Package 'grainkey'

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Title Grain-Age Key Estimation Tools

Version 0.1.0

Description Functions to estimate and visualize age composition by grain class based on individual peces biological data (age and weight).

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Depends R (>= 2.10)

Imports dplyr,
ggplot2,
tidyr,
lubridate,
purrr,
stats,
magrittr

Suggests knitr,
rmarkdown,
testthat (>= 3.0.0),
tibble

Config/testthat/edition 3

VignetteBuilder knitr

R topics documented:

`build_grain_key` *Construct Grain–Age Key from Individual Biological Observations*

Description

Builds a grain–age key based on individual biological records, specifically total weight (in grams) and age (in years). Samples are classified into commercial grain size classes (approximated by fish/kg), and the function estimates the proportion-at-age and mean weight-at-age within each grain class, by year and quarter.

Usage

```
build_grain_key(data_biological)
```

Arguments

`data_biological`
: A data frame with individual-level biological data, including:

operation_date Sampling date (format: YYYY-MM-DD)

edad Age of the individual (integer; typically 0–3)

ptot_g Total individual weight in grams (numeric)

Details

The method uses the inverse of the average weight to estimate the number of individuals per kilogram ("Grain"), which is then assigned to predefined grain size classes. For each class, it computes:

- Proportion of individuals per age group (`grain_key`)
- Mean individual weight per age group (`weight_key`)

Value

A list with:

grain_key Proportion-at-age by grain class, year, and quarter

weight_key Mean weight-at-age by grain class, year, and quarter

long_data Merged long-format data frame with intermediate variables

data Processed input data

N_by_age Number of individuals by age

W_by_age Mean weight by age

grain_data Grain values and classes

pct_by_age Proportions at age

weighted_pct Weighted proportions

long_pct Long-format proportion data

long_weighted Long-format weighted proportion data

long_n Long-format number at age

long_weight Long-format mean weight at age

merged Merged long-format output

calc_catch_by_age *Calculate Number of Fish Caught by Age*

Description

Estimates the number of fish caught by age class using a grain–age key (either in wide or long format) and a table of total numbers caught per grain class.

Usage

```
calc_catch_by_age(grain_key, grain_catch)
```

Arguments

grain_key	A data frame with either wide-format columns (Age-0, Age-1, ...) or long-format columns (age, proportion).
grain_catch	A data frame output from calc_grain_catch, containing total number of fish by year, quarter, and Grain_class.

Value

A data frame with number of fish caught by age, grain class, quarter, and year.

calc_grain_catch *Calculate Number of Fish by Commercial Grain Size and Quarter*

Description

Estimates the number of anchovies caught per commercial grain size class and quarter, based on landed weight and assumed units per kilogram. Optionally allows reassignment of "TALLA 1" to another commercial size class to adjust for inconsistent pricing behavior.

Usage

```
calc_grain_catch(data, reassign = TRUE, talla1_to = "TALLA 2")
```

Arguments

data	A data frame with columns: **FECHA_VENTA** Date of sale (format: YYYY-MM-DD) **TALLA** Commercial size class (e.g. "TALLA 1" to "TALLA 4") **TOTAL_KILOS** Landed weight in kilograms **TOTAL_EUROS** Total value in euros
reassign	Logical. If TRUE, reassigns "TALLA 1" to another class.
talla1_to	Character. New commercial size class to assign to "TALLA 1".

Value

A data frame with estimated total kilograms, number of fish, and mean weight (in grams) by year, quarter, and Grain_class.

Database *Simulated biological dataset*

Description

Example dataset of individuals with age and total weight, used for building a grain–age key.

Usage

```
data(Database)
```

Format

A data frame with 3 columns:

operation_date Date of sampling (class Date)

edad Age of the individual (integer)

ptot_g Total weight in grams (numeric)

data_NV *commercial landings data (simulated)*

Description

A simulated dataset representing commercial landings by grain size class.

Usage

```
data(data_NV)
```

Format

A data frame with 4 columns:

FECHA_VENTA Date of sale (class Date)

TALLA Commercial grain size (factor or character)

TOTAL_EUROS Total value in euros (numeric)

TOTAL_KILOS Total landed weight in kilograms (numeric)

plot_catch_by_age *Plot Number of Fish Caught by Age and Grain Class*

Description

Creates a bar plot of the number of anchovies caught by age and grain class, grouped by year and quarter, using the output from `calc_catch_by_age`.

Usage

```
plot_catch_by_age(catch_by_age)
```

Arguments

`catch_by_age`	A data frame containing columns: • `year`: Year of catch (numeric) • `quarter`: Quarter of catch (numeric) • `age`: Age of individuals (integer or factor) • `num_at_age`: Estimated number of fish caught at age • `Grain_class`: Commercial grain class

Value

A `ggplot2` object: a facetted bar plot by year and quarter

plot_grain_catch *Plot Number of Fish by Grain Class and Quarter*

Description

Generates a bar plot of the estimated number of anchovies caught per grain class and quarter, using the output from `calc_grain_catch`. Grain classes are automatically ordered based on their labels (e.g., "31-50", "51-83").

Usage

```
plot_grain_catch(grain_data)
```

Arguments

`grain_data`	A data frame with columns: • `year`: Year of catch (numeric) • `quarter`: Quarter of catch (numeric) • `Grain_class`: Commercial grain class (character) • `num_total`: Estimated total number of fish caught

Value

A `ggplot2` bar plot (facetted by year-quarter)

plot_grain_key *Plot Grain Age Key*

Description

Visualizes either the proportion-at-age or the mean weight-at-age by grain class, year, and quarter, using the output of build_grain_key.

Usage

```
plot_grain_key(grain_key, plot_type = "percentage")
```

Arguments

grain_key	A list returned by build_grain_key(), containing at least: grain_key (proportion-at-age) and weight_key (mean weight-at-age).
plot_type	Character string indicating which type of plot to return. Options: **"percentage"** Plot proportion-at-age (default) **"mean_weight"** Plot mean weight-at-age

Value

A ggplot2 object showing grain-age distribution or mean weight.

Examples

```
## Not run:
results <- build_grain_key(data_bio)
plot_grain_key(results, plot_type = "percentage")
plot_grain_key(results, plot_type = "mean_weight")

## End(Not run)
```