

# Measures of Dispersion

Arif\_Furkan

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## Showing the basic features of the data with the Stargazer package

```
library(stargazer)

##
## Please cite as:

## Hlavac, Marek (2022). stargazer: Well-Formatted Regression and Summary Statistics Tables.

## R package version 5.2.3. https://CRAN.R-project.org/package=stargazer

data(mtcars)
stargazer(mtcars,type = "text",median = TRUE,iqr = TRUE)

##
## =====
## Statistic N      Mean    St. Dev.  Min    Pctl(25) Median  Pctl(75)    Max
## -----
## mpg           32 20.091    6.027   10.400  15.425   19.200   22.800   33.900
## cyl           32  6.188    1.786     4         4         6         8         8
## disp          32 230.722 123.939  71.100 120.825 196.300 326.000 472.000
## hp            32 146.688  68.563   52       96.5    123      180      335
## drat           32  3.597    0.535   2.760   3.080   3.695   3.920   4.930
## wt            32  3.217    0.978   1.513   2.581   3.325   3.610   5.424
## qsec          32 17.849    1.787  14.500  16.892  17.710  18.900  22.900
## vs            32  0.438    0.504     0         0         0         1         1
## am            32  0.406    0.499     0         0         0         1         1
## gear          32  3.688    0.738     3         3         4         4         5
## carb          32  2.812    1.615     1         2         2         4         8
## -----
```

## Checking central tendency measures with the Psych package

```
library(psych)
with(mtcars, c(mean(mpg),sd(mpg),median(mpg),geometric.mean(mpg),range(mpg)))
```

```
## [1] 20.090625 6.026948 19.200000 19.250064 10.400000 33.900000
```

```
with(mtcars, c(IQR(mpg), quantile(mpg)))
```

```
##           0%    25%    50%    75%   100%  
##  7.375 10.400 15.425 19.200 22.800 33.900
```

```
mid.range <- with(mtcars, 0.5*(min(mpg) + max(mpg)))  
mid.range
```

```
## [1] 22.15
```

## Calculation of distribution criteria with the mad function

```
with(mtcars, c(var(mpg), sd(mpg), (100*sd(mpg)/mean(mpg))))
```

```
## [1] 36.324103 6.026948 29.998808
```

```
meanAD <- mad(mtcars$mpg, center = mean(mtcars$mpg))  
medianAD <- mad(mtcars$mpg)  
meanAD
```

```
## [1] 6.37518
```

```
medianAD
```

```
## [1] 5.41149
```

## Correlation Test

```
cor_result <- cor.test(mtcars$mpg, mtcars$hp)  
cor_result
```

```
##  
## Pearson's product-moment correlation  
##  
## data: mtcars$mpg and mtcars$hp  
## t = -6.7424, df = 30, p-value = 1.788e-07  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## -0.8852686 -0.5860994  
## sample estimates:  
## cor  
## -0.7761684
```

```
require(ggplot2)
```

```
## Zorunlu paket yükleniyor: ggplot2
```

```
##
```

```
## Attaching package: 'ggplot2'
```

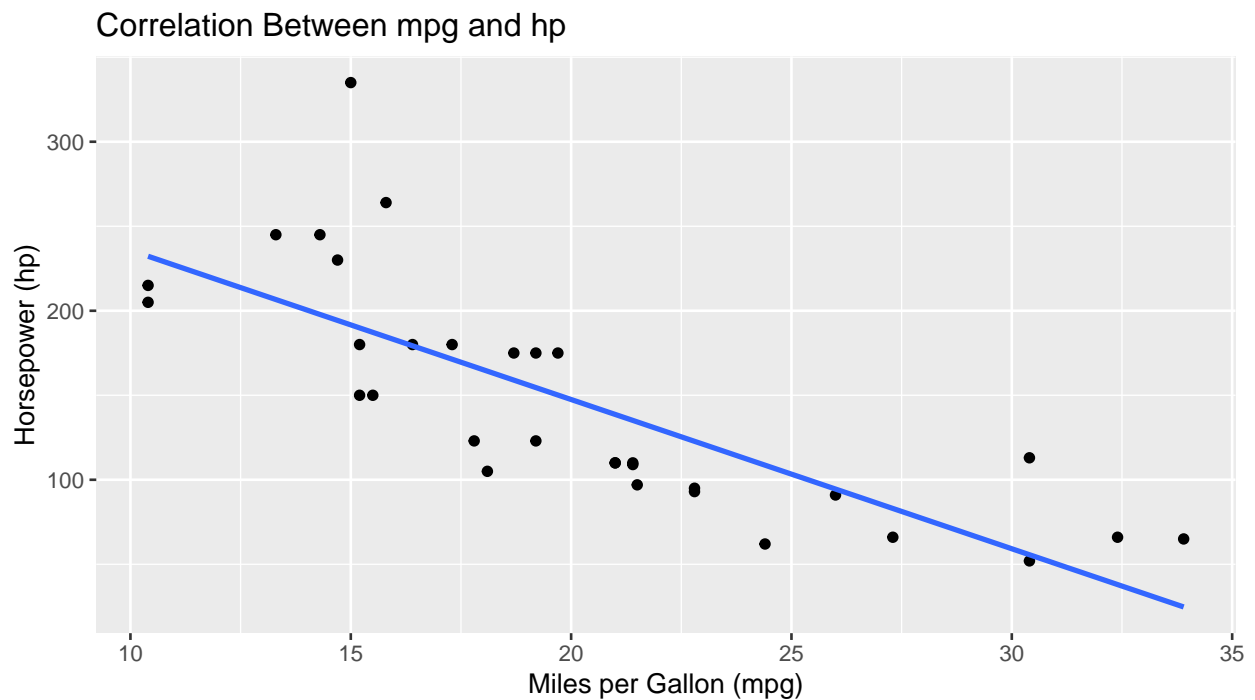
```
## The following objects are masked from 'package:psych':
```

```
##
```

```
## %+%, alpha
```

```
ggplot(mtcars, aes(x = mpg, y = hp)) +  
  geom_point() +  
  geom_smooth(method = "lm", se = FALSE) +  
  labs(x = "Miles per Gallon (mpg)", y = "Horsepower (hp)", title = "Correlation Between mpg and hp")
```

```
## 'geom_smooth()' using formula = 'y ~ x'
```



## Partial Correlation

```
require(ppcor)
```

```
## Zorunlu paket yükleniyor: ppcor
```

```
## Zorunlu paket yükleniyor: MASS
```

```
## Warning: package 'MASS' was built under R version 4.4.1
```

```
attach(mtcars)
```

```
## The following object is masked from package:ggplot2:
```

```
##
```

```
##      mpg
```

```
pcor.test(mpg,hp,wt)
```

```
##      estimate      p.value statistic  n gp Method
```

```
## 1 -0.5469926 0.001451229 -3.518712 32  1 pearson
```

```
require(psych)
```

```
with(mtcars, c(cor(mpg,hp),cov(mpg,hp)))
```

```
## [1] -0.7761684 -320.7320565
```

```
skewness <- skew(mtcars$mpg)
```

```
kurtosis <- kurtosi(mtcars$mpg)
```

```
c(skewness,kurtosis)
```

```
## [1] 0.610655 -0.372766
```

## Kurtosis Chart

```
library(e1071)
```

```
## Warning: package 'e1071' was built under R version 4.4.1
```

```
curve(dnorm(x, mean = mean(mtcars$mpg), sd = sd(mtcars$mpg)),
```

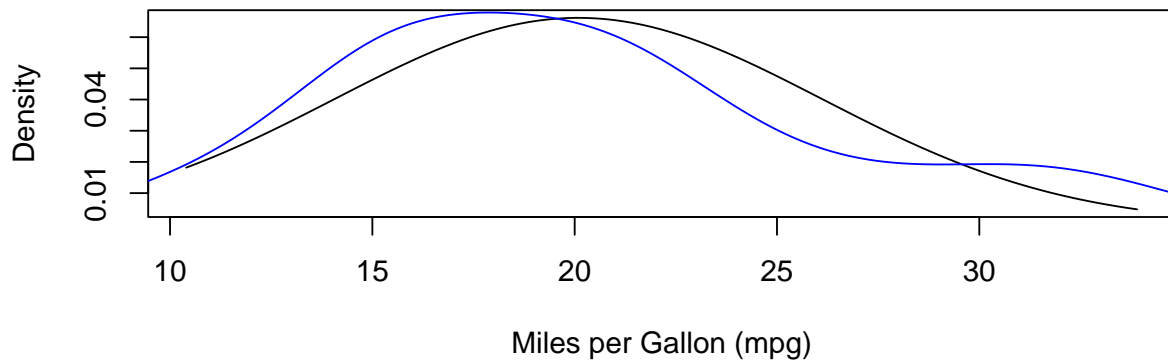
```
from = min(mtcars$mpg), to = max(mtcars$mpg),
```

```
xlab = "Miles per Gallon (mpg)", ylab = "Density",
```

```
main = "Kurtosis Graph")
```

```
lines(density(mtcars$mpg), col = "blue")
```

## Kurtosis Graph



## Skewness Chart

```
skewness <- skewness(mtcars$mpg)
curve(dnorm(x, mean = mean(mtcars$mpg), sd = sd(mtcars$mpg)),
      from = min(mtcars$mpg), to = max(mtcars$mpg),
      xlab = "Miles per Gallon (mpg)", ylab = "Density",
      main = paste("Skewness:", round(skewness, 2)))
lines(density(mtcars$mpg), col = "blue")
abline(v = mean(mtcars$mpg), col = "red", lty = 2)
legend("topright", legend = c("Normal distribution", "Data Density", "Mean"),
      col = c("black", "blue", "red"), lty = c(1, 1, 2), cex = 0.8)
```

## Skewness: 0.61

