

Package ‘fundiversity’

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Title Easy Computation of Alpha Functional Diversity Indices

Version 0.0.1

Description Computes 4 alpha-functional diversity indices: Functional Divergence FDiv, Function Evenness Feve, Functional Richness FRic, and Rao's entropy Q (reviewed in Villéger et al. 2008 <doi:10.1890/07-1206.1>). Provides efficient and modular functions to compute functional diversity indices.

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

Depends R (>= 2.10)

Imports geometry, Matrix, vegan

Suggests testthat (>= 3.0.0), knitr, rmarkdown

URL <https://bisaloo.github.io/fundiversity/>,
<https://github.com/bisaloo/fundiversity>

BugReports <https://github.com/Bisaloo/fundiversity/issues>

Config/testthat/edition 3

VignetteBuilder knitr

NeedsCompilation no

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fd_fdiv	<i>Compute Functional Divergence (FDiv)</i>
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Description

Compute Functional Divergence (FDiv)

Usage

```
fd_fdiv(traits, sp_com)
```

Arguments

traits	The matrix dataset for which you want to compute the index
sp_com	Site-species matrix with sites as rows and species as columns if not provided, the function considers all species with equal abundance in a single site. This can be either a matrix, a data.frame, or a <code>Matrix::Matrix()</code> object. package.

Value

a data.frame with two columns:

- site the names of the sites as the row names of the input sp_com,
- FDiv the values of functional divergence at each site.

References

Villéger S., Mason N. W. H., Mouillot D. (2008), New multidimensional functional diversity indices for a multifaceted framework in functional ecology, *Ecology* 89(8), doi: [10.1890/071206.1](https://doi.org/10.1890/071206.1)

Examples

```
data(traits_birds)
fd_fdiv(traits_birds)
```

fd_feve	<i>Compute Functional Evenness (FEve)</i>
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Description

Compute Functional Evenness (FEve)

Usage

```
fd_feve(traits = NULL, sp_com, dist_matrix = NULL)
```

Arguments

traits	The matrix dataset for which you want to compute the index
sp_com	Site-species matrix with sites as rows and species as columns if not provided, the function considers all species with equal abundance in a single site. This can be either a matrix, a data.frame, or a <code>Matrix::Matrix()</code> object. package.
dist_matrix	A dissimilarity matrix that can be provided instead of a trait data.frame (default: NULL). This can be either a matrix, a data.frame, or a <code>Matrix::Matrix()</code> object.

Value

a data.frame with two columns:

- site character column that contains site names based on input sp_com row names,
- FEve numeric column that contains FEve values corresponding to each site.

References

Villéger, S., Mason, N.W.H., Mouillot, D., 2008. New Multidimensional Functional Diversity Indices for a Multifaceted Framework in Functional Ecology. *Ecology* 89, 2290–2301. doi: [10.1890/071206.1](https://doi.org/10.1890/071206.1)

Examples

```
data(traits_birds)
fd_feve(traits_birds)
```

`fd_fric`*Compute Functional Richness (FRic)*

Description

Functional Richness is computed as the volume of the convex hull from all included traits.

Usage

```
fd_fric(traits, sp_com, stand = FALSE)
```

Arguments

<code>traits</code>	The matrix dataset for which you want to compute the index
<code>sp_com</code>	Site-species matrix with sites as rows and species as columns if not provided, the function considers all species with equal abundance in a single site. This can be either a <code>matrix</code> , a <code>data.frame</code> , or a <code>Matrix::Matrix()</code> object. package.
<code>stand</code>	a boolean indicating whether to standardize FRic values over the observed maximum over all species (default: <code>FALSE</code>). This scales FRic between 0 and 1. NB: The maximum FRic values only considers species that are present in both site-species and trait matrices. If you want to consider species that are absent in the site-species matrix, add corresponding columns of 0s.

Value

a `data.frame` with two columns:

- `site` the names of the sites as the row names of the input `sp_com`,
- `FRic` the values of functional richness at each site.

References

Cornwell W. K., Schwilk D. W., Ackerly D. D. (2006), A trait-based test for habitat filtering; convex hull volume, *Ecology* 84(6), doi: [10.1890/00129658\(2006\)87\[1465:ATTFHF\]2.0.CO;2](https://doi.org/10.1890/00129658(2006)87[1465:ATTFHF]2.0.CO;2)

Examples

```
data(traits_birds)
fd_fric(traits_birds)
```

fd_raoq	<i>Compute Rao's entropy index (Rao's Q)</i>
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Description

Compute Rao's entropy index (Rao's Q)

Usage

```
fd_raoq(traits = NULL, sp_com, dist_matrix = NULL)
```

Arguments

traits	The matrix dataset for which you want to compute the index
sp_com	Site-species matrix with sites as rows and species as columns if not provided, the function considers all species with equal abundance in a single site. This can be either a matrix, a data.frame, or a <code>Matrix::Matrix()</code> object. package.
dist_matrix	A dissimilarity matrix that can be provided instead of a trait data.frame (default: NULL). This can be either a matrix, a data.frame, or a <code>Matrix::Matrix()</code> object.

Value

a data.frame with two columns:

- site the names of the sites as the row names of the input sp_com,
- Q the values of Rao's quadratic entropy at each site.

References

Pavoine S., Dolédec S. (2005). The apportionment of quadratic entropy: a useful alternative for partitioning diversity in ecological data. *Environmental and Ecological Statistics*, 12(2), 125–138. doi: [10.1007/s1065100510372](https://doi.org/10.1007/s1065100510372)

Examples

```
data(traits_birds)
fd_raoq(traits_birds)
```

site_sp_birds

Site-species matrix of birds along a Tropical Gradient

Description

Presences and absences of birds at different elevations along a tropical gradient. Species names are indicated as column names.

Usage

site_sp_birds

Format

A matrix with 217 columns (1 per species) and 8 rows:

elev_250 is species present at 250 m elevation? 0=No, 1=Yes

elev_500 is species present at 500 m elevation? 0=No, 1=Yes

elev_1000 is species present at 1000 m elevation? 0=No, 1=Yes

elev_1500 is species present at 1500 m elevation? 0=No, 1=Yes

elev_2000 is species present at 2000 m elevation? 0=No, 1=Yes

elev_2500 is species present at 2500 m elevation? 0=No, 1=Yes

elev_3000 is species present at 3000 m elevation? 0=No, 1=Yes

elev_3500 is species present at 3500 m elevation? 0=No, 1=Yes

Source

Nowak, Larissa et al. (2019), Data from: Projecting consequences of global warming for the functional diversity of fleshy-fruited plants and frugivorous birds along a tropical elevational gradient, Dryad, Dataset, doi: [10.5061/dryad.c0n737b](https://doi.org/10.5061/dryad.c0n737b)

site_sp_plants

Site-species matrix of plants along a Tropical Gradient

Description

Presences and absences of plants at different elevations along a tropical gradient. Species names are indicated as column names.

Usage

site_sp_plants

Format

A matrix with 392 columns (1 per species) and 10 rows:

elev_250 is species present at 250 m elevation? 0=No, 1=Yes

elev_500 is species present at 500 m elevation? 0=No, 1=Yes

elev_1000 is species present at 1000 m elevation? 0=No, 1=Yes

elev_1500 is species present at 1500 m elevation? 0=No, 1=Yes

elev_2000 is species present at 2000 m elevation? 0=No, 1=Yes

elev_2500 is species present at 2500 m elevation? 0=No, 1=Yes

elev_3000 is species present at 3000 m elevation? 0=No, 1=Yes

elev_3500 is species present at 3500 m elevation? 0=No, 1=Yes

elev_3750 is species present at 3750 m elevation? 0=No, 1=Yes

elev_4000 is species present at 4000 m elevation? 0=No, 1=Yes

Source

Nowak, Larissa et al. (2019), Data from: Projecting consequences of global warming for the functional diversity of fleshy-fruited plants and frugivorous birds along a tropical elevational gradient, Dryad, Dataset, doi: [10.5061/dryad.c0n737b](https://doi.org/10.5061/dryad.c0n737b)

traits_birds

Functional Traits of Frugivorous Birds along a Tropical Gradient

Description

A dataset containing some functional traits of frugivorous birds in the Manú biosphere reserve, southeast Peru. Given are species mean trait values. The row names of the dataset give species names. Morphological traits have been measured on museum specimen following Eck et al.(2011). Traits have been measured only for adult and, if possible, for a minimum of two female and two male specimens. Body mass was taken from Dunning et al. (2007).

Usage

traits_birds

Format

A data frame with 217 rows and 4 variables:

Bill.width..mm. bill width, in mm

Bill.length..mm. bill length, in mm

Kipp.s.index Kipp's index indicating wing Pointedness

Bodymass..g. adult's bodymass, in g

Source

Nowak, Larissa et al. (2019), Data from: Projecting consequences of global warming for the functional diversity of fleshy-fruited plants and frugivorous birds along a tropical elevational gradient, Dryad, Dataset, doi: [10.5061/dryad.c0n737b](https://doi.org/10.5061/dryad.c0n737b)

traits_plants

Functional Traits of Fleshy-fruit plants along a Tropical Gradient

Description

Taxonomy and functional traits of 392 fleshy-fruited plant species from the Manu National Park in south-east Peru. Given are fruit length and width (mm), plant height (m) and crop mass (g). Fruit traits have been measured on fresh fruit samples. Number of fruits per plant (used to determine the crop mass) and plant height have been estimated in the field. Species names are indicated as row names.

Usage

```
traits_plants
```

Format

A data frame with 392 rows and 4 variables:

Fruit.length..mm. fruit length, in mm

Fruit.width..mm. fruit width, in mm

Plant.height..m. plant height, in m

Crop.mass..g. seed mass, in g

Source

Nowak, Larissa et al. (2019), Data from: Projecting consequences of global warming for the functional diversity of fleshy-fruited plants and frugivorous birds along a tropical elevational gradient, Dryad, Dataset, doi: [10.5061/dryad.c0n737b](https://doi.org/10.5061/dryad.c0n737b)

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