinders      -10.352928    2.909696     169.7219    55.34824   1300.4244
## Displacement  -657.585207  169.721949   10950.3676  3614.03374  82929.1001
## Horsepower    -233.857926   55.348244    3614.0337  1481.56939  28265.6202
## Weight       -5517.440704 1300.424363   82929.1001 28265.62023 721484.7090
## Acceleration     9.115514   -2.375052    -156.9944   -73.18697   -976.8153
## ModelYear       16.691477   -2.171930    -142.5721   -59.03643   -967.2285
##              Acceleration   ModelYear
## MPG              9.115514   16.691477
## Cylinders       -2.375052   -2.171930
## Displacement  -156.994435 -142.572133
## Horsepower     -73.186967  -59.036432
## Weight        -976.815253 -967.228457
## Acceleration     7.611331    2.950462
## ModelYear        2.950462   13.569915
```

```
cor(auto_data[,1:7], use = "na.or.complete")
```

```
##                     MPG  Cylinders Displacement Horsepower     Weight
## MPG           1.0000000 -0.7776175   -0.8051269 -0.7784268 -0.8322442
## Cylinders    -0.7776175  1.0000000    0.9508233  0.8429834  0.8975273
## Displacement -0.8051269  0.9508233    1.0000000  0.8972570  0.9329944
## Horsepower   -0.7784268  0.8429834    0.8972570  1.0000000  0.8645377
## Weight       -0.8322442  0.8975273    0.9329944  0.8645377  1.0000000
## Acceleration  0.4233285 -0.5046834   -0.5438005 -0.6891955 -0.4168392
## ModelYear     0.5805410 -0.3456474   -0.3698552 -0.4163615 -0.3091199
##              Acceleration  ModelYear
## MPG             0.4233285  0.5805410
## Cylinders      -0.5046834 -0.3456474
## Displacement   -0.5438005 -0.3698552
## Horsepower     -0.6891955 -0.4163615
## Weight         -0.4168392 -0.3091199
## Acceleration    1.0000000  0.2903161
## ModelYear       0.2903161  1.0000000
```

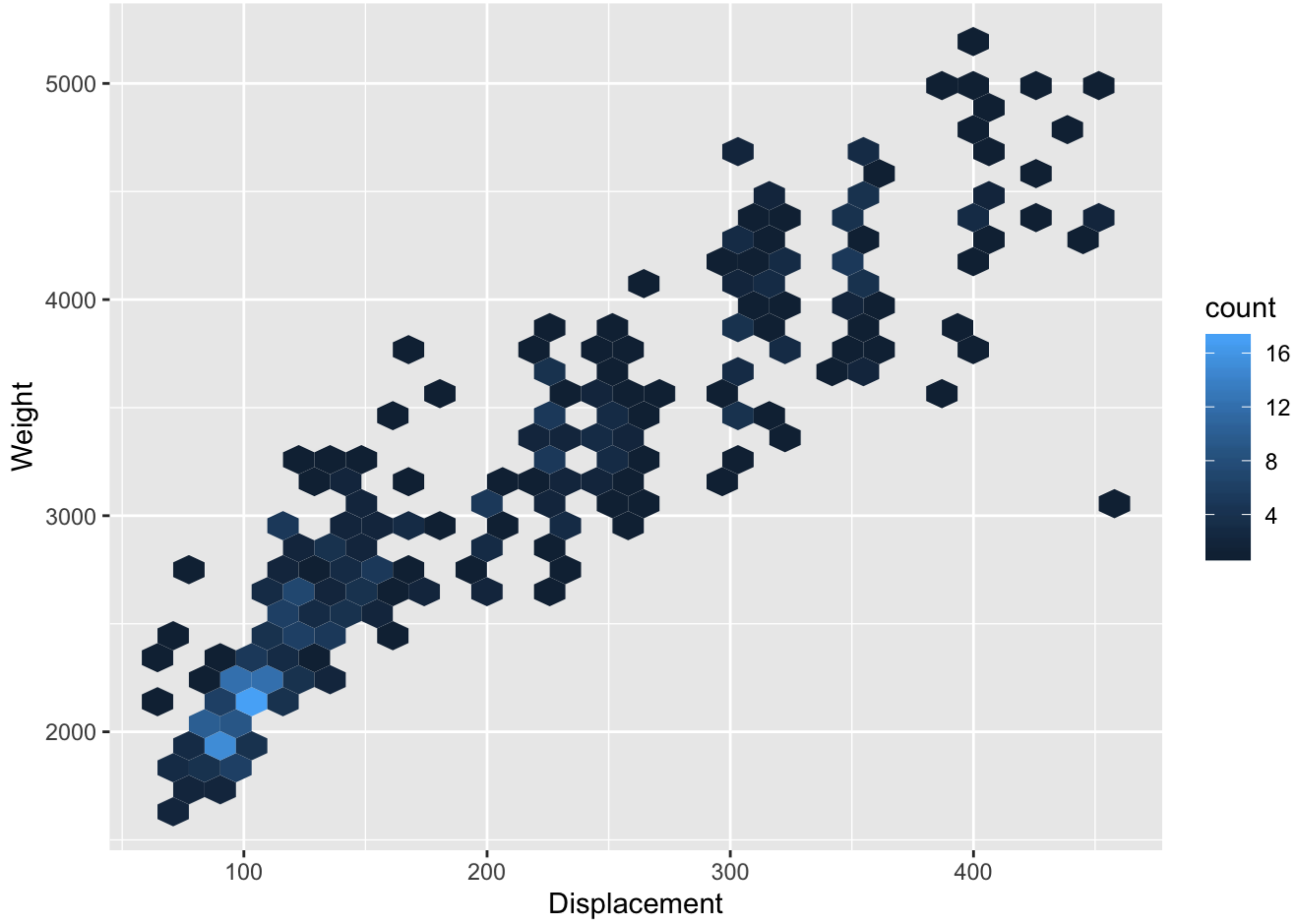
A 2d histogram generalised the univariate in the natural wayas the count of data points falling inside a given two-dimensional area.

```
ggplot(auto_data, aes(x=Displacement,y=Weight)) + geom_bin2d()
```

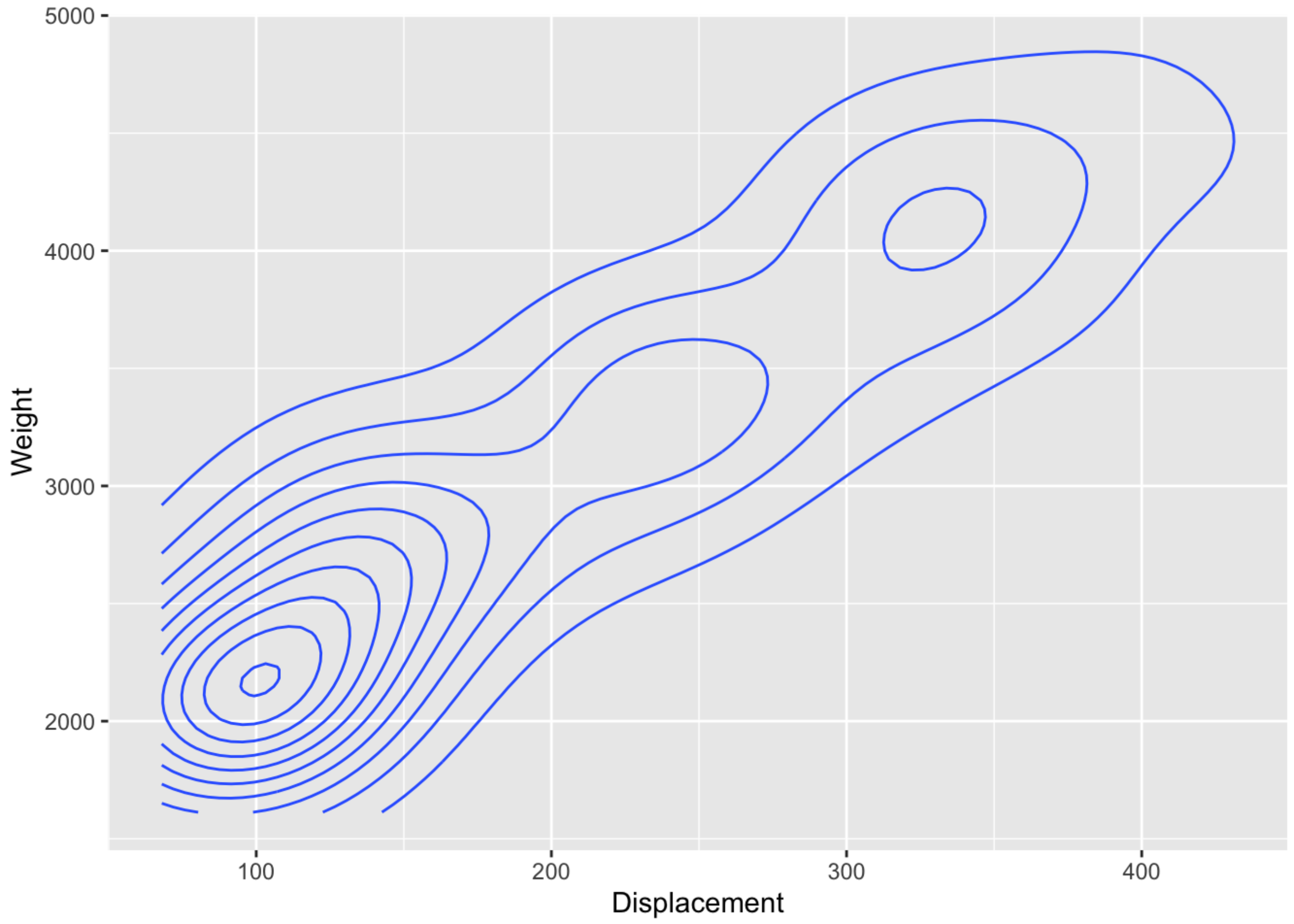


the area need not be a rectangle!

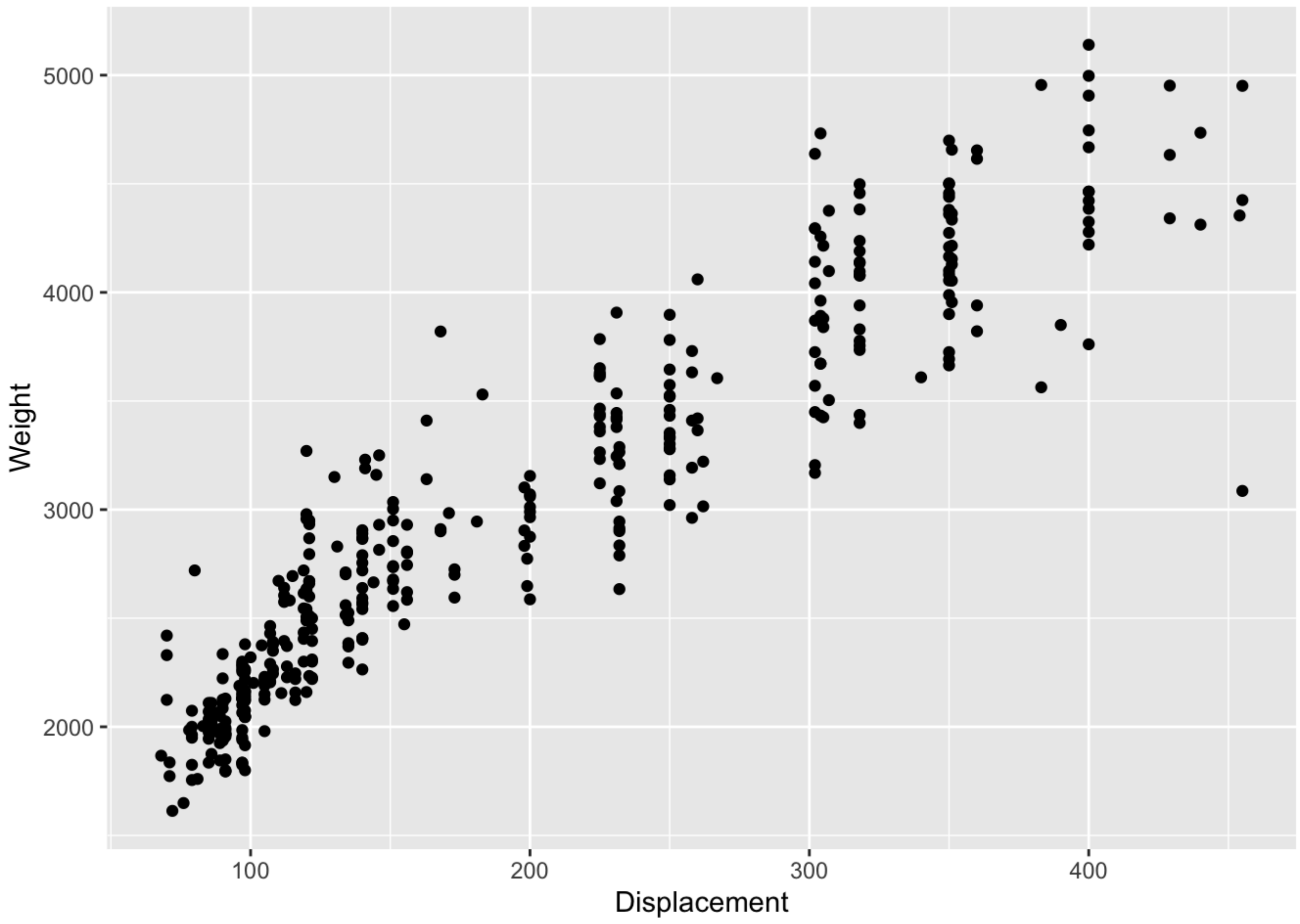
```
ggplot(auto_data, aes(x=Displacement,y=Weight)) + geom_hex()
```



```
ggplot(auto_data, aes(x=Displacement,y=Weight)) + geom_density_2d()
```

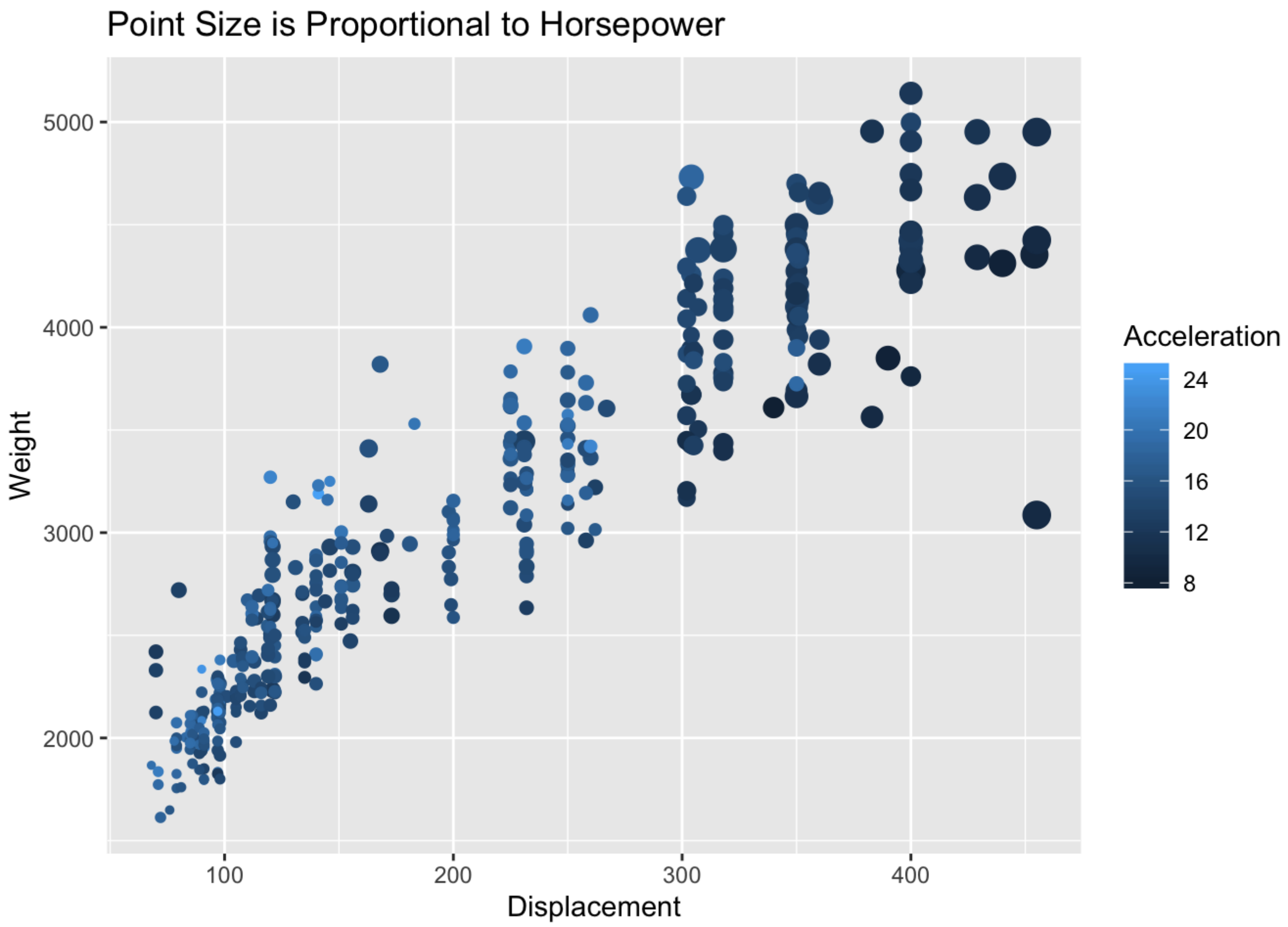


```
ggplot(auto_data, aes(x=Displacement,y=Weight)) + geom_point()
```



```
ggplot(auto_data, aes(x=Displacement,y=Weight)) + geom_point(aes(color=Acceleration),
size=auto_data$Horsepower/50)+ ggtitle("Point Size is Proportional to Horsepower")
```

```
## Warning: Removed 6 rows containing missing values (geom_point).
```


Point Size is Proportional to Horsepower
Weight
5000
4000
3000
2000
Displacement
100
200
300
400
Acceleration
24
20
16
12
8