

\mathbb{R} IS MODULAR

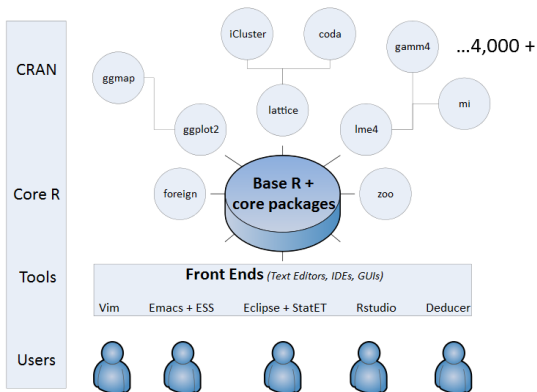
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Where to find routines

- Many functions are included in basic R
- Many specific functions are integrated in additional libraries
- R can be modularly extended by so-called packages or libraries
- Most important packages hosted on CRAN (15322 at Fr Feb 28)
- Further packages can be found e.g. at **bioconductor**

OVERVIEW R PACKAGES



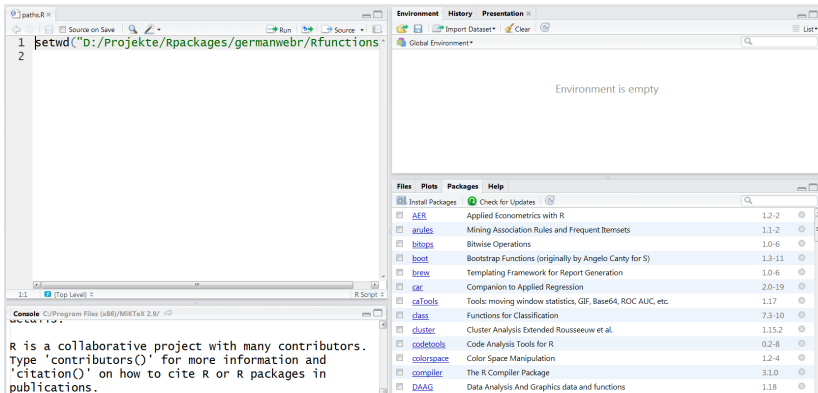
INSTALLATION OF PACKAGES

- The quotes around the package name are necessary for the command `install.packages`.
- They are optional for the command `library`.
- You can also use `require` instead of `library`.

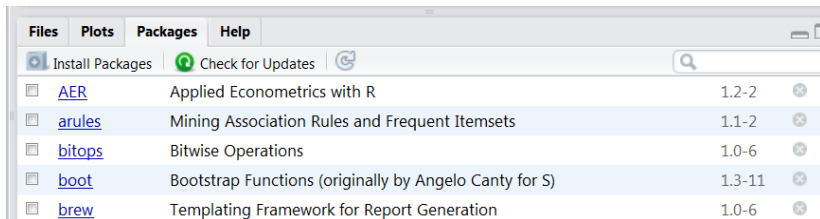
```
install.packages("lme4")
```

```
library(lme4)
```

INSTALLATION OF PACKAGES WITH RSTUDIO



EXISTING PACKAGES AND INSTALLATION



EXERCISE: DOWNLOAD PACKAGES

Download and install the following packages from CRAN:

- tidyverse
- nycflights13
- cluster
- ggplot2
- tmap

Have a look at the package documentation. What are these packages for?

OVERVIEW OF MANY USEFUL PACKAGES:

- Luhmann - **Table with many useful packages**

OTHER INTERESTING PACKAGES:

- Package for Import/Export - `foreign`
- **sampling-package for survey Sampling**
- `xtable` Package for integrating LaTeX in R (**xtable Galerie**)
- **dummies package for creating dummies**
- **Package `mvtnorm` for getting a multivariate normal distribution**
- **Package `maptools` for creating maps**

INSTALL PACKAGES FROM VARIOUS SOURCES

INSTALL PACKAGES FROM CRAN SERVER

```
install.packages("lme4")
```

INSTALL PACKAGES FROM BIOCONDUCTOR SERVER

```
source("https://bioconductor.org/biocLite.R")  
biocLite(c("GenomicFeatures", "AnnotationDbi"))
```

INSTALL PACKAGES FROM GITHUB

```
install.packages("devtools")  
library(devtools)  
  
install_github("hadley/ggplot2")
```


PACKAGES

```
# load the package to use in the current R session
library(tidyverse)

# use a particular function within a package
# without loading the package
stringr::str_replace()
```

GETTING HELP ON PACKAGES

```
# provides details regarding contents of a package
help(package = "tidyr")
# list vignettes available for a specific package
vignette(package="tidyr")
# view specific vignette
vignette("tidy-data")
```

HOW DO I GET AN OVERVIEW

- **Discover packages recently uploaded to CRAN**
- Look at the Shiny web app that shows the **packages recently downloaded from CRAN**
- Have a look at a **quick-list of useful packages**,...
- ..., or at a list with the **best packages for data processing and analysis**,...
- ..., or at **the 50 most used packages**

CRAN TASK VIEWS

- For some topics all possibilities are arranged in R. (**Overview of Task Views**)
- Currently there are 35 task views.
- All packages of a task view can be installed with the following **command**:

```
install.packages("ctv")  
library("ctv")  
install.views("Bayesian")
```

CRAN Task Views

[Bayesian](#)

Bayesian Inference

[ChemPhys](#)

Chemometrics and Computational Physics

[ClinicalTrials](#)

Clinical Trial Design, Monitoring, and Analysis

[Cluster](#)

Cluster Analysis & Finite Mixture Models

[DifferentialEquations](#)

Differential Equations

[Distributions](#)

Probability Distributions

[Econometrics](#)

Econometrics

[Environmetrics](#)

Analysis of Ecological and Environmental Data

[ExperimentalDesign](#)

Design of Experiments (DoE) & Analysis of Experimental Data

[ExtremeValue](#)

Extreme Value Analysis

[Finance](#)

Empirical Finance

EXERCISE: ADDITIONAL PACKAGES

GO FOR EXAMPLE TO:

<https://cran.r-project.org/>

<https://awesome-r.com/>

OR SEARCH FOR

most interesting r packages

AND SEARCH FOR PACKAGES ...

- for descriptive data analysis.
- with functions to work with date-times and time-spans.
- to use an interface to python.
- to import foreign data (e.g. SPSS data).
- to handle large amounts of data

THE SWIRL PACKAGE

LEARN R, IN R

```
install.packages("swirl")
```

```
library(swirl)
```

```
# type the following into the console:
```

```
swirl()
```