# Important R-commands to work with maps

## First steps in R

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# Vectors and assignment

- `<-` is the assignment operator
- `b <- c(1,2)` creates an object with the numbers 1 and 2
- I can apply a function to that object:
- `mean(b)` gives me the mean

  With the following functions we can learn about its characteristics:
  - `length(b)` - b has the length 2
  - `str(b)` - b is an numeric vector

If you are new to R have a look at:

`http://cran.r-project.org/doc/manuals/R-intro.html`

### 2.1 Vectors and assignment

R operates on named *data structures*. The simplest such structure is the numeric *vector*, which is a single entity consisting of an ordered collection of numbers. To set up a vector named `x`, say, consisting of five numbers, namely 10.4, 5.6, 3.1, 6.4 and 21.7, use the R command

```
> x <- c(10.4, 5.6, 3.1, 6.4, 21.7)
```

This is an *assignment* statement using the *function* `c()` which in this context can take an arbitrary number of vector *arguments* and whose value is a vector got by concatenating its arguments end to end.[6]

- R is a modular program
- Many functions are included in the basic R
- But more specific functions are embedded in libraries

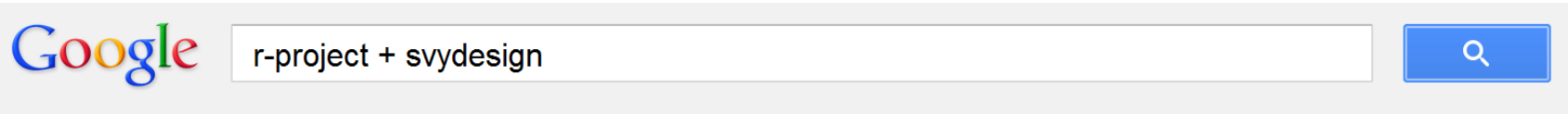
```
install.packages("ggmap")
library(ggmap)
```

# Important libraries

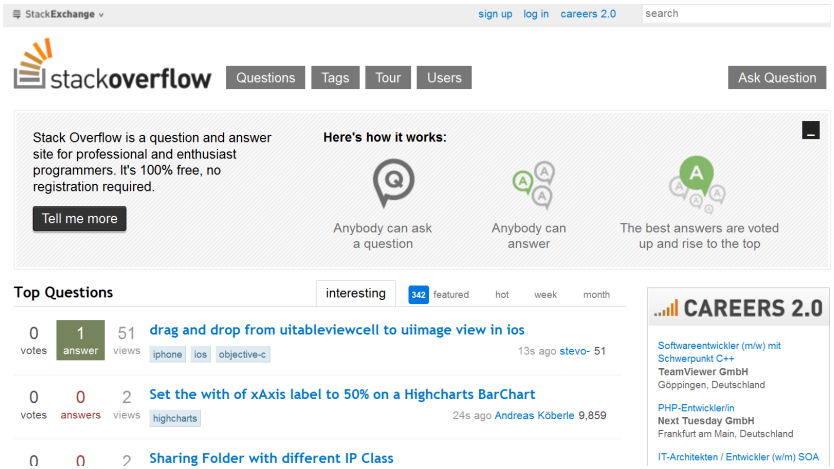
| **Library** | **Topic** |
|---|---|
| ggmap | Spatial Visualization with ggplot2 |
| foreign | Functions for reading and writing data stored by statistical packages |
| maptools | Tools for Reading and Handling Spatial Objects |
| maps | Draw Geographical Maps |
| raster | Geographic Data Analysis and Modeling |

# How to get help

- To get General help in R write the following command at R command prompt `help.start()`
- Online documentation for most of the functions and variables in R exists, and can be printed on-screen by typing `help(name)`
- Use of `?` for Help
  Example: `?mean`
- `example(lm)` will provide an example of your required function such as lm




- Normaly I use google if want to find something in R
- Type in:
  *R-project + What I always wanted to know*
- That works of course with every search engine




- `http://stackoverflow.com/`
- For programming questions
- It is not focused on R
- Richly detailed discussions

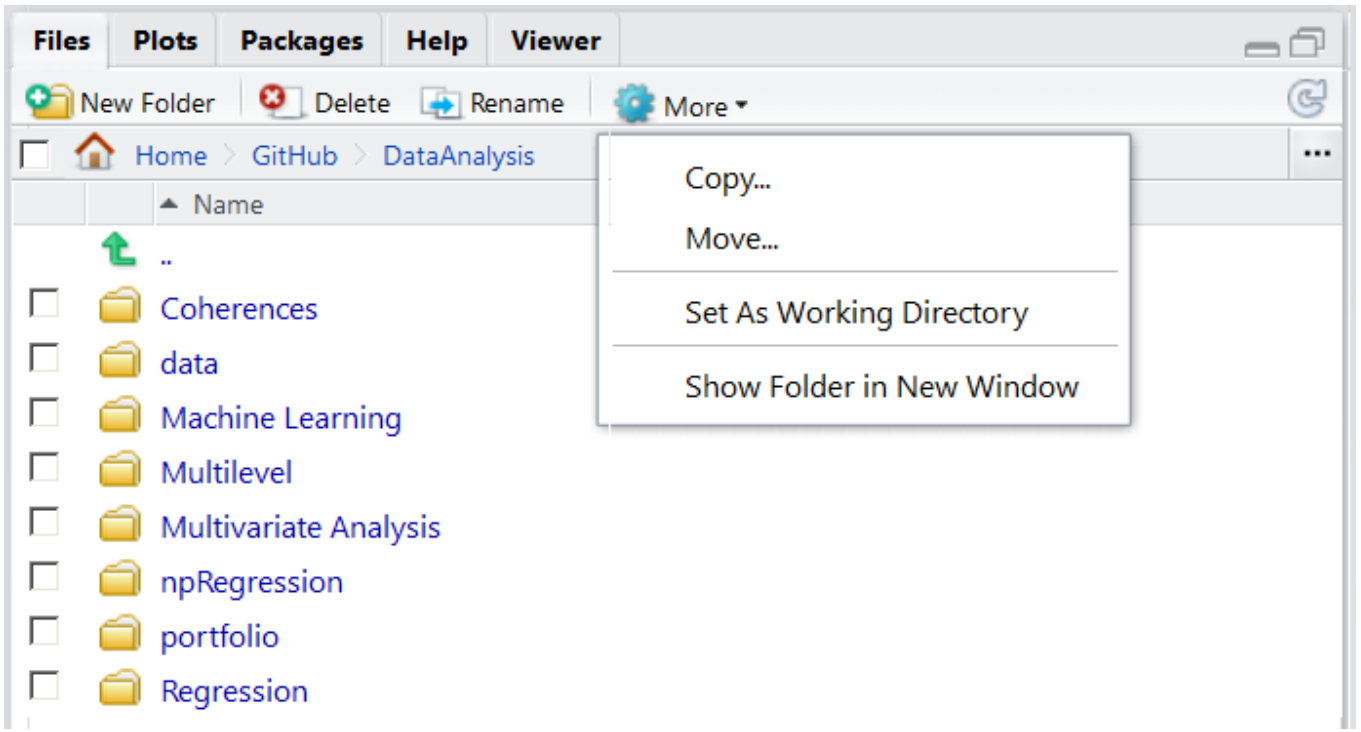
# Different types of data

| | |
|---|---|
| numeric | `b <- c(1,2)` |
| logical | `log <- c(T,F)` |
| character | `char <-c("A","b")` |
| factor | `fac <- as.factor(c(1,2))` |

With `str()` you get the type.

```
> str(fac)
 Factor w/ 2 levels "1","2": 1 2
```

# Set Working Directory



# Indexing

**Indexing a vector:**

```
> A1 <- c(1,2,3,4)
> A1
[1] 1 2 3 4
> A1[1]
[1] 1
> A1[4]
[1] 4
> A1[1:3]
[1] 1 2 3
> A1[-4]
[1] 1 2 3
```

# Indexing

## Indexing a dataframe:

```
> AA <- 4:1
> A2 <- cbind(A1,AA)
> A2[1,1]
A1
 1
> A2[2,]
A1 AA
 2  3
> A2[,1]
[1] 1 2 3 4
> A2[,1:2]
     A1 AA
[1,]  1  4
[2,]  2  3
[3,]  3  2
[4,]  4  1
```

# Functions in the base package

| Function | Meaning | Example |
|---|---|---|
| `length()` | Length | `length(b)` |
| `max()` | Maximum | `max(b)` |
| `min()` | Minimum | `min(b)` |
| `sd()` | Standard deviation | `sd(b)` |
| `var()` | Variance | `var(b)` |
| `mean()` | Mean | `mean(b)` |
| `median()` | Median | `median(b)` |

These functions do only need one argument.
There are others which need more:

| | | |
|---|---|---|
| `quantile()` | 90 % Quantile | `quantile(b,.9)` |
| `sample()` | Draw a sample | `sample(b,1)` |

# The function sample

sample {base} R Documentation

## Random Samples and Permutations

### Description

`sample` takes a sample of the specified size from the elements of `x` using either with or without replacement.

### Usage

```
sample(x, size, replace = FALSE, prob = NULL)
```

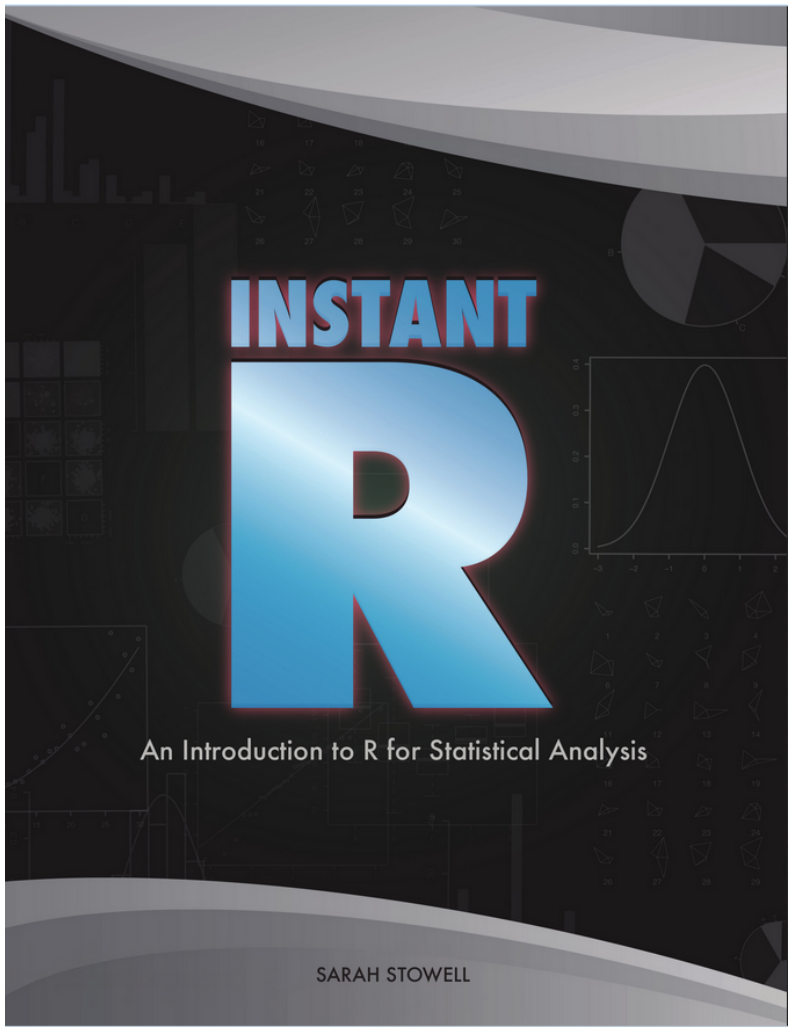
# The R-package swirl

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

# Literature


- Ligges, U. (2008): Programmieren mit R. Springer.
- Good book for beginners, but unfortunately only in German.

# Literature




- Import and export of data
- Data manipulation
- Graphics

# More help for beginners

idre INSTITUTE FOR DIGITAL RESEARCH AND EDUCATION UCLA

Help the Stat Consulting Group by giving a gift

Google™ Custom Search

stat > r > sk

## R Starter Kit

This page is intended for people who:

| Are just starting | Have a question or two about | Want a quick refresher |
|---|---|---|
| • to learn R<br>• to utilize basic statistical procedures | • how to do a simple task in R<br>• how to interpret the output from commonly used procedures | • on how to do basic tasks in R<br>• on frequently used statistical procedures and the interpretation of their output. |

These materials have been collected from various places on our website and have been ordered so that you can, in step-by-step fashion, develop the skills needed to conduct common analyses in R.

**Getting familiar with R**

- Class notes: There is no point in waiting to take an introductory class on how to use R. Instead, we have notes of our introductory class that you can download and view.
- Learning modules: We have developed a set of web pages called learning modules which show you how to accomplish basic data management tasks in R, including how to get data into R, how to recode variable and how to subset data. The R code and the output produced are shown, as well as tips on things to look out for.

http://www.ats.ucla.edu/stat/r/sk/