Package 'diversityArch'

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Type Package

Title Computes Diversity Indices with Archaeological Data

Version 0.1.0

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Depends R (>= 3.5.0)

Repository CRAN

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Contents

`all_indices` *Diversity indices*

Description

Computes and prints all the diversity indices

Usage

```
all_indices(x, groups = NULL)
```

Arguments

`x`	Vector of dimension S (spicies) with the numbers of observed individuals in each spicy. NA values are allowed. 0 values are converted to NA.
`groups`	Vector of dimension S of factors indicating the groups.

Value

No return value. It prints the value of all indicators

References

"Quantifying Diversity through Entropy Decomposition: Insights into Hominin Occupation and Carcass Processing at Qesem cave"

See Also

shannon, dec_shannon, dominance, equitability, evenness, margalev, menhinick, simpson_D, simpson_E

Examples

```
data(Qesem_s)
all_indices(Qesem_s$HU)
all_indices(Qesem_s$HU, Qesem_s$Group)
```

`dec_equit` *Decomposition of the equitability index*

Description

Computes equitability and its decomposition

Usage

```
dec_equit(x, groups)
```

Arguments

`x`	Vector of dimension S (spicies) with the numbers of observed individuals in each spicy. NA values are allowed. 0 values are converted to NA.
`groups`	Vector of dimension S of factors indicating the groups.

Value

- `equitability`: Equitability index.
- `within`: Within groups equitability.
- `between`: Between groups equitability.

References

"Arnaud Barat, Andreu Sansó, Maite Arilla-Osuna, Ruth Blasco, Iñaki Pérez-Fernández, Gabriel Cifuentes-Alcobenda, Rubén Llorente, Daniel Vivar-Ríos, Ella Assaf, Ran Barkai, Avi Gopher, & Jordi Rosell-Ardèvol (2025): Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave"

See Also

dec_shannon

Examples

```
data(Qesem_s)
dec_equit(Qesem_s$HU, Qesem_s$Group)
```

dec_shannon *Shannon diversity decomposition*

Description

Computes Shannon diversity and its decomposition

Usage

```
dec_shannon(x, groups)
```

Arguments

x	Vector of dimension S (spicies) with the numbers of observed individuals in each spicy. NA values are allowed. 0 values are converted to NA.
groups	Vector of dimension S of factors indicating the groups.

Value

- shannon: Shannon's total Entropy.
- within: Within groups entropy.
- between: Between groups entropy.
- groups: A data frame with information about each group: relative frequency, internal entropy and number of spicies.

References

"Arnaud Barat, Andreu Sansó, Maite Arilla-Osuna, Ruth Blasco, Iñaki Pérez-Fernández, Gabriel Cifuentes-Alcobenda, Rubén Llorente, Daniel Vivar-Ríos, Ella Assaf, Ran Barkai, Avi Gopher, & Jordi Rosell-Ardèvol (2025): Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave"

See Also

shannon

Examples

```
data(Qesem_s)
dec_shannon(Qesem_s$HU, Qesem_s$Group)
```

`dominance` *Dominance index*

Description

Modification of the Simpson's dominance index to be restricted between 0 and 1.

Usage

```
dominance(x)
```

Arguments

`x`	Vector of dimension S (spicies) with the numbers of observed individuals in each spicy. NA values are allowed. 0 values are converted to NA.

Value

Dominance index (Modified Simpson's dominance index).

References

"Arnaud Barat, Andreu Sansó, Maite Arilla-Osuna, Ruth Blasco, Iñaki Pérez-Fernández, Gabriel Cifuentes-Alcobenda, Rubén Llorente, Daniel Vivar-Ríos, Ella Assaf, Ran Barkai, Avi Gopher, & Jordi Rosell-Ardèvol (2025): Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave"

See Also

simpson_D

Examples

```
data(Qesem_s)
dominance(Qesem_s$HU)
```

`equitability` *Equitability. J Pielou index*

Description

Computes J Pielou index know as equitability

Usage

```
equitability(x)
```

Arguments

x	Vector of dimension S (spicies) with the numbers of observed individuals in each spicy. NA values are allowed. 0 values are converted to NA.

Value

Equitability. J Pielou index.

References

"Arnaud Barat, Andreu Sansó, Maite Arilla-Osuna, Ruth Blasco, Iñaki Pérez-Fernández, Gabriel Cifuentes-Alcobenda, Rubén Llorente, Daniel Vivar-Ríos, Ella Assaf, Ran Barkai, Avi Gopher, & Jordi Rosell-Ardèvol (2025): Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave"

See Also

shannon

Examples

```
data(Qesem_s)
equitability(Qesem_s$HU)
```

evenness *Evenness index*

Description

Modification of Simpson's evenness index to be restricted between 0 an 1

Usage

```
evenness(x)
```

Arguments

x	Vector of dimension S (spicies) with the numbers of observed individuals in each spicy. NA values are allowed. 0 values are converted to NA.

Value

Evenness index.

References

"Arnaud Barat, Andreu Sansó, Maite Arilla-Osuna, Ruth Blasco, Iñaki Pérez-Fernández, Gabriel Cifuentes-Alcobenda, Rubén Llorente, Daniel Vivar-Ríos, Ella Assaf, Ran Barkai, Avi Gopher, & Jordi Rosell-Ardèvol (2025): Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave"

See Also

simpson_E

Examples

```
data(Qesem_s)
evenness(Qesem_s$HU)
```

margalev *Margalev index*

Description

Computes Margalev's index

Usage

```
margalev(x)
```

Arguments

x	Vector of dimension S (spicies) with the numbers of observed individuals in each spicy. NA values are allowed. 0 values are converted to NA.

Value

Margalev index.

References

"Arnaud Barat, Andreu Sansó, Maite Arilla-Osuna, Ruth Blasco, Iñaki Pérez-Fernández, Gabriel Cifuentes-Alcobenda, Rubén Llorente, Daniel Vivar-Ríos, Ella Assaf, Ran Barkai, Avi Gopher, & Jordi Rosell-Ardèvol (2025): Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave"

Examples

```
data(Qesem_s)
margalev(Qesem_s$HU)
```

menhinick *Menhinick index*

Description

Computes menhinick's index

Usage

```
menhinick(x)
```

Arguments

x	Vector of dimension S (spicies) with the numbers of observed individuals in each spicy. NA values are allowed. 0 values are converted to NA.

Value

Menhinick index.

References

"Arnaud Barat, Andreu Sansó, Maite Arilla-Osuna, Ruth Blasco, Iñaki Pérez-Fernández, Gabriel Cifuentes-Alcobenda, Rubén Llorente, Daniel Vivar-Ríos, Ella Assaf, Ran Barkai, Avi Gopher, & Jordi Rosell-Ardèvol (2025): Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave"

Examples

```
data(Qesem_s)
menhinick(Qesem_s$HU)
```

Qesem_f *Data used in the examples*

Description

Data frame with number of fragments of bones of unidentified spicies but identified group for several levels in Qesem (Israel). Data source: Blasco, R., Rosell, J., Assaf, E., Barkai, R., Gopher, A., (2024)

Usage

```
data(Qesem_f)
```

Value

Data frame with 4 observations (groups) and 7 levels.

Author(s)

Blasco, R., Rosell, J., Assaf, E., Barkai, R., Gopher, A.

Source

Blasco, R., Rosell, J., Assaf, E., Barkai, R., Gopher, A., 2024. Exploring the lack of articular ends at the Middle Pleistocene site of Qesem Cave, Israel. Journal of Human Evolution 189, 103509. doi:10.1016/j.jhevol.2024.103509

References

Barat, A. Sansó, A. Arilla-Osuna, M. Blasco, R., Pérez-Fernández, I., Cifuentes-Alcobenda, G. Llorente, R., Vivar-Ríos, D., Assaf, E. Barkai, R., Gopher, A. & Rosell-Ardèvol, J., 2025. Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave. Blasco, R., Rosell, J., Assaf, E., Barkai, R., Gopher, A., 2024. Exploring the lack of articular ends at the Middle Pleistocene site of Qesem Cave, Israel. Journal of Human Evolution 189, 103509. doi:10.1016/j.jhevol.2024.103509

Examples

```
data(Qesem_f)
names(data)
# The following example replicates some of the results of Table 5 in
# Barat, A. Sansó, A. Arilla-Osuna, M. Blasco, R., Pérez-Fernández, I.,
# Cifuentes-Alcobenda, G. Llorente, R., Vivar-Ríos, D., Assaf, E. Barkai, R.,
# Gopher, A. & Rosell-Ardèvol, J., 2025. "Quantifying Diversity through Entropy
# Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave".
shannon_frag(Qesem_s$HU, Qesem_s$Group, Qesem_f$HU, Qesem_f$Group)
```

Qesem_s *Data used in the examples*

Description

Data frame with number of bones of different spicies and diferent levels in Qesem (Israel), and a factor related to the size of the animal. Data source: Blasco, R., Rosell, J., Assaf, E., Barkai, R., Gopher, A., (2024)

Usage

```
data(Qesem_s)
```

Value

Data frame with 15 observations and 7 levels.

Author(s)

Blasco, R., Rosell, J., Assaf, E., Barkai, R., Gopher, A.

Source

Blasco, R., Rosell, J., Assaf, E., Barkai, R., Gopher, A., 2024. Exploring the lack of articular ends at the Middle Pleistocene site of Qesem Cave, Israel. Journal of Human Evolution 189, 103509. doi:10.1016/j.jhevol.2024.103509

References

Barat, A. Sansó, A. Arilla-Osuna, M. Blasco, R., Pérez-Fernández, I., Cifuentes-Alcobenda, G. Llorente, R., Vivar-Ríos, D., Assaf, E. Barkai, R., Gopher, A. & Rosell-Ardèvol, J., 2025. Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave. Blasco, R., Rosell, J., Assaf, E., Barkai, R., Gopher, A., 2024. Exploring the lack of articular ends at the Middle Pleistocene site of Qesem Cave, Israel. Journal of Human Evolution 189, 103509. doi:10.1016/j.jhevol.2024.103509

Examples

```
data(Qesem_s)
names(Qesem_s)
# The following example replicates some of the results of Table 3 in
# Barat, A. Sansó, A. Arilla-Osuna, M. Blasco, R., Pérez-Fernández, I.,
# Cifuentes-Alcobenda, G. Llorente, R., Vivar-Ríos, D., Assaf, E. Barkai, R.,
# Gopher, A. & Rosell-Ardèvol, J., 2025. "Quantifying Diversity through Entropy
# Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave".
all_indices(Qesem_s$HU)
```

---

shannon *Shannon diversity index*

Description

Computes Shannon's diversity index

Usage

```
shannon(x)
```

Arguments

x	Vector of dimension S (spicies) with the numbers of observed individuals in each spicy. NA values are allowed. 0 values are converted to NA.

Value

Shannon's diversity index (Entropy).

References

"Arnaud Barat, Andreu Sansó, Maite Arilla-Osuna, Ruth Blasco, Iñaki Pérez-Fernández, Gabriel Cifuentes-Alcobenda, Rubén Llorente, Daniel Vivar-Ríos, Ella Assaf, Ran Barkai, Avi Gopher, & Jordi Rosell-Ardèvol (2025): Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave"

See Also

dec_shannon, equitability

Examples

```
data(Qesem_s)
shannon(Qesem_s$HU)
```

---

shannon_frag *Shannon diversity decomposition*

Description

Computes Shannon diversity and its decomposition

Usage

```
shannon_frag(x, gx, f, gf)
```

Arguments

x	Vector of dimension S (spicies) with the numbers of observed individuals in each spicy. NA values are allowed. 0 values are converted to NA.
gx	Vector of dimension S of factors indicating the groups. G groups.
f	Vector of dimension G with the number (>0) of fragments in each group
gf	Vector of dimension G of factors indicating the groups of f.

Value

- shannon: Shannon's total Entropy.
- within: Within groups entropy.
- between: Between groups entropy.
- groups: A data frame with information about each group: relative frequency, internal entropy and number of spicies.

References

"Arnaud Barat, Andreu Sansó, Maite Arilla-Osuna, Ruth Blasco, Iñaki Pérez-Fernández, Gabriel Cifuentes-Alcobenda, Rubén Llorente, Daniel Vivar-Ríos, Ella Assaf, Ran Barkai, Avi Gopher, & Jordi Rosell-Ardèvol (2025): Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave"

See Also

shannon

Examples

```
data(Qesem_s)
data(Qesem_f)
shannon_frag(Qesem_s$HU, Qesem_s$Group, Qesem_f$HU, Qesem_f$Group)
```

`simpson_D` *Simpson's dominance index*

Description

Computes Simpson's dominance index.

Usage

```
simpson_D(x)
```

Arguments

`x`	Vector of dimension S (spicies) with the numbers of observed individuals in each spicy. NA values are allowed. 0 values are converted to NA.

Value

Simpson's dominance index.

References

"Arnaud Barat, Andreu Sansó, Maite Arilla-Osuna, Ruth Blasco, Iñaki Pérez-Fernández, Gabriel Cifuentes-Alcobenda, Rubén Llorente, Daniel Vivar-Ríos, Ella Assaf, Ran Barkai, Avi Gopher, & Jordi Rosell-Ardèvol (2025): Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave"

See Also

dominance, simpson_E

Examples

```
data(Qesem_s)
simpson_D(Qesem_s$HU)
```

simpson_E *Simpson's evenness index*

Description

Computes Simpson's evenness index.

Usage

```
simpson_E(x)
```

Arguments

x	Vector of dimension S (spicies) with the numbers of observed individuals in each spicy. NA values are allowed. 0 values are converted to NA.

Value

Simpson's evenness index.

References

"Arnaud Barat, Andreu Sansó, Maite Arilla-Osuna, Ruth Blasco, Iñaki Pérez-Fernández, Gabriel Cifuentes-Alcobenda, Rubén Llorente, Daniel Vivar-Ríos, Ella Assaf, Ran Barkai, Avi Gopher, & Jordi Rosell-Ardèvol (2025): Quantifying Diversity through Entropy Decomposition. Insights into Hominin Occupation and Carcass Processing at Qesem cave"

See Also

evenness, simpson_D

Examples

```
data(Qesem_s)
simpson_E(Qesem_s$HU)
```

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