Searching help pages of R packages

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The sos 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 main capability of this package is the findFn function, which queries only the "function" help pages in Jonathan Baron's RSiteSearch data base and returns the results in a data.frame of class findFn. The corresponding print method displays the results as a table in a web browser with links to the individual help pages, sorted by package displaying the one with the most matches first. Other sos functions provide a summary with one line for each package, support the union and intersection of findFn objects, and write the results to an Excel file with three sheets: (1) PackageSum2, which provides an enhanced summary of the packages with matches, (2) the findFn table itself, and (3) the call used to produce it.

Other R functions can then be used to quickly find what you want among possibly hundreds of matches.

Two examples are considered below: First we find a dataset containing a variable Petal.Length, used without indicating the source by w/o page numbers cite **?**. citet **?**.

citep (**?**).

with page numbers cite (**?**, pp. 282-283). citet **?**, pp. 282-283.

citep (**?**, pp. 282-283).

Second, we study R capabilities for splines, including looking for a function named spline.

Petal.Length

Chambers (2009, p. 282-283) uses a variable Petal.Length from a famous Fisher data set but without naming the dataset nor indicating where it can be found nor even if it exists in R. The sample code he provides does not work by itself. To reproduce his Figure 7.2, we must first obtain a copy of this famous data set in a format compatible with Chambers' code.

How to add Bibliography ? Chambers, John (2009) Software for Data Analysis (Springer)

One might first try the help.search function, which in this case unfortunately yields nothing:

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

When this failed, many users might then try RSiteSearch('Petal.Length'). This produced 80 matches when it was tried on one day and 62 matches a few months later. RSiteSearch('Petal.Length', 'function') will identify only the help pages. We can get something similar and more useful as follows:

```
> library(sos)
> PL <- findFn('Petal.Length')
```

PL is a data.frame of class findFn identifying all the help pages in Jonathan Baron's data base matching the search term.

The summary method for such an object returns the number of matches with a table giving for each Package the Count (number of matches), MaxScore (max of the Score), TotalScore (sum of Score), and Date, sorted like a Pareto chart to place the Package with the most help pages first:

```
> summary(PL)

Total number of matches: 27
Downloaded 27 links in 14 packages.
Packages with at least 1 match using search
                      pattern 'Petal.Length':
Package Count MaxScore TotalScore       Date
yaImpute    8        1          8 2009-08-16
<...>
datasets    1        2          2 2009-07-09
<...>
```

One of the listed packages is datasets. Since it is 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! Any other method known to the present authors would have taken substantially more time.

spline

Three years ago, the lead author of this article decided he needed to learn more about splines. The literature search began as follows:

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

While preparing this manuscript, this command identified 1526 documents. That is too many. It can be restricted to functions as follows:

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

This identified only 631 on one day; 739 a few months later. That's an improvement over 1526 but is still too many. To get a quick overview of these 739, we can proceed as follows:

```
splinePacs <- findFn('spline')
```

This downloaded a summary of the 400 highest-scoring help pages in the 'RSiteSearch' data base in roughly 5-15 seconds, depending on the speed of the Internet connection. To get all 739 matches, increase the maxPages from its default 20:

```
splineAll <- findFn('spline', maxPages=999)
```

The print method for a findFn object will open the result in a web browser.

However, a table with 739 rows is rather large to digest easily. The 739 help pages came from 191 different packages. The summary method by default will display the first minPackages = 12 (plus others with the same number of matches as the that one).

A more complete view can be obtained in MS Excel format using the writeFindFn2xls function:

```
writeFindFn2xls(splineAll)
```

This produces an Excel file (which can be opened with Open Office Calc

citation for Open Office Calc?

asdf, which can be useful for people who do not have Excel) with three sheets:

The PackageSum2 sheet contains information on locally installed packages not available summary.

...

installPackages ...

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 grepFn:

```
> grepFn('spline', splineAll, ignore.case=TRUE)
```

This returned a findFn object identifying 66 help pages. The print method for an object of class findFn presents the result in a web browser,

asdf, 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 identifed as potentially relevant to that search string, none of which had a Score exceeding 1.

To establish priorities among different packages for further study, it might be nice to have a Pareto chart showing 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.

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