

Package ‘traudem’

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Title Use TauDEM

Version 1.0.2

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 (Geospatial 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

Config/testthat/edition 3

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taudem_aread8	<i>D8 Contributing Area</i>
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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	<i>D8 Flow Directions</i>
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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("taudem.n_processes", 1),
    quiet = getOption("taudem.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	<i>Pit Remove</i>
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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("taudem.n_processes", 1),  
  quiet = getOption("taudem.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 = "taudem"),
```

```
    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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