Writing R packages

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Why write an R package?

- ► To distribute R code and documentation
- ► To keep track of the misc. R functions you write and reuse
- ► To distribute data and software accompanying a paper.
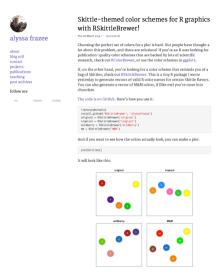
Why write an R package?

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Writing R Extensions

R Core Team

A simple example: RSkittleBrewer

R package contents

```
RSkittleBrewer/

    DESCRIPTION
    NAMESPACE

    R/RSkittleBrewer.R
    R/plotSkittles.R
    R/plotSmarties.R

    man/RSkittleBrewer.Rd
    man/plotSkittles.Rd
    man/plotSmarties.Rd
```

github.com/alyssafrazee/RSkittleBrewer

DESCRIPTION file

```
Package: RSkittleBrewer
Version: 1.1
Author: Alyssa Frazee
Maintainer: Alyssa Frazee <afrazee@jhsph.edu>
Title: Fun with R Colors
Description: For those times you want to make plots with
    candy-themed color schemes.
URL: https://github.com/alyssafrazee/RSkittleBrewer
License: MIT + file LICENSE
Imports: graphics, stats, grDevices
Suggests: knitr, rmarkdown
VignetteBuilder: knitr
RoxygenNote: 5.0.1
```

NAMESPACE file

```
export(RSkittleBrewer)
export(plotSkittles)
export(plotSmarties)
```

An `.Rd` file

```
\name{RSkittleBrewer}
\alias{RSkittleBrewer}
\title{Candy-based color palettes}
\description{Vectors of colors corresponding to different
             candies.}
\usage{RSkittleBrewer(flavor = c("original", "tropical",
                      "wildberry", "M&M", "smarties"))
}
\arguments{
  \item{flavor}{Character string for candy-based color
  palette.}
}
\value{Vector of character strings representing the chosen
       set of colors.}
\examples{
plotSkittles()
plotSmarties()
}
\keyword{hplot}
\seealso{ \code{\link{plotSkittles}},
          \code{\link{plotSmarties}} }
```

Building, installing, and checking

```
R CMD build RSkittleBrewer
R CMD INSTALL RSkittleBrewer_1.1.tar.gz
R CMD check RSkittleBrewer_1.1.tar.gz

R CMD check --as-cran RSkittleBrewer_1.1.tar.gz

R CMD INSTALL --library=~/Rlibs RSkittleBrewer_1.1.tar.gz
# (~/.Renviron file contains R_LIBS=~/Rlibs)

# On windows:
R CMD INSTALL --build RSkittleBrewer_1.1.tar.gz
```

```
# also consider (within R):
library(devtools)
build("/path/to/RSkittleBrewer")
build("/path/to/RSkittleBrewer", binary=TRUE)
```

Roxygen2 comments

```
#   RSkittleBrewer
#' Candy-based color palettes
#'
#' Vectors of colors corresponding to different candies.
#'
#' @param flavor Character string for candy-based color palette.
#'
#' @export
#' @return Vector of character strings representing the chosen...
#'
#' @examples
#' plotSkittles()
#' plotSmarties()
#'
#' @seealso \code{\link{plotSkittles}},
#'   \code{\link{plotSmarties}}
#' @keywords hplot
RSkittleBrewer <-
...
```

Makefile

```
# build package documentation
doc:
  R -e "devtools::document()"
```

.Rbuildignore

```
Makefile
```

Include a README or README.md file

```
fun with R Colors
=================

If you want high-quality, scientifically-researched color
schemes for your R plots, check out
[RColorBrewer](http://cran.r-project.org/web/packages/RColorBrewer).
If you want your plots to be colored the same way as packs of
Skittles (or M&Ms), then this package (RSkittleBrewer) is the
way to go.

### install
with `devtools`:

```S
devtools::install_github('RSkittleBrewer', 'alyssafrazee')
```

use
There are only three functions in this package.

Call `RSkittleBrewer` on a flavor to get a vector of R color
names that correspond to that Skittle flavor.
```

13

That's it!

Package vignettes

- ▶ Include *vignettes* to show how to use your package.

- ▶ It's simplest to use R Markdown.
  - Create a `vignettes/` subdirectory.
  - Place a `.Rmd` file there.
  - The name of the file becomes the name of the vignette.

- ▶ Include the following in the `.Rmd` file's YAML header:
  ```
  output: rmarkdown::html_vignette
  vignette: >
      %\VignetteIndexEntry{Intro to RSkittleBrewer}
      %\VignetteEngine{knitr::rmarkdown}
      \usepackage[utf8]{inputenc}
  ```

- ▶ Load the package in an initial chunk
  ```
  library(RSkittleBrewer)
  ```

Package vignettes

▶ In the DESCRIPTION file, include:
```
Suggests: knitr, rmarkdown
VignetteBuilder: knitr
```

▶ The following lists the vignettes for a package and then opens a
selected vignette.
```
library(RSkittleBrewer)
vignette(package="RSkittleBrewer")
vignette("RSkittleBrewer", "RSkittleBrewer")
```

Optional stuff

- ▶ NEWS file describing changes in each version of the package.

- ▶ inst/CITATION file describing how to cite your package.

- ▶ inst/doc/ directory any sort of misc. documentation (e.g., pre-compiled computationally heavy vignettes)

- ▶ data/ directory containing data

- ▶ src/ directory containing C/C++/Fortran code

- ▶ demo/ directory with demonstrations (like vignettes, but to be executed in real-time).

- ▶ tests/ and/or inst/tests/ containing tests.

devtools

Get to know the devtools package.

- `dev_mode()`
- `load_all()`
- `install_github()`, `install_bitbucket`, ...
- `document()`
- `build()`
- `check()`
- `check_doc()`
- `run_examples()`
- `test()` (next week)

usethis

automates things otherwise hard to remember

- ▶ `create_package()`
- ▶ `use_git()`, `use_github()`
- ▶ `use_mit_license()`, `use_gpl3_license()`
- ▶ `use_readme_md()`
- ▶ `use_r("function_name")`
- ▶ `use_roxygen_md()`
- ▶ `use_package("stats", "imports")`
- ▶ `use_vignette()`

Summary

- ▶ R packages really aren't that hard.

- ▶ R packages are really useful.
  - Distributing software and data
  - Organizing code for a paper
  - Organizing your misc. R functions

- ▶ Look at others' packages, and learn from them.

- ▶ Adopt the tools in the devtools package.