

Package ‘StemAnalysis’

July 21, 2025

Type Package

Title Reconstructing Tree Growth and Carbon Accumulation with Stem Analysis Data

Version 0.1.0

Author Huili Wu [aut, cre],
Wenhua Xiang [aut]

Maintainer Huili Wu <wuhuili0701@163.com>

Description

Use stem analysis data to reconstructing tree growth and carbon accumulation. Users can independently or in combination perform a number of standard tasks for any tree species.

(i) Age class determination.

(ii) The cumulative growth, mean annual increment, and current annual increment of diameter at breast height (DBH) with bark, tree height, and stem volume with bark are estimated.

(iii) Tree biomass and carbon storage estimation from volume and allometric models are calculated.

(iv) Height-diameter relationship is fitted with nonlinear models, if diameter at breast height (DBH) or tree height are available, which can be used to retrieve tree height and diameter at breast height (DBH).

<<https://github.com/forestscientist/StemAnalysis>>.

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NeedsCompilation no

Repository CRAN

Encoding UTF-8

LazyData true

RoxygenNote 7.2.1

Imports lmfor (>= 1.0)

Depends R (>= 2.10)

Suggests knitr, rmarkdown, testthat (>= 3.0.0)

Config/testthat/edition 3

URL <https://github.com/forestscientist/StemAnalysis>

VignetteBuilder knitr

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BEFdata	<i>BEFdata</i>
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Description

Just test number(Description)

Usage

BEFdata

Format

An object of class data.frame with 1 rows and 4 columns.

Examples

head(BEFdata)

dataframe	<i>dataframe</i>
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Description

Just test dataframe(Description)

Usage

dataframe

Format

An object of class data.frame with 97 rows and 18 columns.

Examples

head(dataframe)

dataframe1	<i>dataframe1</i>
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Description

Just test dataframe(Description)

Usage

dataframe1

Format

An object of class data.frame with 5 rows and 4 columns.

Examples

head(dataframe1)

dataframe2	<i>dataframe2</i>
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Description

Just test dataframe(Description)

Usage

dataframe2

Format

An object of class data.frame with 1 rows and 4 columns.

Examples

head(dataframe2)

parameterdata	<i>parameterdata</i>
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Description

Just test number(Description)

Usage

```
parameterdata
```

Format

An object of class data.frame with 5 rows and 4 columns.

Examples

```
head(parameterdata)
```

stemanalysisism	<i>Reconstructing Tree Growth and Carbon Accumulation with Stem Analysis Data</i>
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Description

Reconstructing Tree Growth and Carbon Accumulation with Stem Analysis Data

Usage

```
stemanalysisism(
  xtree,
  stemgrowth = FALSE,
  treecarbon = FALSE,
  HDmodel = FALSE,
  stemdata,
  parameterdata,
  BEFdata
)
```

Arguments

xtree	Xtree is the tree number (Treeno), which is used to choose the target tree to be analyzed
stemgrowth	If stemgrowth is 'TRUE', stem growth profile and growth trends in terms of diameter at breast height (DBH), tree height, and stem volume will be showed in a graph
treecarbon	If treecarbon is 'TRUE', total tree biomass and carbon storage will be estimated by allometric models (Xiang et al., 2021) and volume model (IPCC, 2003). In addition, although treecarbon is 'TRUE', the estimation of tree biomass and carbon storage by allometric models will skip if data 'parameterdata' is missing, and the same is true for the estimation by volume model if data 'BEFdata' is missing
HDmodel	If HDmodel is 'TRUE', height-diameter relationship will be fitted with nonlinear models (Mehtatalo, 2017) and showed the fitted results in a graph
stemdata	Stemdata is the stem analysis data that has been inputted
parameterdata	Parameterdata is the parameter data of allometric models that can be optionally inputted
BEFdata	BEFdata is the biomass estimation factor data of volume model that can be optionally inputted by users

Value

A list with class "output" containing the following components: - 'StemGrowth': the estimated stem growth trends data, including the tree age chronosequence and the corresponding growth data of diameter at breast height (DBH), stem height, and stem volume - 'allomCarbon': the estimated tree biomass and carbon storage data by using allometric models, including tree biomass and carbon storage for each tissues (stem, branch, leaf, root, and total tree) - 'volumeCarbon': the estimated tree biomass and carbon storage data by using volume model, including tree biomass and carbon storage for each tissues (stem, branch, leaf, root, and total tree)

References

- Fang, J., Chen, A., Peng, C., et al. (2001) Changes in forest biomass carbon storage in China between 1949 and 1998. *Science* **292**, 2320-2322. doi:10.1126/science.1058629
- Mehtatalo, L. (2017) Lmfor: Functions for forest biometrics. <https://CRAN.R-project.org/package=lmfor>
- Xiang, W.H., Li, L.H., Ouyang, S., et al. (2021) Effects of stand age on tree biomass partitioning and allometric equations in Chinese fir (*Cunninghamia lanceolata*) plantations. *European Journal of Forest Research* **140**, 317-332. doi:10.1007/s10342-020-01333-0

Examples

```
library(StemAnalysis)

# Load the data sets
data(stemdata)
data(parameterdata)
```

```
# To calculating tree growth and carbon accumulation with input data sets
stemanalysisism(xtree = 8, stemdata = stemdata)

# If the graph of stem growth profile and growth trends is needed
stemanalysisism(xtree = 8, stemgrowth = TRUE, treecarbon = TRUE,
  stemdata = stemdata, parameterdata = parameterdata)
```

stemdata	<i>stemdata</i>
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Description

Just test number(Description)

Usage

stemdata

Format

An object of class data.frame with 97 rows and 18 columns.

Examples

head(stemdata)

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