Package 'StemAnalysis'

October 14, 2022

Type Package

Title Reconstructing Tree Growth and Carbon Accumulation with Stem Analysis Data

Version 0.1.0

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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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R topics documented:

`BEFdata` *BEFdata*

Description

Just test number(Description)

Usage

```
BEFdata
```

Format

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

Examples

```
head(BEFdata)
```

`dataframe` *dataframe*

Description

Just test dataframe(Description)

Usage

```
dataframe
```

Format

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

Examples

```
head(dataframe)
```

dataframe1 *dataframe1*

Description

Just test dataframe(Description)

Usage

```
dataframe1
```

Format

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

Examples

```
head(dataframe1)
```

dataframe2 *dataframe2*

Description

Just test dataframe(Description)

Usage

```
dataframe2
```

Format

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

Examples

```
head(dataframe2)
```

parameterdata *parameterdata*

Description

Just test number(Description)

Usage

```
parameterdata
```

Format

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

Examples

```
head(parameterdata)
```

stemanalysism *Reconstructing Tree Growth and Carbon Accumulation with Stem Analysis Data*

Description

Reconstructing Tree Growth and Carbon Accumulation with Stem Analysis Data

Usage

```
stemanalysism(
  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
stemanalysism(xtree = 8, stemdata = stemdata)

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

`stemdata` *stemdata*

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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