Package 'geodetector'

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Title Stratified Heterogeneity Measure, Dominant Driving Force Detection, Interaction Relationship Investigation

Version 1.0-4

Description Spatial stratified heterogeneity (SSH), referring to the within strata are more similar than the between strata, a model with global parameters would be confounded if input data is SSH. Note that the ``spatial" here can be either geospatial or the space in mathematical meaning. Geographical detector is a novel tool to investigate SSH: (1) measure and find SSH of a variable Y; (2) test the power of determinant X of a dependent variable Y according to the consistency between their spatial distributions; and (3) investigate the interaction between two explanatory variables X1 and X2 to a dependent variable Y (Wang et al 2014 <doi:10.1080/13658810802443457>, Wang, Zhang, and Fu 2016 <doi:10.1016/j.ecolind.2016.02.0

Depends R (>= 2.10)

Imports sp (>= 1.2-7),rgeos (>= 0.3-26),rgdal (>= 1.2-16),maptools

License GPL (>= 2.0)

Encoding UTF-8

LazyData true

RoxygenNote 7.1.0

Suggests knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

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R topics documented:

`CollectData` *CollectData*

Description

Including data for neural-tube birth defects (NTD) Y and suspected and environmental factor data, "elevation", "soil type", and "watershed".

Usage

```
data("CollectData")
```

Format

A data frame with 185 observations on the following 4 variables.

`DiseaseData_shp` *DiseaseData_shp*

Description

Shapfile format data for the health effect layer.

Usage

```
data("DiseaseData_shp")
```

Format

A SpatialPolygonsDataFrame with 189 observations.

ecological_detector *ecological detector*

Description

This function identifies the impact differences between two factors X1 ~ X2.

Usage

```
ecological_detector(y_column, x_column_nn, tabledata)
```

Arguments

y_column	The index or field name of explained variable column in input dataset.
x_column_nn	The index or field name of explanatory variable(s)in input dataset.
tabledata	The dataset (dataframe) contains fields of explained variable and explanatory variables.

Value

Results of ecological detector is the significance test of impact difference between two explanatory variables.

Examples

```
data(CollectData)
ecological_detector("incidence",c("soiltype","watershed"),CollectData)
ecological_detector("incidence",c("soiltype","watershed","elevation"),CollectData)
```

Elevation_shp *Elevation_shp*

Description

Shapfile format data for the environmental factor layers, "elevation".

Usage

```
data("Elevation_shp")
```

Format

A SpatialPolygonsDataFrame with 7 observations.

factor_detector *factor detector*

Description

The factor detector q-statistic measures the spatial stratified heterogeneity of a variable Y, or the determinant power of a covariate X of Y.

Usage

```
factor_detector(y_column, x_column_nn, tabledata)
```

Arguments

y_column	The index or field name of explained variable in input dataset.
x_column_nn	The index or the field name(s) of explanatory variable(s) in input dataset.
tabledata	The dataset (dataframe) contains fields of explained variable and explanatory variables.

Value

Results of factor detector include q statistic and the corresponding p value.

Examples

```
data(CollectData)
factor_detector("incidence","soiltype",CollectData)
factor_detector(1,2,CollectData)
factor_detector (1,c(2,3,4),CollectData)
factor_detector ("incidence",c("soiltype","watershed"),CollectData)
```

interaction_detector *interaction detector*

Description

This function reveals whether the risk factors X1 and X2 (and more X) have an interactive influence on a disease Y.

Usage

```
interaction_detector(y_column, x_column_nn, tabledata)
```

Arguments

y_column	The index or field name of explained variable in input dataset.
x_column_nn	The index or field name of explanatory variable(s) in input dataset.
tabledata	The dataset (dataframe) contains fields of explained variable and explanatory variables.

Value

Results of interaction detector include the interactive q satistic.

Examples

```
data(CollectData)
interaction_detector("incidence",c("soiltype","watershed"),CollectData)
interaction_detector("incidence",c("soiltype","watershed","elevation"),CollectData)
```

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maps2dataframe *maps2dataframe*

Description

This function transforms the information of varialbles from shipfiles to dataframe.

Usage

```
maps2dataframe(y_shp, x_shp_n, namescolomn)
```

Arguments

y_shp	The shipfile(polygons or points) containing explained varialble in its attribute table.
x_shp_n	Shipfiles(polygons or points) containing explained varialble in their attribute tables.
namescolomn	Field names which represent explained variable and explanatory variables, respectively. The order correspond with y_shp and x_shp_n.

Value

dataframe transformed from shape files. If input data is shapefile format, the function named geoDetector can be used to transform from shapefile map to table format. Please note that, these shapefile layers should have the same projected coordinate system.

Examples

```
library(maptools)

data(DiseaseData_shp)
data(SoilType_shp)
data(Watershed_shp)
data(Elevation_shp)
CollectData2<-maps2dataframe(DiseaseData_shp,c(SoilType_shp, Watershed_shp,
                             Elevation_shp),namescolomn= c('incidence',
                             'soiltype', 'watershed', 'elevation'))

factor_detector("incidence","soiltype",CollectData2)
factor_detector(1,2,CollectData2)
factor_detector (1,c(2,3,4),CollectData2)
rst <- factor_detector ("incidence",c("soiltype","watershed"),CollectData2)
interaction_detector("incidence",c("soiltype","watershed"),CollectData2)
interaction_detector("incidence",c("soiltype","watershed","elevation"),CollectData2)

risk_detector("incidence","soiltype",CollectData2)
risk_detector(1,2,CollectData2)
risk_detector(1,c(2,3,4),CollectData2)
risk_detector("incidence",c("soiltype"),CollectData2)

ecological_detector("incidence",c("soiltype","watershed"),CollectData2)
ecological_detector("incidence",c("soiltype","watershed","elevation"),CollectData2)
```

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risk_detector *risk detector*

Description

This function calculates the average values in each stratum of explanatory variable (X), and presents if there exists difference between two strata.

Usage

```
risk_detector(y_column, x_column_nn, tabledata)
```

Arguments

y_column	The index or field name of explained variable in input dataset.
x_column_nn	The index or field name of explanatory variable(s) in input dataset.
tabledata	The dataset (dataframe) contains fields of explained variable and explanatory variables.

Value

Results of risk detector include the means of explained variable in each stratum derived from an explanatory variable and the t-test for difference between two strata.

Examples

```
data(CollectData)
risk_detector("incidence","soiltype",CollectData)
risk_detector(1,2,CollectData)
risk_detector(1,c(2,3,4),CollectData)
risk_detector("incidence",c("soiltype","watershed","elevation"),CollectData)
```

`SoilType_shp` *SoilType_shp*

Description

Shapfile format data for the environmental factor layers, "soilType".

Usage

```
data("SoilType_shp")
```

Format

A SpatialPolygonsDataFrame with 6 observations.

`Watershed_shp` *Watershed_shp*

Description

Shapfile format data for the environmental factor layers, "watershed".

Usage

```
data("Watershed_shp")
```

Format

A SpatialPolygonsDataFrame with 9 observations.

Index