Einführung in R und RStudio

[Termine 7 & 8]

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Der Kurs

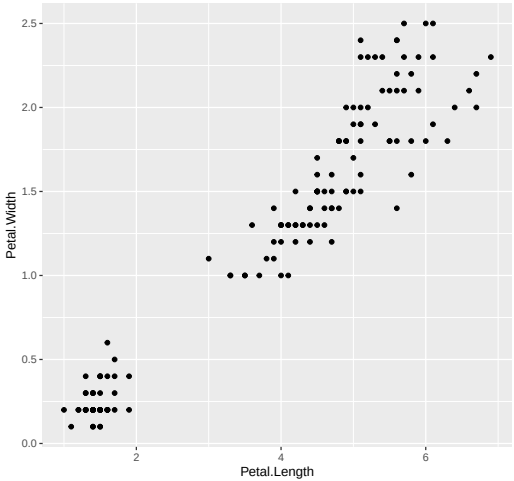
- **Termin 1 & 2**
  - Grundlagen
  - Datentypen
- **Termin 3 & 4**
  - Objekten
  - Lesen und Schreiben
- **Termin 5 & 6**
  - Statistiken
  - Grafiken
- **Termin 7 & 8**
  - Fortgeschrittenes Programmieren
  - Erstellen von Dokumenten
  - Abschluss

Plots (2)

ggplot

Paket ggplot2

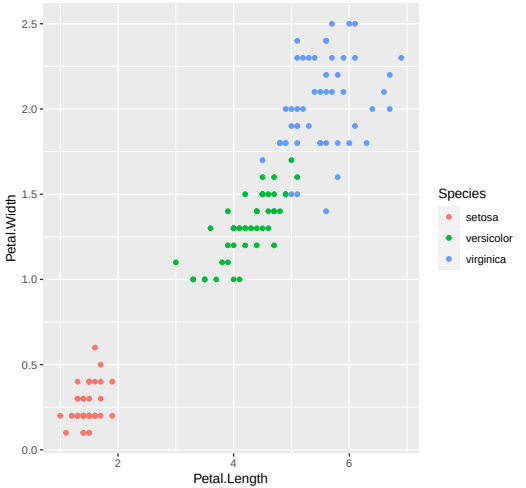
```
library(ggplot2)

ggplot(iris,
       aes(x = Petal.Length,
           y = Petal.Width)) +
    geom_point()
```



Plots (2)

scatterplot

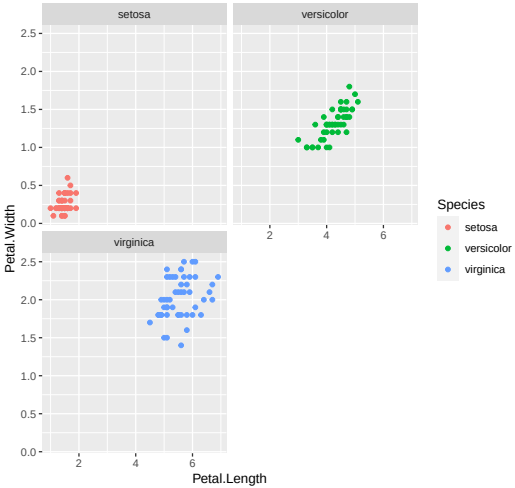
```
ggplot(iris,
       aes(x = Petal.Length,
           y = Petal.Width,
           color = Species)) +
    geom_point()
```



Plots (2)

scatterplot

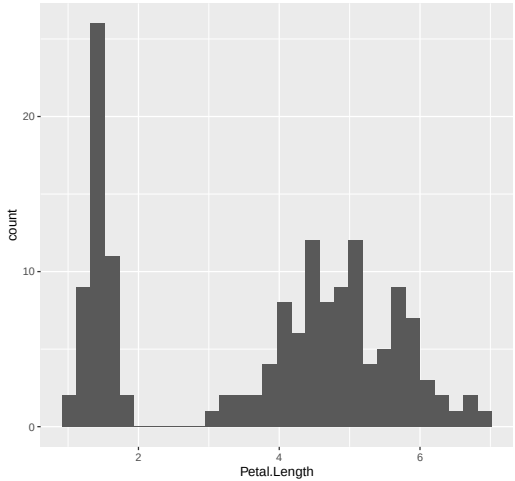
```
ggplot(iris,
       aes(x = Petal.Length,
           y = Petal.Width,
           color = Species)) +
    geom_point() +
    facet_wrap(~ Species, ncol = 2)
```



Plots (2)

histogram

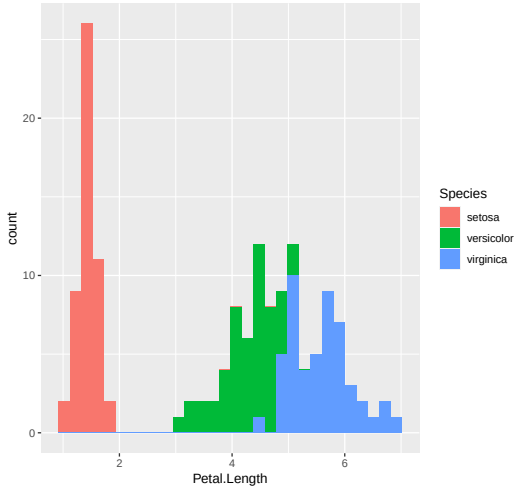
```
ggplot(iris,
       aes(x = Petal.Length)) +
    geom_histogram()
```



Plots (2)

histogram

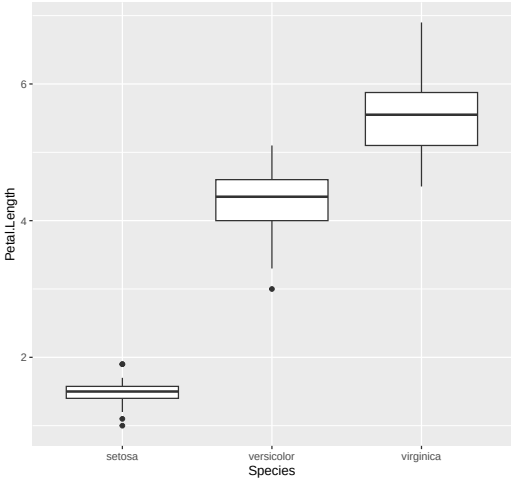
```
ggplot(iris,
       aes(x = Petal.Length,
           fill = Species)) +
    geom_histogram()
```



Plots (2)

boxplot

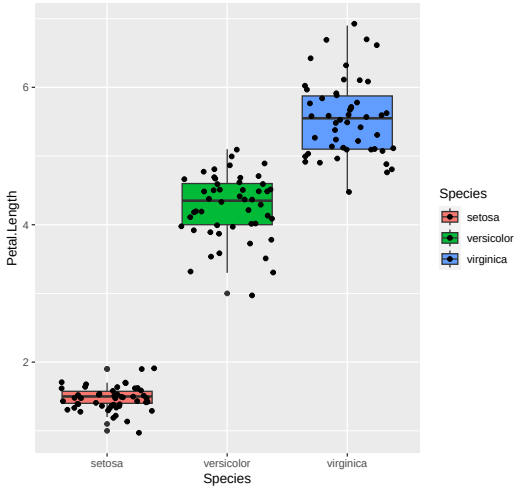
```
ggplot(iris,
       aes(x = Species,
           y = Petal.Length)) +
    geom_boxplot()
```



Plots (2)

boxplot

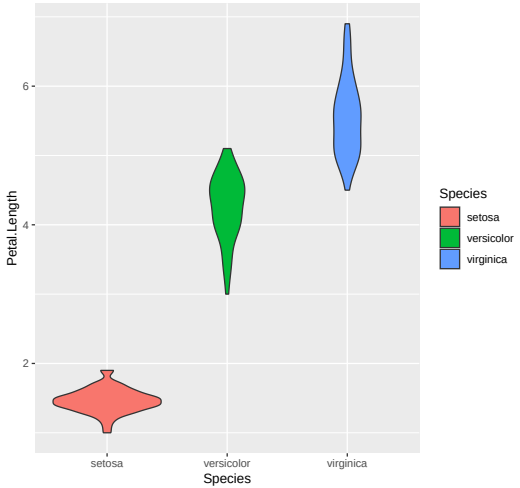
```
ggplot(iris,
       aes(x = Species,
           y = Petal.Length,
           fill = Species)) +
    geom_boxplot() +
    geom_jitter()
```



Plots (2)

violin plot

```
ggplot(iris,
       aes(x = Species,
           y = Petal.Length,
           fill = Species)) +
    geom_violin()
```



Wie ein Profi

- Iterationen (Schleifen)
- Funktionen
- Quellcode
- Pakete

```
for (i in 1:5)
  print(paste("Da wert von i ist", i))
```

```
## [1] "Da wert von i ist 1"
## [1] "Da wert von i ist 2"
## [1] "Da wert von i ist 3"
## [1] "Da wert von i ist 4"
## [1] "Da wert von i ist 5"
```

```
add_one <- function(x) {
  return(x + 1)
}

add_one(c(1:5))
```

```
## [1] 2 3 4 5 6
```

Wie ein Profi

Iterationen (Schleifen)

```
repeat {Ausdruck}
while (Bedingung) {Ausdruck}
for (i in M) {Ausdruck}

next
break
```

```
for (i in names(Bonn)) {
  if (is.numeric(Bonn[[i]])) {
    print(paste(i, mean(Bonn[[i]])))
  }
}
```

```
## [1] "BezirkNr 250.258064516129"
## [1] "Jahr 2020"
## [1] "Gesamt 5389.98924731183"
## [1] "DichteKm2 4162.48924731183"
## [1] "Maenner 2606.31182795699"
## [1] "Frauen 2783.60752688172"
## [1] "Zuwanderer 1627.06989247312"
## [1] "Auslaender 947.693548387097"
## [1] "FlaecheKm2 2.1936729876851"
## [1] "X 2578524.77378713"
## [1] "Y 5620621.4448268"
```

Wie ein Profi

Funktionen

```
foo <- function(Argumente) {Ausdruck}
```

- Definition
- Parameter (Argumente)
- Argumente mit Voreinstellungen
- ...

```
mean_sd <- function(x) {
  y <- c(mean(x), sd(x))
  names(y) <- c("Mittelwert",
      "Standardabweichung")
  return(y)
}

mean_sd(Bonn$Gesamt)
```

```
##          Mittelwert Standardabweichung
##            5389.989           2491.407
```

Wie ein Profi

Quellcode

```
source("Pfad")
```

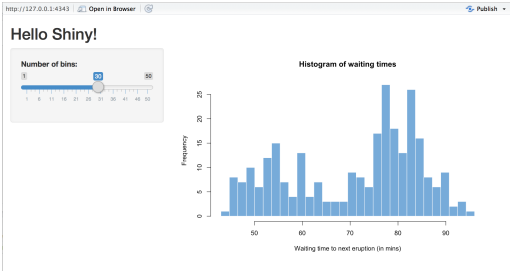
```
source("MeineFunktionen.R", echo = TRUE)
```

```
##
## > BonnStats <- function(x, ...) {
## +   if (!is.numeric(x))
## +     stop("Der Wert 'x' muss numerisch sein
## +   out <- c(mean(x, ...), sd(x, ...))
## +   n .... [TRUNCATED]
```

Schluss

Weitere Themen

- Interaktive Dokumente
  - *shiny* Apps
  - *leaflet* widgets
- Räumliche Daten (GIS)
- Text Analyse
- Bild Animation
- R Pakete
- Internet Seiten



Schluss


Louis, I think this is the beginning of a
beautiful friendship.

Vielen Dank!

```
library(fortunes)
fortune(43)
```

```
##
## My preference goes with the numbering scheme attributed to a tribe on some
## island in the Pacific which consists of a 'factor' with four levels: 'one',
## 'two', 'three', and 'lots'. Hence, I'd go with 'lots of R users'.
##    -- Dirk Eddelbuettel (in a discussion about trying to estimate the number of
##       R users)
##       R-help (April 2004)
```