Package 'ZLAvian'

December 5, 2023

Type Package

Title Zipf's Law of Abbreviation in Animal Vocalisations

Version 0.1.0

Description Assesses evidence for Zipf's Law of Abbreviation in animal vocalisation using IDs, note class and note duration. The package also provides a webplot function for visualisation. Davis, M. K., and Chen, G. (2007) <doi:10.2307/2346786>.

License CC BY-SA 4.0

URL https://github.com/CDr-er/ZLAvian

BugReports https://github.com/CDr-er/ZLAvian/issues

Maintainer CD Durrant <cbdurrantant@gmail.com>

Depends R(>= 4.3.0)

Imports lme4 (>= 1.1-34), performance (>= 0.10.4), doParallel (>= 1.0.17)

Suggests rmarkdown, knitr

VignetteBuilder knitr

Encoding UTF-8

Language en-GB

LazyData true

RoxygenNote 7.2.3

NeedsCompilation no

Author CD Durrant [com, cre, cph],
Tucker Gilman [aut, cph]

Repository CRAN

Date/Publication 2023-12-05 17:30:02 UTC

R topics documented:

`Java.sparrow.notes` *Java sparrow note duration and frequency.*

Description

This dataset reports the durations and frequencies of use for 22,970 notes in 676 undirected songs produced by 73 Java sparrows (Padda oryzivora). Songs were recorded by Masayo Soma and colleagues and notes were assigned to classes by Rebecca Lewis (Lewis et al. 2021; Lewis et al. 2023).

Usage

```
data("Java.sparrow.notes")
```

Format

A list with 22970 observations on the following 3 variables.

`duration` Amount of seconds the note was sung for

`note` Identifier of note type

`ID` Identifier of individual bird

Source

<https://figshare.manchester.ac.uk/articles/dataset/Code_and_Data_from_Lewis_et_al_2023_Animal_Behavior/22550149>

References

Lewis RN, Kwong A, Soma M, de Kort SR, Gilman RT (2023) Inheritance of temporal song features in Java sparrows. Animal Behaviour 206, 61-74

`plotZLA` *Web plots to illustrate Zipf's law of abbreviation*

Description

Produces a webplot. It requires data calculated from the testZLA function.

Usage

```
plotZLA(inputObject)
```

Arguments

`inputObject`	output from the function testZLA

Details

In the figure produced by plotZLA, each point represents a note or phrase type in the population repertoire. Note types are joined by a line if both note types are produced by the same individual. The weight of the line is proportional to the number of individuals that produce both note types. The color of the lines indicates whether there is a positive (blue) or negative (red) concordance between the duration and frequency of use of the note types. Negative concordances are consistent with Zipf's law of abbreviation. Shades between blue and red indicate that the concordance is positive in some individuals and negative in others. For example, this can happen if some individuals use the note types more frequently than others, such that the rank order of frequency of use varies among individuals. Grey crosses centered on each point show the longest and shortest durations of the note type (vertical) and the highest and lowest frequencies of use (horizontal) in the population.

Value

Produces a webplot illustrating concordance between note duration and frequency of use within individuals. Requires output from the testZLA function.

Author(s)

CD Durrant and R. Tucker Gilman (2023)

References

Davis, M. K. and Chen, G. (2007) Graphic Kendall's tau. Computational Statistics & Data Analysis, 51(5), 2373-2378. doi: 10.2307/2346786

`testZLA` *Assess evidence for Zipf's law of abbreviation*

Description

Assesses evidence for Zipf's Law of Abbreviation in a population where samples from the population repertoire can be assigned to individuals.

Usage

```
testZLA(data, minimum = 1, null = 999, est = "mean", cores = 2)
```

Arguments

`data`	a dataframe containing columns "note" (factor/character; identifies the note/phrase type of each token), "duration" (numeric; describes the duration of each token), and "ID" (factor; identifies the individual that produced each token). Other columns in the dataframe are ignored.
`minimum`	the minimum number of times a note type must appear in the data set to be included in the analysis. Must be a positive integer.

`null`	the number of permutations used to estimate the null distribution. Must be a positive integer 99 or greater.
`est`	takes values "mixed" or "mean." If est = "mixed," then the expected duration for each note type in the population is computed as the intercept of an intercept-only mixed effects model (fit using the lmer() function of lme4) that includes a random effect of individual ID. If est = "mean," then the expected duration for each note type in the population is computed as the weighted mean across all observations in the dataset with each individual weighted equally. The expected durations for note types are used in the permutation algorithm.
`cores`	divides (parallelizes) computation of the null distribution among cores. Cores must be an integer between 1 and the number of cores available on the users machine, inclusive.

Value

a matrix that reports Kendall's tau and the p-value associated with Kendall's tau computed at both the population and individual levels.

Author(s)

CD Durrant and R. Tucker Gilman (2023)

Index