Package ‘ggFishPlots’

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Type Package

Title Visualise and Calculate Life History Parameters for Fisheries Science using ‘ggplot2’

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URL https://github.com/DeepWaterIMR/ggFishPlots

BugReports https://github.com/DeepWaterIMR/ggFishPlots/issues

Description Contains functions to create life history parameter plots from raw data. The plots are created using ‘ggplot2’, and calculations done using the ‘tidyverse’ collection of packages. The package contains references to FishBase (Froese R., Pauly. D., 2023) <https://www.fishbase.se/>.

Depends R (>= 3.5.0), ggplot2

Imports dplyr, tibble, tidyr, ggridges, fishmethods, broom, rlang, tidyselect, magrittr, ggrepel

Suggests knitr, rmarkdown

License GPL-3

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NeedsCompilation no

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R topics documented:

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Description

Plot age-length relationships and growth curves

Usage

```r
plot_growth(
  dt,
  length = "length",
  age = "age",
  sex = "sex",
  female.sex = "F",
  male.sex = "M",
  length.unit = "cm",
  split.by.sex = FALSE,
  growth.model = 1,
  force.zero.group.length = NA,
  force.zero.group.strength = 10,
  force.zero.group.cv = 0,
  show.Linf = TRUE,
  boxplot = TRUE,
  base_size = 8,
  legend.position = "bottom"
)
```

Arguments

- `dt` A data.frame, tibble or data.table
- `length` Character argument giving the name of the length column in dt
- `age` Character argument giving the name of the age column in dt
- `sex` Character argument giving the name of the sex column in dt. Ignored if `split.by.sex` == FALSE.
- `female.sex` A character denoting female sex in the sex column of dt
- `male.sex` A character denoting male sex in the sex column of dt
- `length.unit` A character argument giving the unit of length. Will be used in the labels of the figure.
- `split.by.sex` Logical indicating whether the result should be split by sex.
plot_growth

growth.model  Integer defining the growth model. 1 = von Bertalanffy, 2 = Gompertz, 3 = Logistic.

force.zero.group.length  Numeric indicating the length to which 0-group should be forced. Use NA ignore the forcing.

force.zero.group.strength  Numeric indicating how many percent of total fish should be added to the specified force.zero.group.length.

force.zero.group.cv  Numeric indicating the coefficient of variation for the forced 0-group length. Resulting lengths will be randomly generated from a normal distribution.

show.Linf  Logical indicating whether Linf values should be shown as dashed vertical lines.

boxplot  Logical indicating whether boxplots (TRUE) should be used to show data over points (FALSE)

base_size  Base size parameter for ggplot. See ggtheme.

legend.position  Position of the ggplot legend as a character. See ggtheme.

Details

Uses the fishmethods::growth function to calculate the growth curves. Zero group length can be forced to the growth functions using the force.zero.group.* parameters.

Value

A list containing the plot, text for Rmarkdown and Shiny applications, and estimated parameters (params).

Author(s)

Mikko Vihtakari // Institute of Marine Research.

Examples

# Simple plot. Note that a list is returned.
data(survey_ghl)
plot_growth(survey_ghl, length = "length", age = "age")

# Split by sex
plot_growth(survey_ghl, split.by.sex = TRUE)$plot
# Data as points. Forcing zero group to 10 cm
plot_growth(survey_ghl, force.zero.group.length = 10, boxplot = FALSE)$plot
**Description**

Plot length-weight relationships

**Usage**

```r
plot_lw(
  dt,
  length = "length",
  weight = "weight",
  sex = "sex",
  female.sex = "F",
  male.sex = "M",
  length.unit = "cm",
  weight.unit = "kg",
  split.by.sex = FALSE,
  xlab = "Total length",
  ylab = "Weight",
  use.nls = FALSE,
  init.a = NULL,
  init.b = NULL,
  log.axes = FALSE,
  base_size = 8,
  legend.position = "bottom",
  correct.units = FALSE,
  verbose = TRUE
)
```

**Arguments**

- `dt` A data.frame, tibble or data.table
- `length` Character argument giving the name of the length column in `dt`
- `weight` Character argument giving the name of the weight column in `dt`
- `sex` Character argument giving the name of the sex column in `dt`. Ignored if `split.by.sex` == FALSE.
- `female.sex` A character denoting female sex in the `sex` column of `dt`
- `male.sex` A character denoting male sex in the `sex` column of `dt`
- `length.unit` Character argument giving the unit of length. Will be used in the labels of the figure and for conversion of the a parameter. Allowed values for the conversion: "mm" (millimeters), "cm" (centimeters), and "m" (meters).
- `weight.unit` Character argument giving the unit of weight. Will be used in the labels of the figure and for conversion of the a parameter. Allowed values: "g" (grams), "kg" (kilograms), and "t" (metric tons).
split.by.sex Logical indicating whether the result should be split by sex.

xlab Character giving the x-axis label without unit.

ylab Character giving the x-axis label without unit.

use.nls Logical indicating whether the parameters should be calculated using the nonlinear least squares (nls; TRUE) method over the log-log transformed linear model (lm; FALSE) method.

init.a, init.b Numeric values giving the starting value for a and b parameters respectively for non-linear least-squares estimation (i.e. when use.nls = TRUE). If NULL, default values are guessed.

log.axes Logical indicating whether logarithmic axes should be used instead of cartesian ones.

base.size Base size parameter for ggplot. See ggtheme.

legend.position Position of the ggplot legend as a character. See ggtheme.

correct.units Logical indicating whether a and b parameters should be converted for centimeters and grams as in FishBase.

verbose Logical indicating whether to return warnings and messages.

**Details**

It is crucial to get the units right when calculating length-weight relationships. In models, the length and weight units should often match those of the data going into the model, while in comparisons with FishBase, the units of length and weight should be centimetres and grams, respectively. If the units are wrong, the intercept, a, will be off the FishBase scale by orders of magnitude (see FishBase). If correct.units = TRUE, plot_lw() attempts to correct for the units to the FishBase standard (cm and g). The function also returns a warning when the returned parameters are not within expected bounds for cm and g estimation. You can ignore this warning if you want to estimate values. Comparing your a and b with those in FishBase for the species is a good idea. This function may contain bugs.

**Value**

A ggplot together with the a and b parameters.

**Author(s)**

Mikko Vihtakari // Institute of Marine Research.

**Examples**

data(survey_ghl)

# Simple plot
plot_lw(survey_ghl, length = "length", weight = "weight")

# Split by sex
plot_lw(survey_ghl, split.by.sex = TRUE)$plot
plot_maturity

Plot maturity ogive

Description

Plots an estimate of length or age at 50% mature for a dataset

Usage

plot_maturity(
  dt,
  length = "length",
  maturity = "maturity",
  sex = "sex",
  split.by.sex = FALSE,
  female.sex = "F",
  male.sex = "M",
  length.unit = "cm",
  length.bin.width = 2,
  bootstrap.n = NA,
  force.zero.group.length = NA,
  force.zero.group.strength = NA,
  force.zero.group.n = NA,
  force.zero.group.cv = 0,
  xlab = "Total length",
  base_size = 8,
  legend.position = "bottom",
  ...
)

Arguments

dt A data.frame, tibble or data.table
length Character argument giving the name of the length (or age) column in dt
maturity Character argument giving the name of the maturity column in dt. Should be either logical (TRUE == mature, FALSE == immature) or integer (1 == mature, 0 == immature).
sex Character argument giving the name of the sex column in dt. Ignored if split.by.sex == FALSE.
split.by.sex Logical indicating whether the result should be split by sex.
female.sex A character denoting female sex in the sex column of dt
male.sex A character denoting male sex in the sex column of dt
length.unit A character argument giving the unit of length. Will be used in the labels of the figure.
length.bin.width

Numeric specifying the increment (delta length) by which length data should be binned to calculate maturity proportions. Use NULL to remove from the plot.

bootstrap.n

Integer defining the number of bootstrap replicates to be used to calculate 95% confidence intervals for the mean 50% mature estimate. If NA (default), the confidence intervals are calculated from the glm object without bootstrapping. See Details.

force.zero.group.length

Numeric indicating the length to which 0-group (all immatures) should be forced. Use NA ignore the forcing.

force.zero.group.strength

Numeric indicating how many percent of total fish should be added to the specified force.zero.group.length. Cannot be used simultaneously with force.zero.group.n

force.zero.group.n

Numeric indicating how many observations should be added to the specified force.zero.group.length. If split.by.sex = TRUE, use a named vector of length two with names referring to female.sex and male.sex. Cannot be used simultaneously with force.zero.group.strength

force.zero.group.cv

Numeric indicating the coefficient of variation for the forced 0-group (all immature) length. Resulting lengths will be randomly generated from a normal distribution.

xlab

Character giving the x-axis label without unit

base_size

Base size parameter for ggplot. See gghtheme.

legend.position

Position of the ggplot legend as a character. See gghtheme.

Value

Returns a ggplot2 or tibble depending on the plot argument showing the maturity ogives.

Details

The 95% confidence intervals for the mean 50% mature estimate are calculated using the glm function by default. This routine might not be optimal when zero group fish are added. Hence, the function contains an option to bootstrap confidence intervals using the same number of data than observations (i.e. excluding the added data from the number of randomly resampled rows). Adding an integer to the bootstrap.n argument turns on this feature. Note that the confidence intervals calculated this way tend to be narrower than the glm() confidence intervals.

Author(s)

Mikko Vihtakari // Institute of Marine Research.
Examples

```r
# Simple L50 plot
data(survey_ghl)
plot_maturity(survey_ghl, length = "length", maturity = "maturity")

# Bootstrapped CIs are narrower than the glm ones
plot_maturity(survey_ghl, bootstrap.n = 10)

# A50 plot, split by sex
plot_maturity(survey_ghl, length = "age", length.unit = "years",
xlab = "Age", length.bin.width = 1, split.by.sex = TRUE)$plot

# Add juveniles
plot_maturity(survey_ghl, length = "age", length.unit = "years",
xlab = "Age", length.bin.width = 1, split.by.sex = TRUE,
force.zero.group.length = 0,
force.zero.group.strength = 100)$plot
```

---

**survey_ghl**

*Greenland halibut measurements from IMR surveys*

**Description**

Greenland halibut measurements from IMR surveys

**Usage**

```r
data(survey_ghl)
```

**Format**

A dataframe

**Details**

Contains length, weight, age, sex and maturity measurements of Greenland halibut acquired on various surveys.

**Source**

Institute of Marine Research ([https://www.hi.no/hi](https://www.hi.no/hi))
theme_fishplots

A ggplot2 theme for the ggFishPlots package

Description
A ggplot2 theme for the ggFishPlots package

Usage
theme_fishplots(..., grid.col, grid.size)

Arguments

... additional arguments passed to ggtheme.

grid.col Character code specifying the color of grid lines. Use NA to remove the grid lines.

grid.size Numeric value specifying the width of grid lines.

Value
A ggplot2 theme layer.
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