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

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]
```

Rmarkdown

Literarisches Programmieren Paradigma

Reproduzierbare Datenanalyse

- Sweave
- knitr
- Rmarkdown
- roxygen

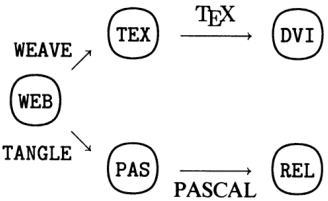


Figure 1. Dual usage of a WEB file.

Knuth (1984)

Rmarkdown

Datei **.Rmd**

- Kopf: `yaml`
- Inhalt: `markdown`
- Code Chunks (Bausteine):
  - R
  - SQL
  - usw.
- Ausgangsformate
  - PDF
  - html
  - docx (MS Word)
  - odt (LibreOffice Write)
  - pptx (MS Power Point)

```
---
title: "Untitled"
author: "Ich"
date: "`r Sys.Date()`"
output: html_document
---

```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
```

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for
authoring HTML, PDF, and MS Word documents. For more details on using
R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes
both content as well as the output of any embedded R code chunks within the
document. You can embed an R code chunk like this:

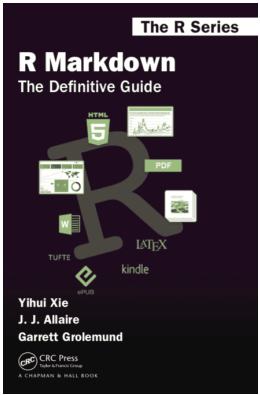
```{r cars}
summary(cars)
```

Including Plots

You can also embed plots, for example:

```{r pressure, echo=FALSE}
plot(pressure)
```
```

Rmarkdown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R Markdown
The Definitive Guide
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kindle
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Yihui Xie
J. J. Allaire
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CRC Press
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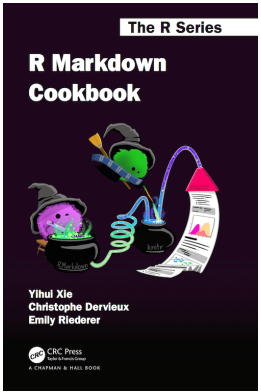
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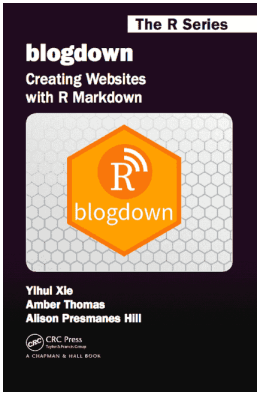
The R Series
blogdown
Creating Websites
with R Markdown
blogdown
Yihui Xie
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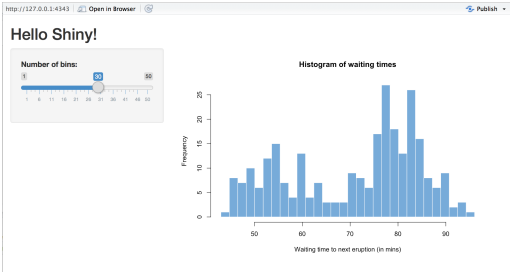
Schluss

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!