Package ‘sfislands’

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Type Package

Title Streamlines the Process of Fitting Areal Spatial Models

Version 1.0.0

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Description Helpers for addressing the issue of disconnected spatial units.
   It allows for convenient adding and removal of neighbourhood connectivity between
   areal units prior to modelling, with the visual aid of maps.
   Post-modelling, it reduces the human workload for extracting, tidying and mapping predictions
   from areal models.

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Encoding UTF-8

LazyData true

Imports dplyr, ggplot2, methods, purrr, sf, spdep, stats, stringr,
   tidyr, broom.mixed

Suggests mgcv, testthat (>= 3.0.0)

RoxygenNote 7.2.3

URL https://github.com/horankev/sfislands,
   https://horankev.github.io/sfislands/

BugReports https://github.com/horankev/sfislands/issues

Depends R (>= 2.10)

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NeedsCompilation no

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\begin{verbatim}
st_augment
Augment dataframe with predictions of model
\end{verbatim}

\textbf{Description}

Augment dataframe with predictions of model

\textbf{Usage}

\begin{verbatim}
st_augment(model, df)
\end{verbatim}

\textbf{Arguments}

\begin{verbatim}
model \hspace{0.5cm} an `mgcv`, `lme4` or `nlme` model.

df \hspace{0.5cm} an `sf` data frame to be augmented with model predictions.
\end{verbatim}

\textbf{Value}

An augmented `sf` data frame with extra columns showing estimates of random effects from model.

\textbf{Examples}

\begin{verbatim}
prepdata <- st_bridges(uk_election,"constituency_name")
mgcv::gam(health_not_good ~
   s(constituency_name, bs='mrf', xt=list(nb=prepdata$nb), k=100),
   data=prepdata, method="REML") |>
st_augment(uk_election)
\end{verbatim}
st_bridges

Create first-order queen contiguity neighbourhood structure with additional connections when islands are present, ensuring that there are no unconnected units

Description
Create first-order queen contiguity neighbourhood structure with additional connections when islands are present, ensuring that there are no unconnected units

Usage

```r
st_bridges(
  df,
  geom_col_name,
  remove_islands = FALSE,
  link_islands_k = 1,
  nb_structure = "list",
  add_to_dataframe = TRUE
)
```

Arguments

df an 'sf' or 'sfc' object.
geom_col_name name of a column from 'df' containing names (or unique identifiers) for each row.
remove_islands default 'FALSE'. Whether or not to omit islands from contiguity construction.
link_islands_k an integer, k. The number of nearest units to which each island should be connected.
nb_structure default "list". Can also be "matrix". The format in which to return the named contiguity structure.
add_to_dataframe default 'TRUE'. Whether or not to augment existing df with contiguity output as "nb" column. 'FALSE' returns only the contiguity structure.

Value
Either a named neighbourhood list or matrix, or an 'sf' dataframe with list or matrix included as "nb" column.

Examples

```r
st_bridges(uk_election,"constituency_name")
```
### st_check_islands

Examine contiguity actions which have been performed on islands by `st_bridges()`.  

**Usage**

```r
st_check_islands(data)
```

**Arguments**

- `data` an `sf` dataframe with a neighbourhood column called `"nb"` such as the output of `st_bridges()`.

**Value**

A dataframe reporting non-contiguous connections made by `st_bridges()`.

**Examples**

```r
st_bridges(uk_election,"constituency_name") |> 
st_check_islands()
```

### st_manual_cut_nb

Manual remove contiguity between two areas  

**Description**

Manual remove contiguity between two areas  

**Usage**

```r
st_manual_cut_nb(nb, x, y)
```

**Arguments**

- `nb` a neighbourhood `"list"` or `"matrix"`, or an `sf` dataframe with a neighbourhood column called `"nb``.
- `x` name or number of first area.
- `y` name or number of second area.
**Value**

An amended neighbourhood "list", "matrix", or `sf` dataframe with a neighbourhood column called "nb".

**Examples**

```r
st_bridges(uk_election,"constituency_name") |> 
st_manual_cut_nb("Ynys Mon","Arfon") |> 
st_manual_cut_nb(292,378)
```

---

**Description**

Manually enforce contiguity between two areas

**Usage**

```r
st_manual_join_nb(nb, x, y)
```

**Arguments**

- `nb`: a neighbourhood "list", "matrix", or `sf` dataframe with a neighbourhood column called "nb".
- `x`: name or number of first area.
- `y`: name or number of second area.

**Value**

An amended neighbourhood "list", "matrix", or `sf` dataframe with a neighbourhood column called "nb".

**Examples**

```r
st_bridges(uk_election,"constituency_name") |> 
st_manual_join_nb("Gower","St Ives")
```
**st_quickmap_nb**

**Visualise a neighbourhood structure on a map**

**Description**

Visualise a neighbourhood structure on a map

**Usage**

```r
st_quickmap_nb(
  nbsf,
  linkcol = "dodgerblue",
  bordercol = "gray7",
  pointcol = "darkred",
  fillcol = "gray95",
  linksize = 0.2,
  bordersize = 0.1,
  pointsize = 0.8,
  title = NULL,
  subtitle = NULL,
  nodes = "point",
  numericsize = 5,
  numericcol = "black",
  concavehull = FALSE,
  hullratio = 0.8,
  hullcol = "darkgreen",
  hullsize = 0.5
)
```

**Arguments**

- **nbsf**: an `sf` dataframe with a neighbourhood column called "nb", such as the output of `st_bridges()`
- **linkcol**: colour of lines connecting neighbours.
- **bordercol**: colour of boundary lines between areas.
- **pointcol**: colour of centroid points if nodes are "point".
- **fillcol**: fill of areas.
- **linksize**: linewidth of lines connecting neighbours.
- **bordersize**: linewidth of borders between areas.
- **pointsize**: size of centroid points if nodes are "point".
- **title**: plot title.
- **subtitle**: plot subtitle.
- **nodes**: default "point". Can also be "numeric".
- **numericsize**: font size if nodes are "numeric".
st_quickmap_preds

numericcol  font colour if nodes are ‘numeric’.
concavehull default ‘FALSE’. Whether or not to show concave hulls.
hullratio  value between 0 and 1. 1 returns the convex hulls, 0 maximally concave hulls.
hullcol colour of concave hull lines.
hullsize line width of concave hull lines.

Value

A ‘ggplot’ showing areas and neighbourhood structure.

Examples

```r
st_bridges(uk_election,"constituency_name") |> 
st_quickmap_nb()
```

---

**Description**

Visualise the predictions generated by the ‘st_augment()’ function

**Usage**

```r
st_quickmap_preds(
  output,
  scale_low = "firebrick4",
  scale_mid = "white",
  scale_high = "darkblue",
  scale_midpoint = 0,
  borderwidth = 0.05,
  bordercol = "black",
  legendlimits = "individual",
  titlesize = 12,
  subtitlesize = 10,
  framefill = "white",
  frameline = "black",
  framesize = 1
)
```

**Arguments**

- `output` an augmented ‘sf’ dataframe produced by ‘st_augment()’.
- `scale_low` fill of lowest extreme of scale.
- `scale_mid` fill of midpoint of scale.
- `scale_high` fill of highest extreme of scale.
scale_midpoint  value of midpoint of scale.
borderwidth    linewidth of borders between units.
bordercol      colour of borders between units.
legendlimits   default ‘individual’: legend of each plot scaled within its own limits. ‘min-max’ means all plot have common legend limits according to the global min-max.
titlesize      font size for title.
subtitlesize   font size for subtitle.
framefill      colour for background fill.
frameline      colour for frame.
framesize      line width of frame.

Value
A list of ggplots.

Examples
prepdata <- st_bridges(uk_election,"constituency_name")
mgcv::gam(health_not_good ~
  s(constituency_name, bs='mrf', xt=list(nb=prepdata$nb), k=100), data=prepdata, method="REML") |>
st_augment(uk_election) |> 
st_quickmap_preds()

uk_election              UK election data

Description
Swing and socio-economic data for England, Scotland & Wales Census and voting data sourced from parlitools R package Spatial data sourced from UK government geoportal

Usage
uk_election

Format
## 'uk_election' An sf and data.frame object with 632 rows and 9 columns

degree_educated  Percentage of constituency population with level 4 qualifications or higher, scaled to mean 0 and standard deviation 1
health_not_good  Percentage of constituency of population reporting health to be fair, bad, or very bad, scaled to mean 0 and standard deviation 1
white            Percentage of constituency of population of exclusively white ethnicity, scaled to mean 0 and standard deviation 1
**con_swing** Butler swing to the Conservative Party from the Labour Party from election 2019 to election 2019

**population** Constituency population

**region** Regions

**county** Counties

**constituency_name** Westminster parliamentary constituencies, as of 2019

**geometry** sfc polygons column ...

**Source**

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