

Package ‘wowi’

September 28, 2026

Title Detect Spatial Clusters of High Rates of Acute Malnutrition

Version 1.0.3

Description Utilities for detecting statistically significant spatial clusters of high acute malnutrition rates using a Bernoulli spatial scan statistic, implemented via the 'SaTScan' software <<https://www.satscan.org/>>.

License GPL (>= 3)

Encoding UTF-8

LazyData true

Language en-GB

URL <https://github.com/tiwowi/wowi>, <https://tiwowi.github.io/wowi/>

BugReports <https://github.com/tiwowi/wowi/issues>

Imports dplyr (>= 1.1.4), rlang (>= 1.1.6), rsatscan (>= 1.0.9), mwana (>= 0.2.5), withr (>= 3.0.2), stringr (>= 1.5.1), tibble (>= 3.3.0), shiny (>= 1.11.1), shinycssloaders (>= 1.1.0), bslib (>= 0.9.0), openxlsx (>= 4.2.8.1), DT (>= 0.34.0), htmltools (>= 0.5.8.1)

Suggests covr (>= 3.6.4), knitr (>= 1.50), rmarkdown (>= 2.30), quarto (>= 1.4.4), shinytest2 (>= 0.4.1), spelling (>= 2.3.1), testthat (>= 3.0.0)

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anthro	<i>Sample data set of district-level SMART surveys with geographical coordinates</i>
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Description

anthro is a SMART survey-generated data conducted in nine districts in Uganda.

Usage

anthro

Format

A tibble of 2,934 rows and 17 columns.

Variable	Description
<i>district</i>	Location in which the survey was undertaken
<i>cluster</i>	Primary sampling unit
<i>sex</i>	Sex; "1" = boys, "2" = girls
<i>age</i>	Calculated age in months with two decimal places
<i>weight</i>	Weight in kilograms
<i>height</i>	Height in centimetres
<i>oedema</i>	Oedema; "n" = no oedema, "y" = with oedema
<i>muac</i>	Mid upper-arm circumference in millimetres
<i>y</i>	Geographical coordinates: Latitude
<i>x</i>	Geographical coordinates: Longitude
<i>precision</i>	Estimated spatial accuracy of the recorded GPS coordinates, in meters.

Source

anonymous

Examples

anthro

ww_configure_satscan *Configure SaTScan for Bernoulli purely spatial scan*

Description

Define the analysis parameters required by SaTScan's GUI to conduct a Bernoulli-based purely spatial scan to detect either clusters of high rates of acute malnutrition or both high and low rates.

User input is limited to specifying the analysis area filename, the destination directory for the parameters file, the SaTScan version in use, and the type of clusters to be detected. All other parameters are pre-defined by this function.

Usage

```
ww_configure_satscan(  
  filename = character(),  
  params_dir = character(),  
  satscan_version = character(),  
  .scan_for = c("high-rates", "high-low-rates")  
)
```

Arguments

filename	A quoted string identifying the analysis area.
params_dir	A quoted string of the folder or directory in which the parameters file (produced by this function) should be saved. This can be the same directory as that specified in ww_wrangle_data() .
satscan_version	A quoted string indicating the version of SaTScan installed on the user's computer. Internally, this value is checked against the latest available version. If it is older, a warning is issued with a link to SaTScan's website. Although the analysis is not interrupted, it is recommended to use the latest version.
.scan_for	A quoted string indicating the type of clusters to scan for. To scan for clusters of high rates only, set .scan_for = "high-rates". To scan for both high and low rates, set .scan_for = "high-low-rates".

Details

For more information on Bernoulli purely spatial scans, refer to the SaTScan technical documentation available at: <https://www.satscan.org/techdoc.html>.

Value

A SaTScan parameters file with the extension .prm.

References

Kulldorff, M. (2022) *SaTScan user guide for version 10.1*. Available at: <https://www.satscan.org/>.

Examples

```
## Given a temporary directory ----
tmp <- withr::local_tempdir()
directory <- file.path(tmp, "input-files")

## Wrangle data with `{mwana}` ----
x <- anthro |>
  dplyr::rename(longitude = y, latitude = x) |>
  mwana::mw_wrangle_wfhz(
    sex = sex,
    .recode_sex = TRUE,
    weight = weight,
    height = height
  ) |>
  mwana::define_wasting(
    zscores = wfhz,
    .by = "zscores",
    oedema = oedema
  )

## Apply the function ----
ww_wrangle_data(
  .data = x,
  filename = "Locality",
  dir = directory,
  .gam_based = "wfhz",
  latitude = latitude,
  longitude = longitude
)

library(rsatscan) # important to make `{wowi}` access `{rsatscan}`-specific environment

#### Configure SaTScan ----
do.call(
  what = ww_configure_satscan,
  args = list(
    filename = "Locality",
    params_dir = directory,
    satscan_version = "10.3.2",
    .scan_for = "high-low-rates"
  )
)

## Show file's content ----
file.show(file.path(tmp, "input-files/Locality.prm"))
```

ww_run_app

Initialise built-in Shiny application

Description

Initialise built-in Shiny application

Usage

```
ww_run_app(package = "wowi")
```

Arguments

package package name ("wowi").

Value

Called for its side effect of launching the wowi Shiny application in the user's default web browser. Returns NULL invisibly when the app session ends.

Examples

```
if(interactive()) ww_run_app()
```

ww_run_satscan

Run SaTScan for Bernoulli purely spatial scan to detect statistically significant clusters of acute malnutrition

Description

Detect statistically significant spatial clusters of acute malnutrition rates, including high-only or high-and-low clusters. `ww_run_satscan()` is a wrapper function that interacts with the SaTScan GUI via the `{rsatscan}` package. It internally calls both `ww_wrangle_data()` and `ww_configure_satscan()`, allowing users to skip these two steps in the workflow and instead call `ww_run_satscan()` directly.

Usage

```
ww_run_satscan(
  .data,
  filename = NULL,
  dir = character(),
  params_dir = dir,
  sslocation = character(),
  ssbatchfilename = character(),
  satscan_version,
```


Details

The geographical coordinates must be provided as latitude and longitude values. If the input data uses different variable names, they must be renamed accordingly; otherwise, the analysis will be aborted. Latitude corresponds to the X-axis (east-west direction), and longitude the to X-axis (north-south direction).

Value

A set of SaTScan output files, saved in the specified directory. The full file names depend on the filename argument:

- `filename.txt`: A plain-text summary of the results.
- `filename.clustermap.html`: An interactive HTML map showing detected clusters, with red bubbles for high-rate clusters and blue for low-rate clusters.
- `Shapefiles`: A collection of spatial files suitable for use in GIS software.

Examples

```
## Wrangle data with `{mwana}` ----
x <- anthro |>
  dplyr::rename(longitude = y, latitude = x) |>
  mwana::mw_wrangle_wfhz(
    sex = sex,
    .recode_sex = TRUE,
    weight = weight,
    height = height
  ) |>
  mwana::define_wasting(
    zscores = wfhz,
    .by = "zscores",
    oedema = oedema
  )

#' ## Given a temporary directory ----
tmp <- withr::local_tempdir()
directory <- file.path(tmp, "input-files")

## Run satscan ----
library(rsatscan) # important to make `{wowi}` access `{rsatscan}`-specific environment

if (file.exists("/Applications/SaTScan.app/Contents/app/satscan")) {
  results <- ww_run_satscan(
    .data = x,
    filename = "Locality",
    dir = directory,
    sslocation = "/Applications/SaTScan.app/Contents/app",
    ssbatchfilename = "satscan",
    satscan_version = "10.3.2",
    .scan_for = "high-low-rates",
    .gam_based = "wfhz",
    latitude = latitude,
```

```

    longitude = longitude,
    .by_area = FALSE,
    area = NULL,
    verbose = FALSE,
    cleanup = FALSE
  )
}

```

ww_wrangle_data	<i>Prepare SaTScan-required input data files for Bernoulli spatial scan analysis and save them in a user-defined working directory</i>
-----------------	--

Description

SaTScan's Bernoulli-based spatial scan requires the input data to be split into cases, controls, and geographical coordinates files, then saved in a format readable by the software, and placed in a directory it can access.

ww_wrangle_data() is a convenient function designed for this task. It assumes that the input anthropometric data has been pre-processed using {mwana} data wrangling functions.

Usage

```

ww_wrangle_data(
  .data,
  latitude,
  longitude,
  filename = character(),
  dir = character(),
  .gam_based = c("wfhz", "muac", "combined")
)

```

Arguments

.data	A data frame object that has been wrangled using mwana::mw_wrangle_*() functions.
latitude	Geographical coordinates. An unquoted string for the variable containing the Y-axis, also known as latitude (north-south direction). The variable must be named "latitude".
longitude	Geographical coordinates. An unquoted string for the variable containing the X-axis, also known as longitude (east-west direction). The variable must be named "latitude".
filename	A quoted string identifying the analysis area.
dir	A quoted string of the folder or directory in which the files should be saved.
.gam_based	A quoted string indicating the criterion used to define acute malnutrition. This is used to identify the right vector where flagged values are identified, and for which should be excluded from the analysis. Defaults to wfhz.

Value

Three files are created and saved in the user-defined directory as specified in the `dir` argument: a `.cas` file for cases, a `.ctl` for controls, and a `.geo` file for geographical coordinates. The full filenames will incorporate the use-defined filename string.

The `.cas` and `.ctl` files will each have two columns: the first containing survey cluster or enumeration area IDs, and the second containing only 1s, representing either cases or controls, respectively. The length of the `.cas` file depends on the number of positive acute malnutrition cases (`gam == 1`), and the `.ctl` file on the number of negative cases (`gam == 0`).

The `.geo` file will have three columns: cluster or enumeration area IDs, latitude, and longitude.

Examples

```
## Given a temporary directory ----
tmp <- withr::local_tempdir()
directory <- file.path(tmp, "input-files")

## Wrangle data with `{mwana}` ----
x <- anthro |>
  dplyr::rename(longitude = y, latitude = x) |>
  mwana::mw_wrangle_wfhz(
    sex = sex,
    .recode_sex = TRUE,
    weight = weight,
    height = height
  ) |>
  mwana::define_wasting(
    zscores = wfhz,
    .by = "zscores",
    oedema = oedema
  )

## Apply the function ----
ww_wrangle_data(
  .data = x,
  filename = "Locality",
  dir = directory,
  .gam_based = "wfhz",
  latitude = latitude,
  longitude = longitude
)

## Show created files ----
list.files(file.path(tmp, "input-files"))

## Display each files' content ----
file.show(file.path(tmp, "input-files/Locality.cas"))
file.show(file.path(tmp, "input-files/Locality.ctl"))
file.show(file.path(tmp, "input-files/Locality.geo"))
```

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