Package 'PROJ'

April 15, 2020

Title Generic Coordinate System Transformations Using 'PROJ'

Version 0.1.6

Description A wrapper around the generic coordinate transformation software 'PROJ' that transforms geospatial coordinates from one coordinate reference system ('CRS') to another. This includes cartographic projections as well as geodetic transformations. Version 6.0.0 or higher is required, earlier versions if available are not used leaving this package harmlessly non-functional. The intention is for this package to be used by user-packages such as 'reproj', and that the older 'PROJ.4' and version 5 pathways be provided by the 'proj4' package. Separating this disruptive version change (from 4.0 and 5.0, to 6.0 and above) allows the use of existing and stable code in 'proj4' alongside the new idioms and requirements of modern 'PROJ' using this package. The 'PROJ' library is available from <https://proj.org/>.

Depends R (>= 2.10)

License GPL-3

Encoding UTF-8

LazyData true

SystemRequirements proj (>= 6.0.0 required for full operation, package will install and pass check with lower versions or even if no PROJ available)

Suggests testthat (>= 2.1.0), covr, spelling, knitr, rmarkdown

URL https://github.com/hypertidy/PROJ

BugReports https://github.com/hypertidy/PROJ/issues

RoxygenNote 7.1.0

Language en-US

VignetteBuilder knitr

NeedsCompilation yes

Author Michael D. Sumner [aut, cre] (<https://orcid.org/0000-0002-2471-7511>), Jeroen Ooms [ctb] (provided PROJ library support on Windows, and assistance with Windows configuration), Simon Urbanek [cph, ctb] (wrote original code versions for PROJ version 6)

Maintainer Michael D. Sumner <mdsumner@gmail.com>

Repository CRAN

Date/Publication 2020-04-15 04:40:02 UTC

R topics documented:

`ok_proj6` *Is 'PROJ library >= 6' available*

Description

Test for availability of 'PROJ' system library version 6 or higher.

Usage

```
ok_proj6()
```

Details

On unix-alikes, this function is run in `.onLoad()` to check that version 6 functionality is available. On Windows, the load process sets the data file location with the version 6 API, and that is used as a test instead.

If 'PROJ' library version 6 is not available, the package still compiles and installs but is not functional.

The lack of function can be simulated by setting `options(reproj.mock.noproj6 = TRUE)`, designed for use with the reproj package.

Value

logical, `TRUE` if the system library 'PROJ >= 6'

Examples

```
ok_proj6()
```

`proj_create` *Generate a projection string.*

Description

Input any accepted format of 'PROJ' coordinate reference system specification. Return value is a string in the requested format.

Usage

```
proj_create(source, format = 0L)
```

Arguments

`source`	input projection specification one of ('PROJ4', 'WKT2', 'EPSG', 'PROJJSON', ... see the library documentation link in Details)
`format`	integer, 0 for 'WKT', 1 for 'PROJ'

Details

This function requires PROJ version 6.0 or higher to be useful. If not, this function simply returns 'NA'.

See the library documentation for details on input and output formats.

Some nuances of the format are not available, currently we use formats '0: PJ_WKT2_2018', '1: PJ_PROJ_5'.

A third option '2: PROJJSON' is not available, requiring 'PROJ 6.2.0' or above.

Some formats are hard to read, such as WKT so for easy reading use `cat()`.

Value

character string in requested format

Examples

```
proj_create("EPSG:4326", format = 1)

proj_create("urn:ogc:def:crs:EPSG::4326")

proj_create("urn:ogc:def:crs:EPSG::4326", format = 1L)

cat(wkt <- proj_create("EPSG:3857"))

proj_create(wkt, format = 1L)

wkt_method <- proj_create("+proj=etmerc +lat_0=38 +lon_0=125 +ellps=bessel")

cat(wkt_method)
```

```
proj_create(wkt_method, format = 1L)
s1 <- "+proj=merc +a=6378137 +b=6378137 +lat_ts=0 +lon_0=0 +x_0=0"
s2 <- "+y_0=0 +k=1 +units=m +nadgrids=@null +wktext +no_defs +type=crs"
cat(proj_create(paste(s1, s2)))
```

`proj_trans_generic` *Transform a set of coordinates with 'PROJ'*

Description

A raw interface to proj_trans_generic in 'PROJ => 6', if it is available.

Usage

```
proj_trans_generic(x, target, ..., source = NULL, z_ = 0, t_ = 0)
```

Arguments

`x`	input coordinates (x,y, list or matrix see `z_` and `t_`)
`target`	projection for output coordinates
`...`	ignored
`source`	projection of input coordinates (must be named)
`z_`	optional z coordinate vector
`t_`	optional t coordinate vector

Details

Input 'x' is assumed to be 2-columns of "x", then "y" coordinates. If "z" or "t" is required pass these in as named vectors with "z_" and "t_". For simplifying reasons `z_` and `t_` must always match the length of `x y`. Both default to 0, and are automatically recycled to the number of rows in `x` so it's pretty flexible.

Values that are detected out of bounds by library PROJ are allowed, we return `Inf` in this case, rather than the error "tolerance condition error".

Value

list of transformed coordinates, with 4-elements `x_`, `y_`, `z_`, `t_`

References

see the PROJ library documentation for details on the underlying functionality

Examples

```
if (ok_proj6()) {
 proj_trans_generic(cbind(147, -42), "+proj=laea", source = "epsg:4326")
 proj_trans_generic(cbind(147, -42), z_ = -2, "+proj=laea", source = "epsg:4326")
 proj_trans_generic(cbind(147, -42), z_ = -2, t_ = 1, "+proj=laea", source = "epsg:4326")
 }
```

`xymap` *xymap data for testing*

Description

A copy of the xymap data set from the quadmesh package.

Details

A matrix of longitude/latitude values of the world coastline.

Index