

Searching R Packages

by Spencer Graves and Sundar Dorai-Raj

The `RSiteSearch` package provides a means to quickly and flexibly search the help pages of contributed packages, finding functions and datasets in seconds or minutes that could not be found in hours or days by any other means we know.

The results are returned in a `data.frame` of class `RSiteSearch`. Other R functions can then be used to quickly find what you want among possibly hundreds or thousands of hits.

Two examples are considered below: First we find a dataset containing a variable `Petal.Length`. Second, we find packages with `spline` capabilities, including looking for a function named `spline`.

Petal.Length

For example, a document discussing R provides an example using a variable `Petal.Length` from a famous Fisher data set but without naming the dataset nor where it can be found nor even if it exists in R.

```
> help.search('Petal.Length')
No help files found ...
```

`RSiteSearch('Petal.Length')` produced 80 hits. `RSiteSearch('Petal.Length', 'function')` will identify only the help pages on this list, but we can get the same thing as a `data.frame` as follows:

```
> PL <- RSiteSearch.function('Petal.Length')
```

The `summary.RSiteSearch` method returns the number of hits, `max(Score)`, and `sum(Score)` by Package:

```
> summary(PL)
```

```
Total number of hits: 23
Number of links downloaded: 23
```

```
Packages with at least 1 hit
using search pattern 'Petal.Length':
      Count MaxScore TotalScore
yaImpute      8         1         8
<...>
datasets      1         2         2
<...>
```

One of the listed packages is `datasets`. Since it's part of the default R distribution, we decide to look there first. We can select that row of `PL` just like we would select a row from any other `data.frame`:

```
> PL[PL$Package=='datasets', 'Function']
[1] iris
```

Problem solved in less than a minute!

spline

Three years ago, I decided I wanted to learn more about splines. I started my literature search as follows:

```
RSiteSearch('spline')
```

While preparing this manuscript, this command identified 1526 documents. That is too much, so I restricted it to functions:

```
RSiteSearch('spline', 'fun')
```

This identified only 631. That's an improvement over 1526 but is too much. To get a quick overview of these 631, we can proceed as follows:

```
splinePacs <- RSiteSearch.function('spline')
```

This downloaded a summary of the 200 highest-scoring help pages in the `'RSiteSearch'` data base in roughly 5-10 seconds, depending on the speed of the Internet connection. To get all 631 hits, increase `maxPages`:

```
splineAll <- RSiteSearch.function('spline',
                                  maxPages=999)
```

To find a function named `spline` from this, we can proceed as follows:

```
selSpl <- (splineAll[, 'Function'] == 'spline')
splineAll[selSpl, ]
```

This has 0 rows, because there is no help page named `spline`.

We can expand this to include any help page containing `spline` in the name using `grep`:

```
> fns <- tolower(splineAll[, 'Function'])
> select <- grep('spline', fns)
> splineAll[select, c(1, 4, 5, 7)]
      Count Package      Function Score
31    34  assist      lspline      1
35    30   fda create.bspline.basis 48
<...>
```

This identified 66 help pages, the first of which is `'lspline'` in the `'assist'` package. The `RSiteSearch` engine assigned it a Score of 1. Evidently, that search engine found only minimal evidence of its relevance to the requested search string. It appeared at the top of this list, because the `assist` package had 34 help pages identified as potentially relevant to that search string.

To establish priorities among different packages for further study, it might be nice to have a Pareto of the 10 packages with the most help pages relevant to our search string. We can get this as follows:

```
> spSm <- attr(splineAll, 'PackageSummary')
> spSm[1:10, 'Count']
      assist      fda      gss      mgcv
      34      30      25      22
      VGAM kernlab DierckxSpline bayesSurv
      17      17      16      16
smoothSurv splines
      15      14
```

To obtain a similar Pareto by 'TotalScore' requires a little more effort:

```
> o <- rev(order(spSm[, 'TotalScore']))
> splineSum[o, ][1:10, ]
      Count MaxScore TotalScore
gss      25      35      448
splines  14      45      354
fda      30      48      275
<...>
```

This analysis gave us in seconds a very informative overview of spline capabilities in contributed R packages in a way that can help establish priorities for further study of the different packages and functions.

HTML

The HTML function writes an RSiteSearch object to a file in HTML format and opens it in a browser from which a mouse click will open a desired help page.

The power of this can be seen by applying this function to the grep'ed subset of help pages with names including the phrase spline:

```
HTML(splineAll[select, ])
```

Of the 631 help pages containing spline, this displayed only those whose name included the phrase spline. Similar analyses could display any desired subset of an RSiteSearch object created from merging several calls to RSiteSearch.function.

Summary

In sum, we have found RSiteSearch.function in the RSiteSearch package to be a very quick and efficient method for finding things in contributed packages.

Acknowledgments

The RSiteSearch capabilities here extend the power of the RSiteSearch search engine maintained by Jonathan Baron. Without Prof. Baron's support, it would not have been feasible to develop the features described here. We also wish to thank Romain Francois, who had an RSiteSearch project on R-Forge before we did. He not only agreed to merge his "R Site Search extension for firefox" project with ours, he also added the `template` argument to our HTML function, thereby providing added flexibility.