Writing R packages

Tools for Reproducible Research

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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.

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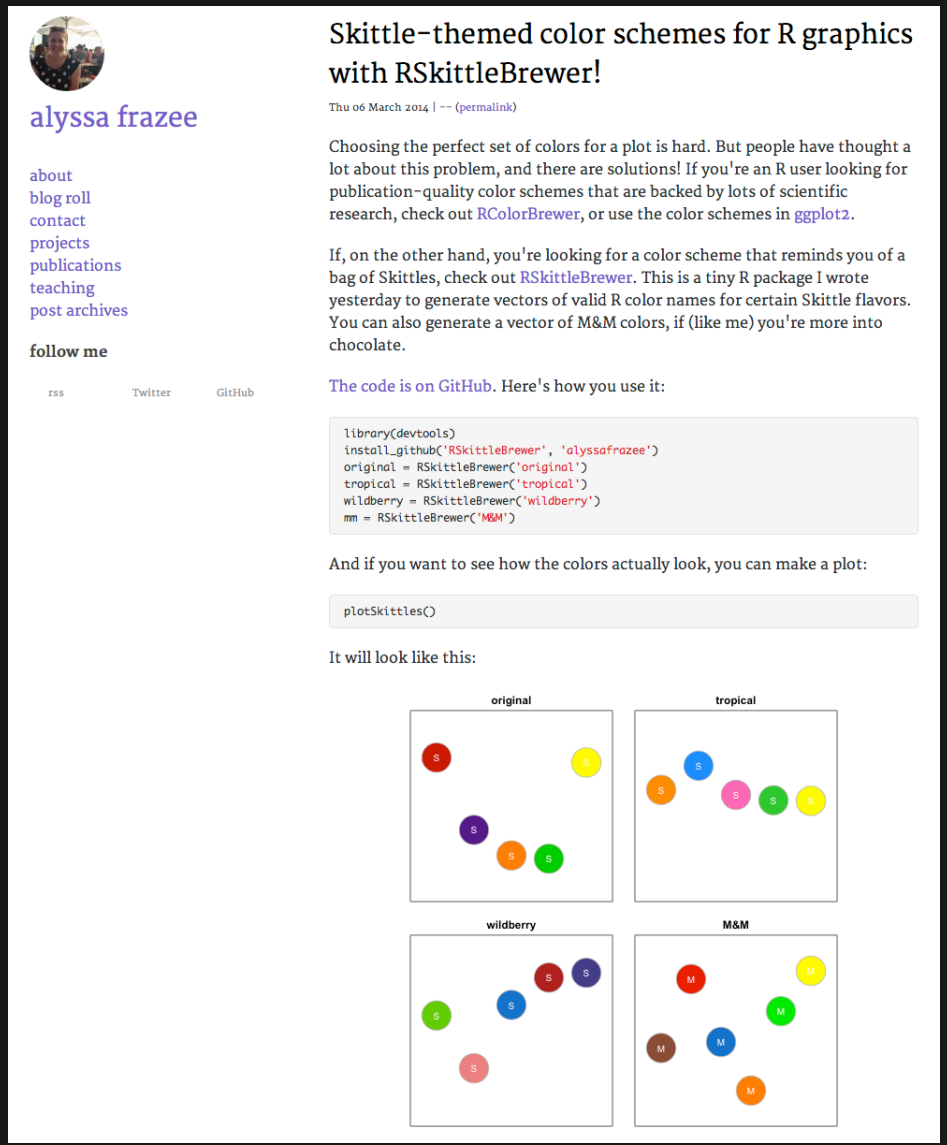
Writing R Extensions

Version 3.0.3 (2014-03-06)

R Core Team

A simple example: RSkittleBrewer



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Skittle-themed color schemes for R graphics with RSkittleBrewer!

Thu 06 March 2014 | -- (permalink)

Choosing the perfect set of colors for a plot is hard. But people have thought a lot about this problem, and there are solutions! If you're an R user looking for publication-quality color schemes that are backed by lots of scientific research, check out RColorBrewer, or use the color schemes in ggplot2.

If, on the other hand, you're looking for a color scheme that reminds you of a bag of Skittles, check out RSkittleBrewer. This is a tiny R package I wrote yesterday to generate vectors of valid R color names for certain Skittle flavors. You can also generate a vector of M&M colors, if (like me) you're more into chocolate.

The code is on GitHub. Here's how you use it:

```
library(devtools)
install_github('RSkittleBrewer', 'alyssafrazee')
original = RSkittleBrewer('original')
tropical = RSkittleBrewer('tropical')
wildberry = RSkittleBrewer('wildberry')
mm = RSkittleBrewer('M&M')
```

And if you want to see how the colors actually look, you can make a plot:

```
plotSkittles()
```

It will look like this:

alyssafrazee.com/RSkittleBrewer.html

R package contents

```
RSkittleBrewer/

    DESCRIPTION
    NAMESPACE

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

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

DESCRIPTION file

```
Package: RSkittleBrewer
Version: 1.1
Author: Alyssa Frazee
Maintainer: Alyssa Frazee <afrazee@jhsph.edu>
License: MIT + file LICENSE
Title: fun with R colors
Description: for those times you want to make plots with...
URL: https://github.com/alyssafrazee/RSkittleBrewer
```

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.
...
````

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:

```
vignette: >
    %\VignetteIndexEntry{Intro to RSkittleBrewer}
    %\VignetteEngine{knitr::rmarkdown}
    \usepackage[utf8](inputenc)
```

- Load the package in an initial chunk

```
library(RSkittleBrewer)
```

- In the `DESCRIPTION` file, include:

```
Suggests: knitr, rmarkdown
VignetteBuilder: knitr
```

Package vignettes

- Add the following lines to your `DESCRIPTION` file.

```
VignetteBuilder: knitr
Suggests: 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 time)

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.