Package 'ethnoecologyR'

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Type Package

Title Quantitative Ethnoecology Analysis and Landscape Knowledge Modeling

Version 0.1.6

Description A comprehensive toolkit for quantitative ethnoecology analysis and landscape knowledge modeling. Implements core indices including Landscape Use (LU), Cultural Importance in Ecology (CIE), Frequency of Citation (FC), Fidelity Level (FL), Number of Uses (NU), and Cultural Value of Ecolandscape (CVe). Provides visualization tools for chord diagrams, alluvial plots, radial plots, and bipartite networks, as well as Bayesian consensus modeling and bootstrap resampling to support reproducible research in Local Ecological Knowledge (LEK) and participatory land-use decision analysis. Methods are based on Tardío and Pardo-de-Santayana (2008) <doi:10.1007/s12231-007-9004-5>, Reyes-García et al. (2006) <https://www.jstor.org/stable/4257061>, and Friedman et al. (1986) <doi:10.1037/0022-3514.51.6.1173>.

License GPL (>= 3)

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`CIEs` *Cultural Importance in Ecology (CIE)*

Description

Calculates the Cultural Importance in Ecology (CIE) index per landscape unit. CIE = LU / N, where N is the number of informants.

Usage

```
CIEs(data)
```

Arguments

`data`	an ethnoecology data set with columns 'informant' and 'landscape_unit'.

Value

Data frame with CIE values per landscape unit.

References

Tardío, J., and Pardo-de-Santayana, M. 2008. "Cultural Importance Indices: A Comparative Analysis Based on the Useful Wild Plants of Southern Cantabria (Northern Spain)." *Economic Botany* 62(1): 24-39.

Examples

```
data(ethnoecology_data)
CIEs(ethnoecology_data)
```

`CVe_eco` *Cultural Value of Ecolandscape (CVe)*

Description

Calculates the Cultural Value (CVe) per landscape unit. CVe = (LU / N) * (FC / N) where N = number of informants.

Usage

```
CVe_eco(data)
```

Arguments

`data`	an ethnoecology data set with columns 'informant' and 'landscape_unit'.

Value

Data frame with CVe values per landscape unit.

References

Reyes-García, V., Huanca, T., Vadez, V., Leonard, W., and Wilkie, D. 2006. "Cultural, Practical, and Economic Value of Wild Plants: A Quantitative Study in the Bolivian Amazon." *Economic Botany* 60(1): 62-74.

Examples

```
data(ethnoecology_data)
CVe_eco(ethnoecology_data)
```

ethnoecology_data *Data Uji Coba untuk ethnoecologyR*

Description

Dataset sintetis untuk menguji fungsi-fungsi dalam paket ethnoecologyR. Berisi 15 informan, 6 unit lanskap, dan 6 kategori penggunaan (0/1).

Usage

```
ethnoecology_data
```

Format

Data frame dengan 90 baris dan 8 kolom:

informant ID informan (karakter)

landscape_unit Nama unit lanskap (karakter)

use_forest Penggunaan hutan (0/1)

use_water Penggunaan air (0/1)

use_agriculture Penggunaan pertanian (0/1)

use_hunting Penggunaan perburuan (0/1)

use_fishing Penggunaan perikanan (0/1)

use_gathering Penggunaan pengumpulan (0/1)

Source

Data sintetis buatan.

ethno_bayes_land *Bayesian Consensus Model for Landscape Knowledge*

Description

Fits a Bayesian model to estimate consensus among informants regarding landscape use and ecological knowledge.

Usage

```
ethno_bayes_land(data, iter = 2000, chains = 4)
```

Arguments

data	an ethnoecology data set with columns 'informant' and 'landscape_unit'.
iter	number of MCMC iterations.
chains	number of MCMC chains.

Value

A Bayesian model object (Stan).

Examples

```
data(ethnoecology_data)
ethno_bayes_land(ethnoecology_data, iter = 1000, chains = 2)
```

---

ethno_boot_land *Bootstrap Analyses of Ethnoecology Indices*

Description

Performs bootstrap resampling to calculate confidence intervals for ethnoecology indices.

Usage

```
ethno_boot_land(data, index_function, R = 1000)
```

Arguments

data	an ethnoecology data set.
index_function	a function that calculates an ethnoecology index (e.g., LUs, CIEs).
R	number of bootstrap replicates.

Value

A list containing bootstrap results.

Examples

```
data(ethnoecology_data)
ethno_boot_land(ethnoecology_data, LUs, R = 100)
```

ethno_data_prep *Prepare Ethnoecology Data*

Description

Prepare Ethnoecology Data

Usage

```
ethno_data_prep(
  data,
  id_cols = c("informant", "landscape_unit"),
  pivot_long = TRUE
)
```

Arguments

data	Raw data frame.
id_cols	Columns to keep as identifiers (e.g., informant, landscape).
pivot_long	Logical. Convert wide to long format (default: TRUE).

Value

A cleaned and standardized data frame.

ethno_habitat_analysis *Habitat × Use-Category Cross-Analysis*

Description

Habitat × Use-Category Cross-Analysis

Usage

```
ethno_habitat_analysis(
  data,
  habitat_col = "landscape_unit",
  use_col = "use_category",
  use_cols = NULL
)
```

Arguments

data	Data frame in wide or long format.
habitat_col	Column name for habitat (default "landscape_unit").
use_col	Column name for use-category. Auto-detects use_* columns if not present (wide format).
use_cols	Optional character vector of use columns for wide format. If NULL, columns starting with "use_" are auto-detected.

Value

A wide data frame with one row per habitat and one column per use-category.

---

ethno_landscape_alluvial

Alluvial Plot of Landscape Uses

Description

Creates an alluvial diagram showing flows between informants, landscape units, and ecological uses.

Usage

```
ethno_landscape_alluvial(data)
```

Arguments

data	an ethnoecology data set with columns 'informant', 'landscape_unit', and use categories.

Value

A ggplot2 alluvial plot.

Examples

```
data(ethnoecology_data)
ethno_landscape_alluvial(ethnoecology_data)
```

ethno_landscape_chord *Chord Diagram of Landscape Uses*

Description

Creates a chord diagram showing relationships between informants, landscape units, and ecological uses.

Usage

```
ethno_landscape_chord(data, by = "landscape_unit")
```

Arguments

data	an ethnoecology data set with columns 'informant' and 'landscape_unit'.
by	grouping variable: "landscape_unit" or "informant".

Value

A chord diagram plot.

Examples

```
data(ethnoecology_data)
ethno_landscape_chord(ethnoecology_data, by = "landscape_unit")
```

ethno_landscape_network *Landscape Network Visualization*

Description

Visualize bipartite relationships between landscape units (or informants) and the plant-use categories associated with them. The function accepts both wide- and long-format input, so users can pass data straight from Excel without prior reshaping.

Usage

```
ethno_landscape_network(data, by = "landscape_unit", use_cols = NULL)
```

Arguments

data	Data frame. Wide format: one row per (informant x landscape_unit) observation, with binary columns prefixed use_ (e.g., use_forest, use_water). Long format: contains a use_category column with category labels.
by	Grouping variable: "landscape_unit" (default) or "informant".
use_cols	Optional character vector of use columns for wide format. If NULL (default), columns starting with "use_" are auto-detected.

Value

A ggraph network plot (inherits ggplot).

Examples

```
# Wide format (package dataset)
ethno_landscape_network(ethnoecology_data)
ethno_landscape_network(ethnoecology_data, by = "informant")

# Long format
long_df <- data.frame(
  informant      = c("A", "A", "B", "B"),
  landscape_unit = c("L1", "L2", "L1", "L2"),
  use_category   = c("forest", "water", "forest", "agriculture")
)
ethno_landscape_network(long_df, by = "informant")
```

---

ethno_ranking *Generate Top-N Rankings*

Description

Generate Top-N Rankings

Usage

```
ethno_ranking(data, index_function, top_n = 10)
```

Arguments

data	Data frame.
index_function	The index function to use (e.g., LUs, CIEs).
top_n	Number of top items to display (default: 10).

Value

A nicely formatted data frame.

ethno_resilience *Landscape Resilience Index (LRI)*

Description

Computes the Landscape Resilience Index combining use-value intensity, functional richness, and Shannon diversity of use-categories per landscape unit.

Usage

```
ethno_resilience(data, use_col = "use_category", use_cols = NULL)
```

Arguments

data	Data frame in wide or long format.
use_col	Column name for use-category. Auto-detects use_* columns if not present (wide format).
use_cols	Optional character vector of use columns.

Value

A data frame with columns landscape_unit, UV, FL, H, and LRI, sorted by descending LRI.

ethno_richness *Species / Unit Richness per Group*

Description

Computes richness (number of distinct units) per group. Supports both long format (with an explicit count_col) and wide format (auto-detects alternative count column, or falls back to row count).

Usage

```
ethno_richness(data, group_by = "informant", count_col = "species")
```

Arguments

data	Data frame.
group_by	Column to group by (default "informant").
count_col	Column to count distinct values from (default "species"). If not found, auto-detects an alternative or falls back to row count.

Value

A data frame with columns group_by and Richness.

FCs_eco *Frequency of Citation (FC) for Ethnoecology*

Description

Calculates the Frequency of Citation (FC) per landscape unit. FC = number of informants who mention the landscape unit for any use.

Usage

```
FCs_eco(data)
```

Arguments

data	an ethnoecology data set with columns 'informant' and 'landscape_unit'.

Value

Data frame with FC values per landscape unit.

References

Friedman, J., Yaniv, Z., Dafni, A., and Palevitch, D. 1986. "A Preliminary Classification of the Healing Potential of Medicinal Plants, Based on a Rational Analysis of an Ethnopharmacological Field Survey among Bedouins in the Negev Desert, Israel." *Journal of Ethnopharmacology* 16(2-3): 275-287.

Examples

```
data(ethnoecology_data)
FCs_eco(ethnoecology_data)
```

FLs_eco *Fidelity Level (FL) for Ethnoecology*

Description

Calculates the Fidelity Level (FL) per landscape unit for a specific use category. FL = (number of informants who mention the landscape unit for a specific use / total number of informants who mention the landscape unit for any use) * 100.

Usage

```
FLs_eco(data, use_category)
```

Arguments

data	an ethnoecology data set with columns 'informant' and 'landscape_unit'.
use_category	a character string specifying the use category column name.

Value

Data frame with FL values per landscape unit.

References

Friedman, J., Yaniv, Z., Dafni, A., and Palevitch, D. 1986. "A Preliminary Classification of the Healing Potential of Medicinal Plants, Based on a Rational Analysis of an Ethnopharmacological Field Survey among Bedouins in the Negev Desert, Israel." *Journal of Ethnopharmacology* 16(2-3): 275-287.

Examples

```
data(ethnoecology_data)
FLs_eco(ethnoecology_data, "use_forest")
```

---

landscape_radial_plot *Radial Bar Plot of Ethnoecology Indices*

Description

Radial Bar Plot of Ethnoecology Indices

Usage

```
landscape_radial_plot(data, indices_list)
```

Arguments

data	An ethnoecology data set (data frame).
indices_list	A list of index functions to apply (e.g., list(LUs, CIEs)).

Value

A ggplot2 radial plot object.

LUs *Landscape Use (LU)*

Description

Calculates the Landscape Use (LU) per landscape unit, a common metric for ethnoecology studies. This is the sum of all use reports for each landscape unit.

Usage

```
LUs(data)
```

Arguments

data	an ethnoecology data set with column 1 'informant' and column 2 'landscape_unit' as row identifiers of informants and of landscape units respectively. The rest of the columns are the identified ethnoecology use categories. The data should be populated with counts of uses per person (0 or 1 values).

Value

Data frame of landscape units and Landscape Use (LU) values.

Warning

Identification for informants and landscape units must be listed by the names 'informant' and 'landscape_unit' respectively in the data set. The rest of the columns should all represent separate identified ethnoecology use categories.

References

Tardío, J., and Pardo-de-Santayana, M. 2008. "Cultural Importance Indices: A Comparative Analysis Based on the Useful Wild Plants of Southern Cantabria (Northern Spain)." *Economic Botany* 62(1): 24-39.

Whitney, C. W., Bahati, J., and Gebauer, J. 2018. "Ethnobotany and Agrobiodiversity: Valuation of Plants in the Homegardens of Southwestern Uganda." *Ethnobiology Letters* 9(2): 1-12.

Examples

```
data(ethnoecology_data)
LUs(ethnoecology_data)
```

NUs_eco *Number of Uses (NU) for Ethnoecology*

Description

Calculates the Number of Uses (NU) per landscape unit. NU = total number of use categories reported for each landscape unit.

Usage

```
NUs_eco(data)
```

Arguments

data	an ethnoecology data set with columns 'informant' and 'landscape_unit'.

Value

Data frame with NU values per landscape unit.

Examples

```
data(ethnoecology_data)
NUs_eco(ethnoecology_data)
```

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