Package 'traudem'

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Title Use TauDEM

Version 1.0.3

Description Simple trustworthy utility functions to use TauDEM
(Terrain Analysis Using Digital Elevation Models <https://hydrology.usu.edu/taudem/taudem5/>) command-line interface.
This package provides a guide to installation of TauDEM and its dependencies GDAL (Geopatial Data Abstraction Library)
and MPI (Message Passing Interface) for different operating systems.
Moreover, it checks that TauDEM and its dependencies are correctly installed and included to the PATH,
and it provides wrapper commands for calling TauDEM methods from R.

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URL https://lucarraro.github.io/traudem/,
https://github.com/lucarraro/traudem

BugReports https://github.com/lucarraro/traudem/issues

Imports cli, purrr, rlang, sys, tools, withr

Suggests knitr, rmarkdown, testthat (>= 3.0.0), terra, shapefiles, sf,
elevatr, fs

VignetteBuilder knitr

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NeedsCompilation no

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`taudem_aread8` *D8 Contributing Area*

Description

D8 Contributing Area

Usage

```
taudem_aread8(
  input_d8flowdir_grid,
  output_contributing_area_grid = NULL,
  check_edge_contamination = TRUE,
  n_processes = getOption("traudem.n_processes", 1),
  wg_file = NULL,
  outlet_file = NULL,
  outlet_layer_name = NULL,
  outlet_layer_number = NULL,
  quiet = getOption("traudem.quiet", FALSE)
)
```

Arguments

`input_d8flowdir_grid`	Input flow directions grid.
`output_contributing_area_grid`	Output contributing area grid.
`check_edge_contamination`	Whether to check for edge contamination.
`n_processes`	Number of processes for `mpiexec`. If `NULL` TauDEM is called without mpiexec.
`wg_file`	Input weight grid (optional).
`outlet_file`	Input outlets file (OGR readable dataset, optional).
`outlet_layer_name`	OGR layer name if outlets are not the first layer in `outlet_file` (optional). Layer name and layer number should not both be specified.

`outlet_layer_number`
: OGR layer number if outlets are not the first layer in `outlet_file` (optional). Layer name and layer number should not both be specified.

`quiet`
: If `FALSE` output from TauDEM CLI is suppressed.

Details

See https://hydrology.usu.edu/taudem/taudem5/help53/D8ContributingArea.html

Value

Path to output file (invisibly).

Examples

```
test_dir <- withr::local_tempdir()
dir.create(test_dir)
 file.copy(
   system.file("test-data", "DEM.tif", package = "traudem"),
   file.path(test_dir, "DEM.tif")
 )

filled_pit <- taudem_pitremove(file.path(test_dir, "DEM.tif"))
outputs <- taudem_d8flowdir(filled_pit)
outputs
contributing_area_grid <- taudem_aread8(outputs$output_d8flowdir_grid)
contributing_area_grid
```

---

taudem_d8flowdir *D8 Flow Directions*

Description

D8 Flow Directions

Usage

```
taudem_d8flowdir(
  input_elevation_grid,
  output_d8flowdir_grid = NULL,
  output_d8slopes_grid = NULL,
  n_processes = getOption("traudem.n_processes", 1),
  quiet = getOption("traudem.quiet", FALSE)
)
```

Arguments

input_elevation_grid	Pit filled elevation input data.
output_d8flowdir_grid	D8 flow directions output.
output_d8slopes_grid	D8 slopes output.
n_processes	Number of processes for mpiexec. If NULL TauDEM is called without mpiexec.
quiet	If FALSE output from TauDEM CLI is suppressed.

Details

See https://hydrology.usu.edu/taudem/taudem5/help53/D8FlowDirections.html

Value

List with the two output filenames.

Examples

```
test_dir <- withr::local_tempdir()
dir.create(test_dir)
 file.copy(
   system.file("test-data", "DEM.tif", package = "traudem"),
   file.path(test_dir, "DEM.tif")
 )
filled_pit <- taudem_pitremove(file.path(test_dir, "DEM.tif"))
outputs <- taudem_d8flowdir(filled_pit)
outputs
```

---

taudem_exec *Call TauDEM*

Description

Call TauDEM

Usage

```
taudem_exec(
  program,
  args,
  ...,
  n_processes = getOption("traudem.n_processes", 1),
  quiet = getOption("traudem.quiet", FALSE)
)
```

Arguments

program	TauDEM command (character). See examples.
args	Character vector of arguments. See examples.
...	These dots are for future extensions and must be empty. As a consequence, all following arguments must be fully named (see examples).
n_processes	Number of processes for mpiexec. If NULL TauDEM is called without mpiexec.
quiet	If FALSE output from TauDEM CLI is suppressed.

Details

You can use this function to call more TauDEM methods than the ones with dedicated wrappers in this package. Please refer to the relative TauDEM function documentation for the syntax used to specify optional arguments. See also examples.

Value

TRUE if the call was successful, FALSE otherwise.

Examples

```
test_dir <- withr::local_tempdir()
dir.create(test_dir)
file.copy(
   system.file("test-data", "DEM.tif", package = "traudem"),
   file.path(test_dir, "DEM.tif")
 )
 # Default name for output file, only input command and input filename.
taudem_exec("pitremove", file.path(test_dir, "DEM.tif"))

# syntax for user-attributed output file name
taudem_exec(
  "pitremove",
  c(
    "-z", file.path(test_dir, "DEM.tif"),
    "-fel", file.path(test_dir,"filled_pits.tif")
  )
)
```

---

taudem_moveoutletstostream

Move Outlets To Streams

Description

Move Outlets To Streams

Usage

```
taudem_moveoutletstostream(
  input_d8flowdir_grid,
  input_stream_raster_grid,
  output_moved_outlets_file = NULL,
  om_layer_name = NULL,
  max_dist = NULL,
  outlet_file,
  outlet_layer_name = NULL,
  outlet_layer_number = NULL,
  n_processes = getOption("traudem.n_processes", 1),
  quiet = getOption("traudem.quiet", FALSE)
)
```

Arguments

`input_d8flowdir_grid`	File name for D8 flow direction grid (input).
`input_stream_raster_grid`	File name for stream raster grid (input).
`output_moved_outlets_file`	Output OGR file where outlets have been moved.
`om_layer_name`	layer name in movedoutletsfile (optional).
`max_dist`	maximum number of grid cells to traverse in moving outlet points (optional).
`outlet_file`	input outlets file (OGR readable dataset).
`outlet_layer_name`	OGR layer name if outlets are not the first layer in `outlet_file` (optional). Layer name and layer number should not both be specified.
`outlet_layer_number`	OGR layer number if outlets are not the first layer in `outlet_file` (optional). Layer name and layer number should not both be specified.
`n_processes`	Number of processes for `mpiexec`. If `NULL` TauDEM is called without mpiexec.
`quiet`	If `FALSE` output from TauDEM CLI is suppressed.

Details

See https://hydrology.usu.edu/taudem/taudem5/help53/MoveOutletsToStreams.html

Value

Path to output file (invisibly).

taudem_pitremove *Pit Remove*

Description

Pit Remove

Usage

```
taudem_pitremove(
  input_elevation_grid,
  output_elevation_grid = NULL,
  only_4way_neighbors = FALSE,
  n_processes = getOption("traudem.n_processes", 1),
  depmask = NULL,
  quiet = getOption("traudem.quiet", FALSE)
)
```

Arguments

input_elevation_grid	Input elevation grid file.
output_elevation_grid	Output elevation grid file.
only_4way_neighbors	Whether to consider only 4 way neighbors.
n_processes	Number of processes for `mpiexec`. If `NULL` TauDEM is called without mpiexec.
depmask	Depression mask file (optional).
quiet	If `FALSE` output from TauDEM CLI is suppressed.

Details

See https://hydrology.usu.edu/taudem/taudem5/help53/PitRemove.html

Value

Path to output file (invisibly).

Examples

```
test_dir <- withr::local_tempdir()
dir.create(test_dir)
 file.copy(
   system.file("test-data", "DEM.tif", package = "traudem"),
   file.path(test_dir, "DEM.tif")
 )
output <- taudem_pitremove(file.path(test_dir, "DEM.tif"))
```

output

---

taudem_sitrep *TauDEM situation report*

Description

Checks installation of TauDEM and provides useful hints.

Usage

```
taudem_sitrep()

can_register_taudem()
```

Value

For `taudem_sitrep()`: None.

For `can_register_taudem()`: A logical scalar.

TauDEM installation and registration

Once you have installed TauDEM, add an environment variable pointing to the correct path. For instance on Ubuntu it could be adding this line in `.Renviron` (see `usethis::edit_r_environ()`) and then re-starting R:

```
TAUDEM_PATH='/usr/local/taudem'
```

or, for just the session, running this line of R code:

```
Sys.setenv(TAUDEM_PATH = "/usr/local/taudem")
```

Examples

```
try(taudem_sitrep(), silent = TRUE)

can_register_taudem()
```

taudem_threshold *Stream Definition By Threshold*

Description

Stream Definition By Threshold

Usage

```
taudem_threshold(
  input_area_grid,
  output_stream_raster_grid = NULL,
  mask_file = NULL,
  threshold_parameter = 100,
  n_processes = getOption("traudem.n_processes", 1),
  quiet = getOption("traudem.quiet", FALSE)
)
```

Arguments

input_area_grid	File name for grid to be thresholded.
output_stream_raster_grid	File name for stream raster grid.
mask_file	File name for grid used to mask the output stream raster, or general thresholded grid.
threshold_parameter	Threshold parameter.
n_processes	Number of processes for `mpiexec`. If `NULL` TauDEM is called without mpiexec.
quiet	If `FALSE` output from TauDEM CLI is suppressed.

Details

See https://hydrology.usu.edu/taudem/taudem5/help53/StreamDefinitionByThreshold.html

Value

Path to output file (invisibly).

Examples

```
test_dir <- withr::local_tempdir()
dir.create(test_dir)
file.copy(
   system.file("test-data", "DEM.tif", package = "traudem"),
   file.path(test_dir, "DEM.tif")
```

```
 )
filled_pit <- taudem_pitremove(file.path(test_dir, "DEM.tif"))
outputs <- taudem_d8flowdir(filled_pit)
outputs
contributing_area_grid <- taudem_aread8(outputs$output_d8flowdir_grid)
contributing_area_grid
thresholded <- taudem_threshold(contributing_area_grid)
thresholded
```

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