Writing R packages in Rstudio

https://stirlingcodingclub.github.io/SCC_R_package/notebook/Rpackage_notes.html

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- CRAN currently holds over 13000 R packages
- R packages are wide ranging
  - Massive multi-person development efforts for large scale coding projects
  - Small joke packages with minimal code
  - Personal packages customised for an individual user

Two packages that need to be installed

The `devtools` package:

> *Devtools makes package development a breeze: it works with R's existing conventions for code structure, adding efficient tools to support the cycle of package development. With devtools, developing a package becomes so easy that it will be your default layout whenever you're writing a significant amount of code.*

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The `roxygen2` package:

> *The goal of roxygen2 is to make documenting your code as easy as possible. R provides a standard way of documenting packages: you write .Rd files in the man/ directory.*

The most basic R package

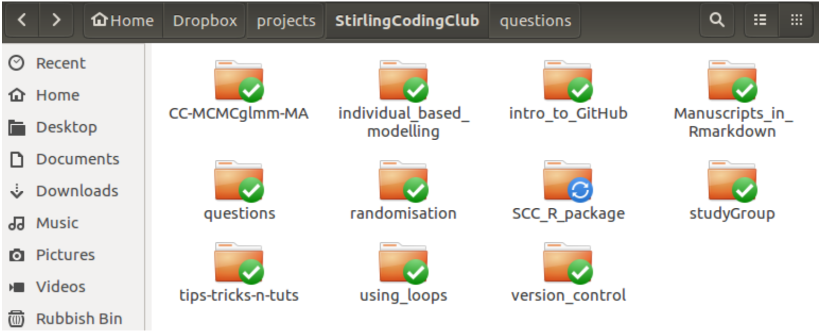
Goal: Create an R package that includes two functions.

```r
# Convert Fahrenheit to Celsius
F_to_C <- function(F_temp){
    C_temp <- (F_temp - 32) * 5/9;
    return(C_temp);
}

# Convert Celsius to Fahrenheit
C_to_F <- function(C_temp){
    F_temp <- (C_temp * 9/5) + 32;
    return(F_temp);
}
```

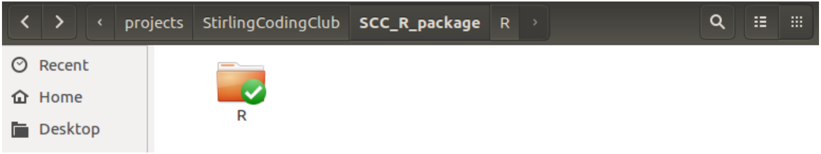
The most basic R package

First, create a new folder in your computer



The most basic R package

Next, add a folder called 'R'



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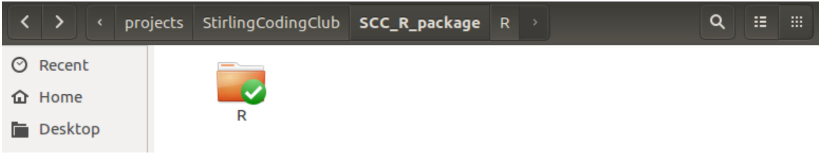
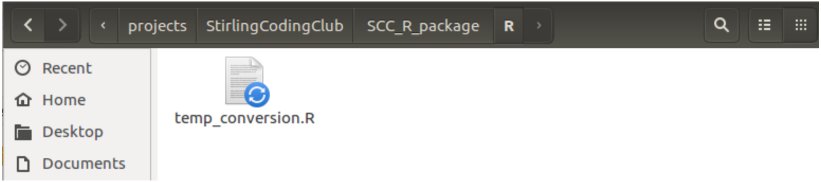


Then drop the R scripts into the 'R' folder



The most basic R package

Add a file called `DESCRIPTION` to the outer directory. This is a plain text file that can just be a few lines of code.

```
Package: SCCTempConverter
Type: Package
Title: Temperature Conversion Package for Demonstration
Version: 0.0.1.0
RoxygenNote: 6.1.0
```

It can also include a lot more information (e.g., authors, maintainers, extended description, website, etc.) if need be.

The most basic R package

This is now *already* an R package, which we can load.

```r
# Working dir should be SCC_R_package
library(devtools);
load_all(".");
```

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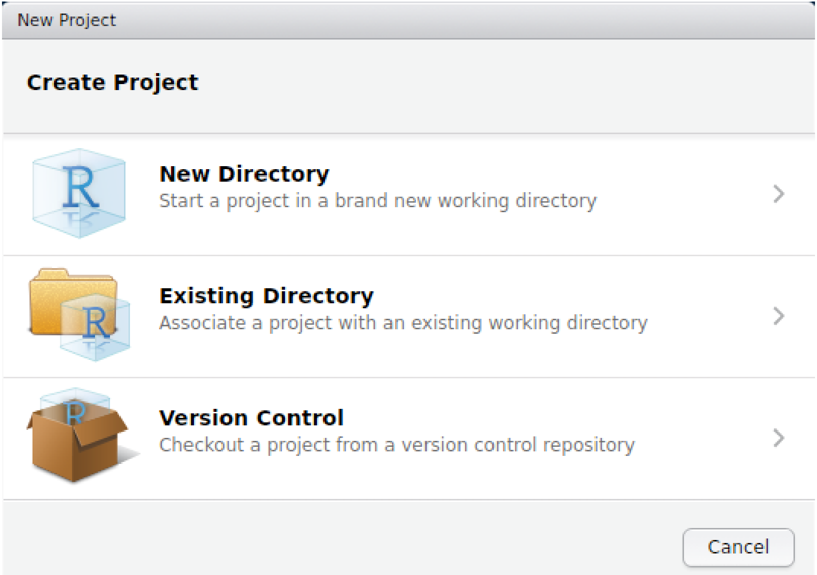
Once loaded, we can start using the R functions in the package.

```
C_to_F(20);
```

```
## [1] 68
```

Creating a new R project

To do this in Rstudio, go to `File > New Project...`



New Project

Create Project

New Directory
Start a project in a brand new working directory

Existing Directory
Associate a project with an existing working directory

Version Control
Checkout a project from a version control repository

Creating a new R project

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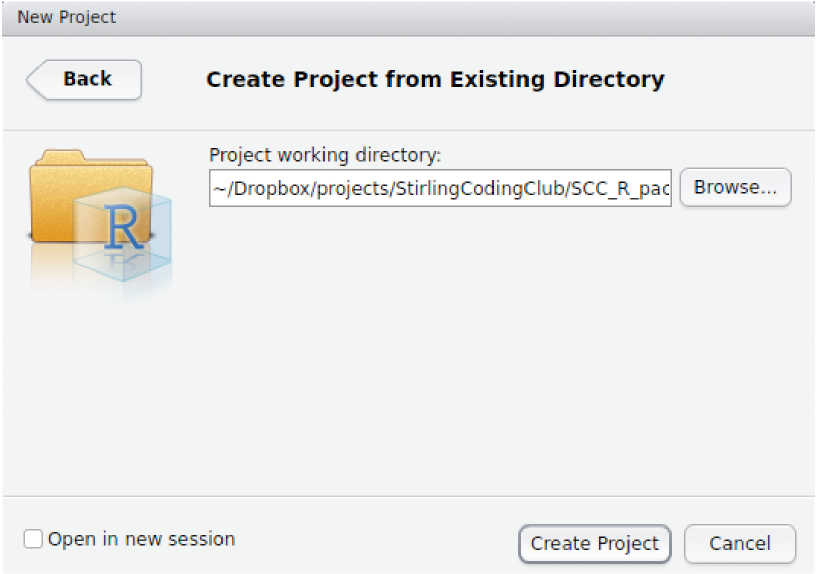

New Project

Create Project from Existing Directory

Project working directory:

~/Dropbox/projects/StirlingCodingClub/SCC_R_pac

□ Open in new session

Creating a new R project

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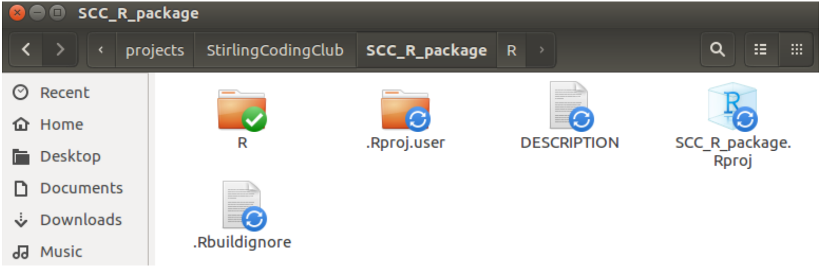


Adding some minimal documentation

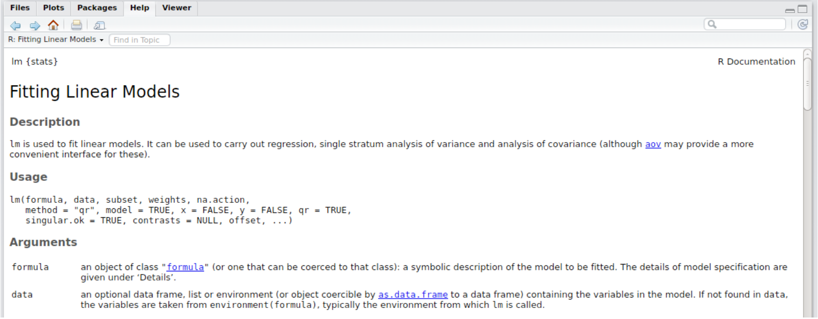
Documentation shows up in the ‘Help’ tab of RStudio when running the function `help`

```
help(lm);
```

Note that the code below does the same thing as the code above.

```
?lm
```

Adding some minimal documentation



lm {stats} R Documentation

Fitting Linear Models

Description

`lm` is used to fit linear models. It can be used to carry out regression, single stratum analysis of variance and analysis of covariance (although aov may provide a more convenient interface for these).

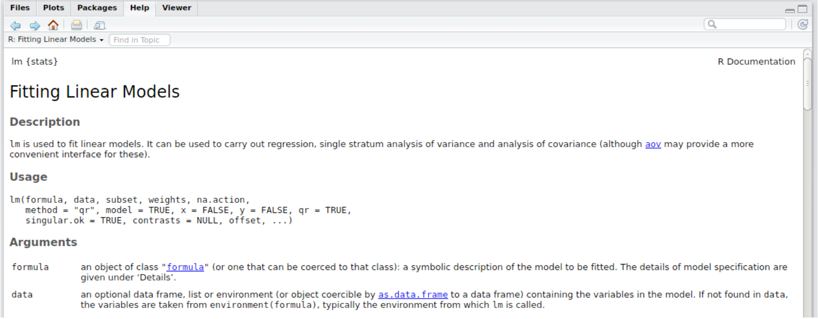
Usage

```
lm(formula, data, subset, weights, na.action,
   method = "qr", model = TRUE, x = FALSE, y = FALSE, qr = TRUE,
   singular.ok = TRUE, contrasts = NULL, offset, ...)
```

Arguments

`formula`	an object of class "`formula`" (or one that can be coerced to that class): a symbolic description of the model to be fitted. The details of model specification are given under 'Details'.
`data`	an optional data frame, list or environment (or object coercible by `as.data.frame` to a data frame) containing the variables in the model. If not found in data, the variables are taken from `environment(formula)`, typically the environment from which `lm` is called.

Adding some minimal documentation



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Create help files in Rstudio using the roxygen2 package

```
install.packages("roxygen2");
library(roxygen2);
```

Adding some minimal documentation

```r
#' Fahrenheit conversion
#'
#' Convert degrees Fahrenheit temp to degrees Celsius
#' @param F_temp The temperature in degrees Fahrenheit
#' @return The temperature in degrees Celsius
#' @examples
#' temp1 <- F_to_C(50);
#' temp2 <- F_to_C( c(50, 63, 23) );
#' @export
F_to_C <- function(F_temp){
    C_temp <- (F_temp - 32) * 5/9;
    return(C_temp);
}
```

Adding some minimal documentation

If we load our package and type the following:

```
help(F_to_C); # ?F_to_C also works
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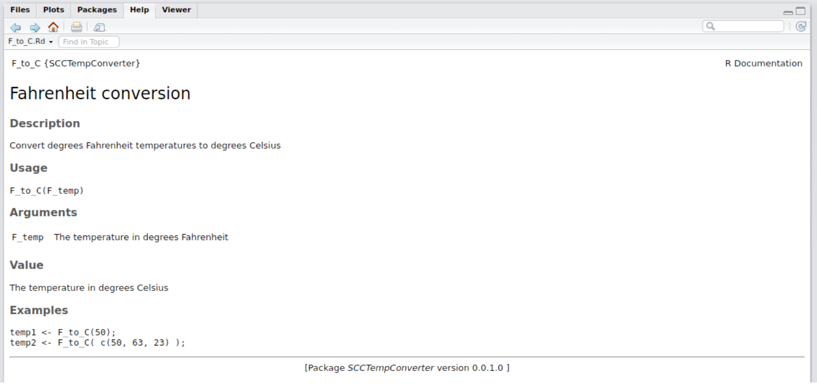
We get the below in RStudio



F_to_C {SCCTempConverter} R Documentation

Fahrenheit conversion

Description

Convert degrees Fahrenheit temperatures to degrees Celsius

Usage

```
F_to_C(F_temp)
```

Arguments

F_temp The temperature in degrees Fahrenheit

Value

The temperature in degrees Celsius

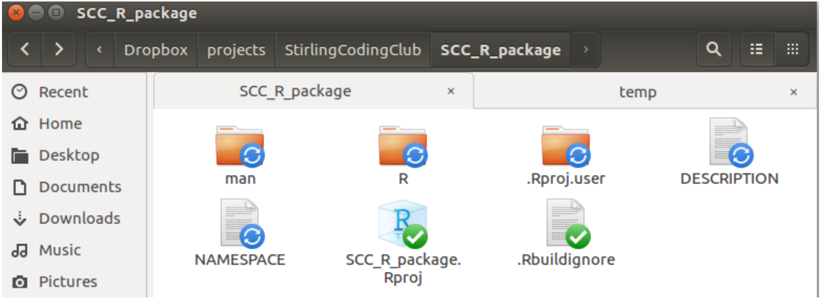
Examples

```
temp1 <- F_to_C(50);
temp2 <- F_to_C( c(50, 63, 23) );
```

[Package *SCCTempConverter* version 0.0.1.0]

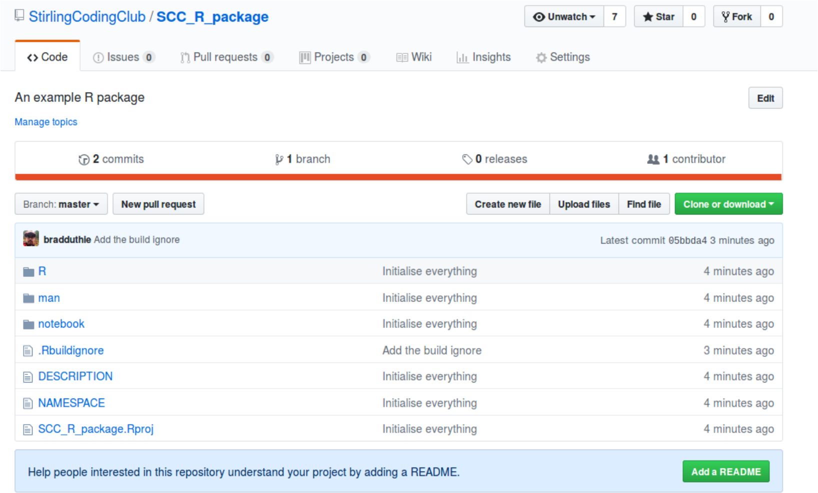
Adding some minimal documentation

Note that a new folder has been added to the directory



Upload the package to GitHub

See notes on version control for help



An example R package

2 commits | 1 branch | 0 releases | 1 contributor

braddthle Add the build ignore — Latest commit 05bbda4 3 minutes ago

R	Initialise everything	4 minutes ago
man	Initialise everything	4 minutes ago
notebook	Initialise everything	4 minutes ago
.Rbuildignore	Add the build ignore	3 minutes ago
DESCRIPTION	Initialise everything	4 minutes ago
NAMESPACE	Initialise everything	4 minutes ago
SCC_R_package.Rproj	Initialise everything	4 minutes ago

Help people interested in this repository understand your project by adding a README.

Upload the package to GitHub

Anyone can download it by using the install_github function in thedevtools

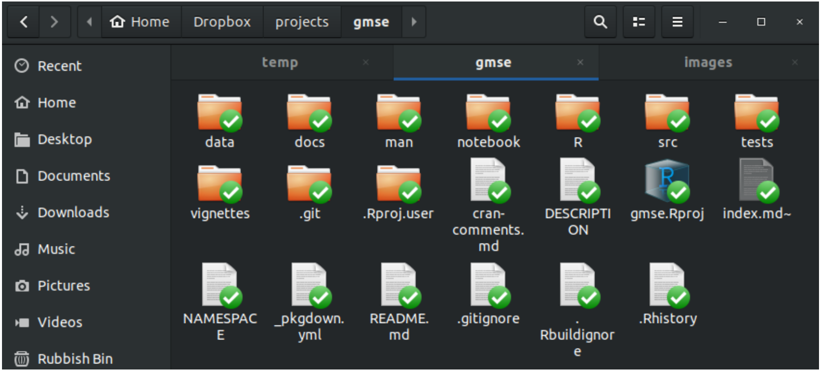
```r
library(devtools);
install_github("StirlingCodingClub/SCC_R_package");
```

Our R package is now installed. We can start using it by reading it in as a normal package.

```r
library(SCCTempConverter);
F_to_C(30);
```

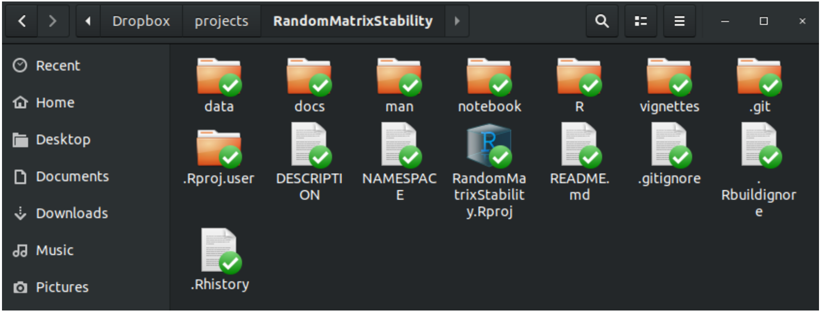
The R package design is very useful

A reasonably large R package directory



The R package design is very useful

A project for a manuscript in the R package style



Today's resources and additional help

Slides: https://stirlingcodingclub.github.io/SCC_R_package/notebook/Rpackage_slides.pdf

Notes: https://stirlingcodingclub.github.io/SCC_R_package/notebook/Rpackage_notes.html

From Karl Broman

- The minimal R package
- Building and installing an R package
- Writing documentation with Roxygen2

From RStudio

- R packages (free online book).
- pkgdown (automatically builds package website)