Package 'BCForestGroundSample'

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Type Package

Title BC forest ground sample compilation

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Description The package provides functions for compiling forest ground sample data in BC.

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Encoding UTF-8

LazyData true

RoxygenNote 6.0.1

Imports haven,
methods,
dplyr,
data.table,
foreign,
fpCompare,
rmarkdown,
sp

Suggests testthat

R topics documented:

`ageByForester` *Site age by experienced forester*

Description

This function derives the site age based on experienced forester. It is equivalent to `vri_age` macro in original SAS compiler.

Usage

```
ageByForester(projectID, sampleNumber, sampleTypeCode)

## S4 method for signature 'character,character,character'
ageByForester(projectID, sampleNumber,
  sampleTypeCode)
```

Arguments

`projectID`	character, Project ID.
`sampleNumber`	character, Sample number.
`sampleTypeCode`	character, Sample type code.

Value

Age provided by experienced forester

Note

Contact Bob Krahn for details

Author(s)

Yong Luo

ageRangeClassifier *Derive age range code*

Description

This function derives age range code based on age, species and FIZ. The returned age range code includes: 1-young(immature), 2-older(immature), 3-mature and 4-overmature. This function is equivalent to age_rng.sas macro.

Usage

```
ageRangeClassifier(age, species, FIZ)

## S4 method for signature 'numeric,character,character'
ageRangeClassifier(age, species, FIZ)
```

Arguments

age	numeric, Usually layer mean age. what does this mean?
species	character, Tree basic species code, which is SP0 in VRI original data.
FIZ	character, BC forest inventory zone.

Value

DWB age range code

Author(s)

Yong Luo

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annualGrowthRateCalculator
Calculate annual growth rate

Description

This function is to calcualte annual growth rate.

Usage

```
annualGrowthRateCalculator(boredDiameter, growthIncrement, growthYear,
  barkThickness)


  ## S4 method for signature 'numeric,numeric,numeric,numeric'
annualGrowthRateCalculator(boredDiameter,
  growthIncrement, growthYear, barkThickness)


  ## S4 method for signature 'numeric,numeric,numeric,missing'
annualGrowthRateCalculator(boredDiameter,
  growthIncrement, growthYear)
```

Arguments

boredDiameter	numeric, Diameter at bored height in cm.
growthIncrement	numeric, Growth increment in mm over a time period.
growthYear	numeric, Number of years over which growth increment is measured.
barkThickness	numeric, Bark thickness in mm. If missing, 0.05 will be used.

Value

Calculated annual growth rate.

Author(s)

Yong Luo

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appendedCat *Prints first text file and appends into second file*

Description

This function is a generic function to print the first text and appends into second file if it exists.

Usage

```
appendedCat(firstText, secondText)

## S4 method for signature 'character,character'
appendedCat(firstText, secondText)

## S4 method for signature 'character,missing'
appendedCat(firstText)
```

Arguments

firstText	character, First text.
secondText	character, Second text.

Value

Appended text file.

Author(s)

Yong Luo

applyDWB *Apply decay, waste and breakage percentage to gross merchantable volume-VRI specific*

Description

This function calculates merchantable volume after removing decay, waste and breakage in VRI compiler. The function is part of cp_vegi_2017.sas to derive tree_ms7.

Usage

```
applyDWB(treeMS)

## S4 method for signature 'data.table'
applyDWB(treeMS)
```

Arguments

treeMS	data.table, Compiled full and enhanced trees with percentage of decay, waste and breakage.

Value

A data table that contains VOL_NTWB (net volume that waste 2 wood and breakage), VOL_D (merchantable volume after removing decay), VOL_DW (merchantable volume after removing decay and waste) and VOL_DWB (merchantable volume after removing decay, waste and breakage).

Author(s)

Yong Luo

auxiTreeCompiler *Derive volume components for H-enhanced and non-enhanced trees-VRI specific*

Description

Estimates volume components for H-enhanced and non-enhanced trees using regression and ratio methods. For H-enhanced trees, the whole stem volume and gross merchantable volume are already calculated directly using taper equations; and rest of volume components will be calculated using ratio method in this function. For non-enhanced trees, the whole stem volume is derived using regression equation between basal area and whole stem volume and the rest of volume components will be computed using ratio method in this function. The function is part of vol_ha_2017.sas.

Usage

```
auxiTreeCompiler(fullMeasuredTrees, auxiTrees, clusterPlotHeader)


  ## S4 method for signature 'data.table,data.table,data.table'
auxiTreeCompiler(fullMeasuredTrees,
  auxiTrees, clusterPlotHeader)
```

Arguments

`fullMeasuredTrees`	Compiled tree-level data in vi_c, which contains full measured trees, enhanced trees and H-enhanced trees. This data is output of `DWBCompiler`
`auxiTrees`	data.table, Non-enhanced trees in anxilirary plots, however, it may have enhanced trees and H-enhanced trees. An output from `VRIInit_auxTree`.
`clusterPlotHeader`	data.table, Cluster and plot-level information. An output of `VRIInit_clusterplot`.

Value

A list of four tables: 1. fullenhancedtrees: full and enhanced trees; 2. HnonenhancedTrees: Height enhanced and non-enhanced trees; 3. regression table; 4. ratio table.

Author(s)

Yong Luo

`BEC2IC` *Group BEC zones into interior and coastal region*

Description

It groups the BC BEC zone into two regions: coastal region `C` and interior region `I`.

Usage

```
BEC2IC(BEC)

## S4 method for signature 'character'
BEC2IC(BEC)
```

Arguments

`BEC`	character, BC BEC zone(s)

Value

grouped region by bec zone, in which `C` stands for coastal region, `I` stands for interior region and ? stands for unknown region.

Author(s)

Yong Luo

`biomassCalculation` *this function is to calculate aboveground biomass for boreal species based on DBH or DBH and Height*

Description

this function is to calculate aboveground biomass for boreal species based on DBH or DBH and Height

Usage

```
biomassCalculation(species, DBH, heightIncluded, height, paperSource)


  ## S4 method for signature 'character,numeric,logical,numeric,character'
biomassCalculation(species,
  DBH, heightIncluded, height, paperSource)


  ## S4 method for signature 'character,numeric,missing,numeric,character'
biomassCalculation(species,
  DBH, height, paperSource)


  ## S4 method for signature 'character,numeric,logical,numeric,missing'
biomassCalculation(species,
  DBH, heightIncluded, height)


  ## S4 method for signature 'character,numeric,missing,numeric,missing'
biomassCalculation(species,
  DBH, height)


  ## S4 method for signature 'character,numeric,missing,missing,character'
biomassCalculation(species,
  DBH, paperSource)


  ## S4 method for signature 'character,numeric,missing,missing,missing'
biomassCalculation(species,
  DBH)
```

Arguments

`species`	Character string. The species name.
`DBH`	Numeric. The tree's diameter at breast height (DBH, cm).
`heightIncluded`	Logical. Whether the biomass is calculated based on DBH and height. If TURE, height must be provided. Default `FALSE`
`height`	Numeric. The tree's height (m).

paperSource Character. Determine the sources of equations. Currently, this functions has two options, i.e., "Lambert2005" and "Ung2008". Default Lambert2005

Value

Biomass (kg) and missedSpecies list that was not calculated.

Note

no note

Author(s)

Yong Luo

See Also

no

Examples

```
## Not run:
 DBH <- seq(1, 100, 5)
 species <- c(rep("jack pine", 10), rep("black spruce", 10))
 species[1] <- "wrongSpecies"
 height <- seq(20, 40, length = 20)
 biomass1 <- biomassCalculation(species = species, DBH = DBH) # without height information and
                                                 # and taking the eqations from Lambert 2005

 biomass2 <- biomassCalculation(species = species, DBH = DBH, heightIncluded = TRUE, height = height)
                                                                 # with height information and
                                                 # and taking the eqations from Lambert 2005

## End(Not run)
```

---

boredAgeCalculator_Bore

Derive bored age using office and field bored age

Description

This function is to derive bore age based on either office bored age (officeBoredAge) or field bored age (fieldBoredAge). When both bore age information are available, the function takes officeBoredAge as priority. The function is one of the four functions that derive bored age using different method. The rests are boredAgeCalculator_Total, boredAgeCalculator_Phys and boredAgeCalculator_Prorated.

Usage

```
boredAgeCalculator_Bore(officeBoredAge, fieldBoredAge)

## S4 method for signature 'numeric,numeric'
boredAgeCalculator_Bore(officeBoredAge,
  fieldBoredAge)

## S4 method for signature 'numeric,missing'
boredAgeCalculator_Bore(officeBoredAge)

## S4 method for signature 'missing,numeric'
boredAgeCalculator_Bore(fieldBoredAge)
```

Arguments

officeBoredAge	numeric, Office bored age, which is measured in lab by professionals.
fieldBoredAge	numeric, Field bored age, estimated in field by field crew.

Value

bored age

Author(s)

Yong Luo

See Also

boredAgeCalculator_Total boredAgeCalculator_Phys boredAgeCalculator_Prorated

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boredAgeCalculator_Crted

Derive age at breast height

Description

This function uses site tools to derive age at breast height for the bored age that is not taken at breast height, i.e., 1.3 m. The process was documented in BC VRI Sample Data Compilation Process.

Usage

```
boredAgeCalculator_Crted(boredAge, boredHeight, treeHeight, species, ICRegion,
  siteToolsDLLPath, sasExePath)


  ## S4 method for signature
## 'numeric,numeric,numeric,character,character,character,character'
boredAgeCalculator_Crted(boredAge,
  boredHeight, treeHeight, species, ICRegion, siteToolsDLLPath, sasExePath)
```

```
  ## S4 method for signature
## 'numeric,numeric,numeric,character,character,character,missing'
boredAgeCalculator_Crted(boredAge,
  boredHeight, treeHeight, species, ICRegion, siteToolsDLLPath)
```

Arguments

boredAge	numeric, Age at bored height
boredHeight	numeric, Height at the bore core.
treeHeight	numeric, Total tree height
species	character, Species code, must be consistent with the species code in site tools. Can be derived using siteToolsSpeciesConvertor.
ICRegion	character, Must be either I (interior) and C (coastal). IC regions can be derived using BEC2IC function.
siteToolsDLLPath	character, Path to SINDEX33.DLL
sasExePath	character, Path to sas executable, i.e., sas.exe. If missing, the function takes C:/Program Files/SASHome/x86/SASFoundation/9.3 as default. However, it will cause crush if sas executable is not located in default path.

Value

Tree age at breast height (1.3 m). For the estimated age <= 0.1, the bored age will be used as breast age and a warning message will be given.

Author(s)

Yong Luo

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boredAgeCalculator_Phys

Derive bored age using physiological age

Description

This function is to derive bore age based on physiological age (physAge). The function is one of the four functions that derive bored age using different method. The rests are boredAgeCalculator_Bore, boredAgeCalculator_Total and boredAgeCalculator_Prorated.

Usage

```
boredAgeCalculator_Phys(physAge)

## S4 method for signature 'numeric'
boredAgeCalculator_Phys(physAge)
```

Arguments

physAge	numeric, Pysiological age.

Value

bored age

Author(s)

Yong Luo

See Also

boredAgeCalculator_Total boredAgeCalculator_Phys boredAgeCalculator_Prorated

---

boredAgeCalculator_Prorated
Derive bored age using pro-rated age

Description

This function is to derive bore age based on diameter at bore (boreDiameter), bark thickness (barkThickness), pro-rated ring length (ringLength_prorated) and pro-rated ring count (ringCount_prorated). The function is one of the four functions that derive bored age using different method. The rests are boredAgeCalculator_Bore, boredAgeCalculator_Total and boredAgeCalculator_Phys.

Usage

```
boredAgeCalculator_Prorated(ringLength_prorated, ringCount_prorated,
  boreDiameter, barkThickness)


  ## S4 method for signature 'numeric,numeric,numeric,numeric'
boredAgeCalculator_Prorated(ringLength_prorated,
  ringCount_prorated, boreDiameter, barkThickness)


  ## S4 method for signature 'numeric,numeric,numeric,missing'
boredAgeCalculator_Prorated(ringLength_prorated,
  ringCount_prorated, boreDiameter)
```

Arguments

ringLength_prorated	numeric, Pro-rated ring length in cm
ringCount_prorated	numeric, Pro-rated ring count
boreDiameter	numeric, Diameter at bore in cm
barkThickness	numeric, Bark thickness in mm. If missing, 0.05 is used in the function.

Value

bored age

Author(s)

Yong Luo

See Also

boredAgeCalculator_Total boredAgeCalculator_Phys boredAgeCalculator_Prorated

---

`boredAgeCalculator_Total`
Derive bored age using total age

Description

This function is to derive bore age based on total age (`totalAge`).The function is one of the four functions that derive bored age using different method. The rests are `boredAgeCalculator_Bore`, `boredAgeCalculator_Phys` and `boredAgeCalculator_Prorated`.

Usage

```
boredAgeCalculator_Total(totalAge)

## S4 method for signature 'numeric'
boredAgeCalculator_Total(totalAge)
```

Arguments

`totalAge`	numeric, Total tree age, ie., age at height of 0.

Value

bored age

Author(s)

Yong Luo

See Also

boredAgeCalculator_Total boredAgeCalculator_Phys boredAgeCalculator_Prorated

`compilerOutputSetup` *Setup an output path of the compiler*

Description

This function does two things: 1. create a folder that will store compiled data; 2. return a path that directs the compiled folder.

Usage

```
compilerOutputSetup(outputPath)

## S4 method for signature 'character'
compilerOutputSetup(outputPath)

## S4 method for signature 'missing'
compilerOutputSetup()
```

Arguments

`outputPath`	character, Specifies an output path. If missing, the current work directory will be used.

Value

An output path that will be used to store your compiled data

Note

Could overwrite the existing output folder, depending on user's choise, i.e., yes or no.

Author(s)

Yong Luo

`DBHClassifier` *Derive DBH class from DBH*

Description

This function derives DBH classes based on DBH. This function is equivalent to dbh_cl.sas macro.

Usage

```
DBHClassifier(DBH, classInterval, maxDBH)

## S4 method for signature 'numeric,numeric,numeric'
DBHClassifier(DBH, classInterval, maxDBH)

## S4 method for signature 'numeric,missing,numeric'
DBHClassifier(DBH, maxDBH)

## S4 method for signature 'numeric,numeric,missing'
DBHClassifier(DBH, classInterval)

## S4 method for signature 'numeric,missing,missing'
DBHClassifier(DBH)
```

Arguments

DBH	numeric, Tree DBH.
classInterval	numeric, The interval that used to categorize the DBH. If missing 5 cm is used.
maxDBH	numeric, Upper class limit. DBH that surpasses this limit is groupped in at this limit. If missing 175 is used.

Value

Classified DBH

Author(s)

Yong Luo

DIB_ICalculator *Calculate the inside-bark diameter at a given height*

Description

This function uses taper equation to calculate diameter inside bark at a given height. It is equivalent to the subroutine of vol_tree_active_equation in vol_setup macro

Usage

```
DIB_ICalculator(taperEquationForm, FIZorBEC, species, height_I, heightTotal,
  DBH, volMultiplier)


  ## S4 method for signature
## 'character,character,character,numeric,numeric,numeric,numeric'
DIB_ICalculator(taperEquationForm,
  FIZorBEC, species, height_I, heightTotal, DBH, volMultiplier)
```

Arguments

taperEquationForm	character, Specifies a taper equation form one of KBEC, KBECQCI, KFIZ3.
FIZorBEC	character, Specifies FIZ or BEC.
species	character, Species code.
height_I	numeric, Height from ground.
heightTotal	numeric, Total height of a tree.
DBH	numeric, Diameter at breast height.
volMultiplier	numeric, Volume adjustment multiplier.

Value

Diameter inside bark

Author(s)

Yong Luo

DWBCompiler *Compile decay, waste and breakage for standard tables-VRI specific*

Description

This function compiles decay, waste and breakage for standard tables in VRI compiler. The function is equivalent to dwb_vri_2017.sas.

Usage

```
DWBCompiler(treeMS, siteAge, treeLossFactors, equation)

## S4 method for signature 'data.table,data.table,data.table,character'
DWBCompiler(treeMS,
  siteAge, treeLossFactors, equation)

## S4 method for signature 'data.table,data.table,data.table,missing'
DWBCompiler(treeMS,
  siteAge, treeLossFactors)
```

Arguments

treeMS	data.table, Tree-level data that has been compiled whole stem volume and gross merchantable volume for full and enhanced trees.
siteAge	data.table, Cluster-level summaries of age and height. This table is an output from siteAgeSummary
treeLossFactors	data.table, The tree loss factor data, an output of VRIInit_lossFactor. In this funtion, this table provides loss indicator.
equation	character, Specifies whether the compiler is based on KFIZ or KBEC. Default is set as KBEC.

Value

A compiled volume after removing decay, waste and breakage; a log file

Author(s)

Yong Luo

`DWBGenerator_BEC` *Collect decay, waste and breakage factor in BEC routine*

Description

This function is to collect the dead, waste and breakage factor from lookup table and join them into tree data. Instead of reading the lookup table from disk, the function uses hard-coded the lookup table. This function is equivalent to `dwb_v3.sas` macro. For `FIZ` routine, the decay, waste and breakage are collected using funtion `DWBGenerator_FIZ`

Usage

```
DWBGenerator_BEC(DBH, height, species, meanAge, BEC, riskGroup, adjustID)


  ## S4 method for signature
## 'numeric,numeric,character,numeric,character,character,character'
DWBGenerator_BEC(DBH,
  height, species, meanAge, BEC, riskGroup, adjustID)
```

Arguments

`DBH`	numeric, Tree DBH.
`height`	numeric, Tree height.
`species`	character, Tree basic species code, which is SP0 in VRI original data.
`meanAge`	numeric, Mean site age.
`BEC`	character, BC BEC zone.
`riskGroup`	character, Specifies the risk group. It must be one of `1`, `2` or `3`. It can be derived from `riskGroupDeriver`.
`adjustID`	character, Adjustment identifier. Blank is no adjustment; QCI is queen charlottes; WET is wetbelt and GLD_NW golden ?.

Value

A list of `decay`, `waste` and `breakage` percentage.

Author(s)

Yong Luo

DWBGenerator_FIZ *Collect decay, waste and breakage factor in FIZ routine*

Description

This function is to collect the dead, waste and breakage factor from lookup table and join them into tree data. Instead of reading the lookup table from disk, the function uses hard-coded the lookup table. This function is equivalent to second part of dwb_fct.sas macro. For BEC routine, the decay, waste and breakage are collected using funtion DWBGenerator_BEC

Usage

```
DWBGenerator_FIZ(DBHClass, tabNumber, riskGroup)

## S4 method for signature 'numeric,character,character'
DWBGenerator_FIZ(DBHClass, tabNumber,
  riskGroup)
```

Arguments

DBHClass	numeric, Tree DBH class. Currently, The function is capatable to the DBH class with 5 cm interval. It can be derived using DBHClassifier.
tabNumber	character, This character consist of 4 numbers. The first two number is the species number, and the last is the series number.
riskGroup	character, Specifies the risk group. It must be one of 1, 2 or 3. It can be derived from riskGroupDeriver.

Value

A list of decay, waste and breakage percentage.

Author(s)

Yong Luo

getDWBSeries *Get local DWB series*

Description

Join local DWB (old/imperical factors) by species, PSYUB, ageRangeClass and FIZ. This function is the first part of dwb_fct.sas.

Usage

```
getDWBSeries(species, ageRangeClass, PSYUB, FIZ, source)


  ## S4 method for signature 'character,character,character,character,character'
getDWBSeries(species,
  ageRangeClass, PSYUB, FIZ, source)


  ## S4 method for signature 'character,character,character,missing,character'
getDWBSeries(species,
  ageRangeClass, PSYUB, source)


  ## S4 method for signature 'character,character,missing,character,character'
getDWBSeries(species,
  ageRangeClass, FIZ, source)
```

Arguments

species	character, Tree basic species code, which is SP0 in VRI original data.
ageRangeClass	character, The classified age range into 1 to 4. Output from ageRangeClassifier.
PSYUB	character, Unique PSYU+PSYU_BLK code.
FIZ	character, BC forest inventory zone.
source	character, Series source, must one of local, zonal and reversingZonal. local is based on species, PSYUB and ageRangeClass; zonal is based on FIZ, species and ageRangeClass; and reversingZonal is based on reversing FIZ zones, i.e., changing interior to coastal and changing coastal to interior.

Value

DWB series, a two number character.

Author(s)

Yong Luo

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heightEstimateForBTOP_D

Estimate tree height for a broken top tree when DBH, inside bark diamater at broken top height, height at broken are available

---

Description

This is the second function to estimate a tree's height for a broken top tree. A tree's height is esimated using height of the broken top (heightBTOP), inside bark diameter at broken height (DIBBTOP) and DBH. Specifically, this function guesses the tree height, computes inside bark diameter at broken height (heightBTOP) using a taper equation, compares it to an observed inside bark diameter and chooses the tree height that has closest value of inside bark diameter at broken. For the broken top trees that have field projected height, total tree height also can be estimated using heightEstimateForBTOP_H.

Usage

```
heightEstimateForBTOP_D(heightBTOP, DIBBTOP, DBH, taperEquationForm, FIZorBEC,
  species, volMultiplier, SASOriginal)


  ## S4 method for signature
## 'numeric,
##   numeric,
##   numeric,
##   character,
##   character,
##   character,
##   numeric,
##   logical'
heightEstimateForBTOP_D(heightBTOP,
  DIBBTOP, DBH, taperEquationForm, FIZorBEC, species, volMultiplier,
  SASOriginal)


  ## S4 method for signature
## 'numeric,numeric,numeric,missing,character,character,numeric,logical'
heightEstimateForBTOP_D(heightBTOP,
  DIBBTOP, DBH, FIZorBEC, species, volMultiplier, SASOriginal)


  ## S4 method for signature
## 'numeric,
##   numeric,
##   numeric,
##   character,
##   character,
##   character,
##   missing,
##   logical'
heightEstimateForBTOP_D(heightBTOP,
  DIBBTOP, DBH, taperEquationForm, FIZorBEC, species, SASOriginal)


  ## S4 method for signature
## 'numeric,
##   numeric,
##   numeric,
##   character,
##   character,
##   character,
##   numeric,
##   missing'
heightEstimateForBTOP_D(heightBTOP,
  DIBBTOP, DBH, taperEquationForm, FIZorBEC, species, volMultiplier)


  ## S4 method for signature
```

```
## 'numeric,numeric,numeric,missing,character,character,missing,logical'
heightEstimateForBTOP_D(heightBTOP,
  DIBBTOP, DBH, FIZorBEC, species, SASOriginal)


  ## S4 method for signature
## 'numeric,numeric,numeric,missing,character,character,numeric,missing'
heightEstimateForBTOP_D(heightBTOP,
  DIBBTOP, DBH, FIZorBEC, species, volMultiplier)


  ## S4 method for signature
## 'numeric,numeric,numeric,missing,character,character,missing,missing'
heightEstimateForBTOP_D(heightBTOP,
  DIBBTOP, DBH, FIZorBEC, species)
```

Arguments

heightBTOP	numeric, Height of the broken top.
DIBBTOP	numeric, Diameter inside bark at the height of the broken top.
DBH	numeric, DBH of the tree, Must be given when BTOP is D.
taperEquationForm	character, Specifies which taper equaiton will be used to estimate tree height, currently supports KBEC, KBECQCI, KFIZ. If missing, the function uses KBEC as default.
FIZorBEC	character, Specifies which FIZ or BEC (depends on taperEquationForm) zones the tree located.
species	character, Tree species.
volMultiplier	numeric, Volume adjustment. If missing, 1 will be used.
SASOriginal	logical, Specifies whether the original sas algrithm will be used for guess tree height If missing, FALSE will be used.

Value

Total tree height

Author(s)

Yong Luo

See Also

heightEstimateForBTOP_H

heightEstimateForBTOP_H *Estimate tree height for a broken top tree when projected tree height is available*

Description

This function is to esimate a broken top tree's height based on projected tree height in the field (heightProjected). For the broken top trees that have diameter at broken and broken top trees, total tree height also can be esimated using heightEstimateForBTOP_D.

Usage

```
heightEstimateForBTOP_H(heightProjected)

## S4 method for signature 'numeric'
heightEstimateForBTOP_H(heightProjected)
```

Arguments

heightProjected
: numeric, Projected tree height in the field, must be non-NA value.

Value

Total tree height

Author(s)

Yong Luo

See Also

heightEstimateForBTOP_D

heightSmry_byC *Summarize mean and lorry's height by cluster-VRI specific*

Description

Summarizes mean and lorry's height by cluster for standing trees, standing + live trees, and standing + live + non-broken top trees. The function is improved version to calculate mean height in vol_ha_2017.sas by outputing lorey's height. For both fixed and variable area plots, the function computes mean height by using plot weight (PLOT_WT) weighted height. For lorey's height computation, the function treats variable and fixed area plots differently. Specifically, the function uses the mean height as lorey's height for variable plots, while uses height that weighted both by plot weight (PLOT_WT) and basal area (BA_TREE) for fixed area plots.

Usage

```
heightSmry_byC(treeMC)

## S4 method for signature 'data.table'
heightSmry_byC(treeMC)
```

Arguments

treeMC	data.table, Compiled tree-level data that contains both measured trees and counted trees.

Value

A table contains computed mean height MN or MEAN and lorey's height LRY for all standing trees ALL, standing and live trees 1 and standing and non-broken top trees 2. The output is equevalent to height table in original compiler.

Author(s)

Yong Luo

---

lm_group *Extended lm function by adding group functionality*

Description

A generic function by adding grouping functionality in lm function.

Usage

```
lm_group(formula, data, groupBy, ...)

## S4 method for signature 'character,data.table,character'
lm_group(formula, data, groupBy, ...)

## S4 method for signature 'character,data.table,missing'
lm_group(formula, data, groupBy, ...)
```

Arguments

formula	character, Linear model formula.
data	data.table, The data used for the models.
groupBy	character, Specifies variables that used for the group.
...	see lm for the rest arguments.

Value

A list of regression analyses results

Author(s)

Yong Luo

See Also

lm

---

logAdjustment *Adjust log length - VRI specific*

Description

The function is to adjust the log length to fit actual height. This function is equivalent to log_adj_new macro in original VRI compiler

Usage

```
logAdjustment(treeData, stumpHeight)

## S4 method for signature 'data.table,numeric'
logAdjustment(treeData, stumpHeight)

## S4 method for signature 'data.table,missing'
logAdjustment(treeData)
```

Arguments

treeData	data.table, Must have tree data information. The table is an output of VRIInit_measuredTree.
stumpHeight	numeric, Length of stump. As default, this arguement is set as 0.3 m.

Value

Data table that contains the adjusted log length

Note

Please see Bob for details about input files

Author(s)

Yong Luo

logAttributesLongForm *Transpose wide form table to long form table-VRI specific*

Description

This function transposes wide form outputs to long form outputs. This function is not included in the VRI compiler anymore.

Usage

```
logAttributesLongForm(treeData, maximumLogNO)

## S4 method for signature 'data.table,numeric'
logAttributesLongForm(treeData, maximumLogNO)

## S4 method for signature 'data.table,missing'
logAttributesLongForm(treeData, maximumLogNO)
```

Arguments

`treeData`	data.table, an output from `logValueCalculator` function, i.e., tree_ms6. This table currently has top diameter (LOG_D_X), length (LOG_L_X), volume (LOG_V_X), merchantable volume (LOG_VM_X), grade (LOG_G_X), sound percentage (LOG_S_X) and value (LOG_c_x). X is log number from 1 to maximum log number.
`maximumLogNO`	numeric, determine the maximum number of logs. In VRI compiler, it is 9. Therefore, 9 is default.

Value

A data table and a log file

Author(s)

Yong Luo

logFileProducer *To display a table to log file*

Description

Simple tool to display a table to log file.

Usage

```
logFileProducer(reason, action, displayTable, displayColumn, changedVariable,
  fromTo)


  ## S4 method for signature
## 'character,character,data.table,character,character,character'
logFileProducer(reason,
  action, displayTable, displayColumn, changedVariable, fromTo)


  ## S4 method for signature
## 'character,character,data.table,missing,character,character'
logFileProducer(reason,
  action, displayTable, changedVariable, fromTo)


  ## S4 method for signature
## 'character,character,data.table,character,missing,missing'
logFileProducer(reason,
  action, displayTable, displayColumn)


  ## S4 method for signature
## 'character,character,data.table,missing,missing,missing'
logFileProducer(reason,
  action, displayTable)
```

Arguments

reason	character, Reason to trigger an action.
action	character, Specifies action from one of removed, no and changed.
displayTable	data.table, A table of interest
displayColumn	character, Specifies which column(s) will be displayed in the log file.
changedVariable,	charcater, Specifies the variable that has been modified, must be present if action is changed.
fromTo	character, This is two vectors character. Specifies columns that before and after alteration. Must be present when action is set as changed.

Value

A tring of text

Author(s)

Yong Luo

logMatrixAdjustment *Adjust log length matrix*

Description

This function is to adjust log length matrix based on tree height, minimum log length and default log length. This function is equivalent to vol_tree_log_validation macro in original sas compiler.

Usage

```
logMatrixAdjustment(logLengthMatrix, height, stumpHeight, logMinLength,
  logDefaultLength)


  ## S4 method for signature 'data.table,numeric,numeric,numeric,numeric'
logMatrixAdjustment(logLengthMatrix,
  height, stumpHeight, logMinLength, logDefaultLength)


  ## S4 method for signature 'data.table,numeric,missing,numeric,numeric'
logMatrixAdjustment(logLengthMatrix,
  height, logMinLength, logDefaultLength)


  ## S4 method for signature 'data.table,numeric,numeric,missing,numeric'
logMatrixAdjustment(logLengthMatrix,
  height, stumpHeight, logDefaultLength)


  ## S4 method for signature 'data.table,numeric,numeric,numeric,missing'
logMatrixAdjustment(logLengthMatrix,
  height, stumpHeight, logMinLength)


  ## S4 method for signature 'data.table,numeric,missing,missing,numeric'
logMatrixAdjustment(logLengthMatrix,
  height, logDefaultLength)


  ## S4 method for signature 'data.table,numeric,missing,numeric,missing'
logMatrixAdjustment(logLengthMatrix,
  height, logMinLength)


  ## S4 method for signature 'data.table,numeric,missing,missing,missing'
logMatrixAdjustment(logLengthMatrix,
  height)
```

Arguments

logLengthMatrix	data.table, A matrix of log length for each tree, NA is accepted in the matrix. The order of log from bottom to top must be presented from left to right in the table
height	numeric, Tree height
stumpHeight,	numeric, Stump height. If missing, 0.3 m is used.
logMinLength	numeric, Minimum log length. If missing, 3 m is used.
logDefaultLength	numeric, Default log length. If missing, 5 m is used.

Value

A data.table that contains the matrix of adjusted log length

Author(s)

Yong Luo

---

lookupCheck *Test whether the lookup table is updated*

Description

Reports whether a lookup table is updated. This function is highly recommended before proceed the VRI compiler.

Usage

```
lookupCheck(lookupName, lookupPath)

## S4 method for signature 'character,character'
lookupCheck(lookupName, lookupPath)

## S4 method for signature 'character,missing'
lookupCheck(lookupName)
```

Arguments

lookupName	character, Specifies the name of lookup table.
lookupPath	character, Path that directs to lookup tables.

Value

Not value returned. A warning message is given if the lookup table is changed.

Author(s)

Yong Luo

mergeAllVolTrees *Merge all volume trees-VRI specific*

Description

Merge all the volume trees, including full trees (fully-measure trees in IPC), enhanced trees (fully-measured trees in auxi plots), H-enhanced trees (Height measured in auxi plots) and non-enhanced trees (only DBH measured in auxi plots). The function is part of `vol_ha_2017.sas` and modified dramatically in R compiler.

Usage

```
mergeAllVolTrees(treeMS, treeAX)

## S4 method for signature 'data.table,data.table'
mergeAllVolTrees(treeMS, treeAX)
```

Arguments

`treeMS`	data.table, Compiled full, enhanced and H-enhanced trees. This data should be listed in vi_c table. This data is an output of `DWBCompiler`
`treeAX`	data.table, Non-enhanced trees in anxilirary plots (vi_i). Supposedly, the table only contains non-enhanced tree list. However, some enhanced and H-enhanced trees also been stored in this dataset. An output from `VRIInit_auxTree`.

Value

A data table that contains all volume trees without duplicates. Equivalent to `tree_vb` table.

Author(s)

Yong Luo

merge_dupUpdate *Merge table and update values for duplicate column*

Description

This is an extended function for `merge` function by updating values for duplicate column for the first, second or both tables.

Usage

```
merge_dupUpdate(x, y, by, updateDup, ...)

## S4 method for signature 'data.table,data.table,character,logical'
merge_dupUpdate(x, y, by,
  updateDup, ...)

## S4 method for signature 'data.table,data.table,character,missing'
merge_dupUpdate(x, y, by,
  updateDup, ...)
```

Arguments

x	data.table, The first table for merging.
y	data.table, The second table for merging.
by	character, The key to merge two tables.
updateDup	logical, Specifies whether update duplicate column in merged table when its information is available in y table, which means update from the second table. If missing, the function takes TRUE.
...	see merge for rest of arguments.

Value

A merged table without duplicate columes. A warning message is given if the duplicate column has different values.

Author(s)

Yong Luo

See Also

merge

---

netVolumeCalculator *Calcualtes total net volume and merchantable volume-VRI specific*

Description

This function calculates total net volume and net merchantable volume for each tree based on ground called sound percentage. From the second column to the last column, the grossVolMatrix table should have same dimensions (i.e., number of rows and columns) of netFactorMatrix and grossMerchVolMatrix if they are provided. Furthermore, be aware of the correspondingness among the matrix. This function is part of log_valu_2017.sas.

Usage

```
netVolumeCalculator(grossVolMatrix, grossMerchVolMatrix, netFactorMatrix)


  ## S4 method for signature 'data.table,data.table,data.table'
netVolumeCalculator(grossVolMatrix,
  grossMerchVolMatrix, netFactorMatrix)


  ## S4 method for signature 'missing,data.table,data.table'
netVolumeCalculator(grossMerchVolMatrix,
  netFactorMatrix)

## S4 method for signature 'data.table,missing,data.table'
netVolumeCalculator(grossVolMatrix,
  netFactorMatrix)
```

```
## S4 method for signature 'data.table,data.table,missing'
netVolumeCalculator(grossVolMatrix,
  grossMerchVolMatrix)
```

Arguments

grossVolMatrix	data.table, Calculated gross volume for each log. The first column of this table is the volume for the stump. If missing, the function calculates the total net merchantable volume.
grossMerchVolMatrix	data.table, Calculated gross merchantable volume for each log. If missing, all the merchantable volume is assigned as 0.
netFactorMatrix	data.table, Ground call for sound percentage. If missing, the net factoring will be assigned as 100.

Value

Data table that contains total net volume (VOL_NET) and total net merchantable volume (VOL_NETM) for each tree.

Author(s)

Yong Luo

PHFCalculator *Calculate tree per ha factor for both fix and variable area plot*

Description

Calculates tree per ha factor for both fix and variable area plots.

Usage

```
PHFCalculator(sampleType, blowUp, treeWeight, plotWeight, treeBasalArea)

## S4 method for signature 'character,numeric,numeric,numeric,numeric'
PHFCalculator(sampleType,
  blowUp, treeWeight, plotWeight, treeBasalArea)

## S4 method for signature 'character,numeric,numeric,numeric,missing'
PHFCalculator(sampleType,
  blowUp, treeWeight, plotWeight)
```

Arguments

sampleType	character, Specifies how the plot is sampled among fixed area plot or variable area plot, must be either V for variable area plot or F for fixed area plot.
blowUp	numeric, Specifies the blowup factor. For fixed area plot, it is calculated as 1/plotarea. For variable area plot, it is basal area factor (BAF).

treeWeight	numeric, Specifies whether a tree is zero counted (tree is out), one time counted (regular count) or two times counted (double counted) in the walk through sampling protocal.
plotWeight	numeric, Specifies how a plot is measured, i.e., full plot measured (valued as 1), half plot measured (valued as 2) or quarter plot measured (valued as 4).
treeBasalArea	numeric, When plot is measured using variable area plot, this value must be given, otherwise, can be missing

Value

Tree per ha factor

Author(s)

Yong Luo

`prj_ID2BEC` *Assign BEC based on project ID*

Description

This function takes lookup table that connects project id to BEC zone and joins BEC zone by project id. The function uses a hardcoded lookup table `vri_bec`. The function is equivalent to `group_bec.sas`.

Usage

```
prj_ID2BEC(projectID)

## S4 method for signature 'character'
prj_ID2BEC(projectID)
```

Arguments

projectID	character, Specifies project ID.

Value

BEC, `Unknown` will be return if project id does have any match in lookup table.

Author(s)

Yong Luo

prj_ID2Grp *Group project ID into project group*

Description

This function takes lookup table that connect project id to project group and joins project group by project id. The function uses hardcoded lookup table `vri_grp`. The function is equivalent to `group_prj.sas`.

Usage

```
prj_ID2Grp(projectID)

## S4 method for signature 'character'
prj_ID2Grp(projectID)
```

Arguments

`projectID`	character, Specifies project ID.

Value

Project group, `Unknown` will be return if project id does have any match in lookup table.

Author(s)

Yong Luo

riskGroupDeriver *Derive risk group for standard sample compilation/data*

Description

will refine. This function is equivalent to risk_grp.sas macro.

Usage

```
riskGroupDeriver(species, pathIndex, series, height, method)


  ## S4 method for signature 'character,character,character,numeric,character'
riskGroupDeriver(species,
  pathIndex, series, height, method)


  ## S4 method for signature 'character,character,missing,missing,character'
riskGroupDeriver(species,
  pathIndex, series, height, method)
```

Arguments

species	character, Tree basic species code, which is SP0 in VRI original data.
pathIndex	character, A character with length of 8, consists of 0 or 1.
series	character, DWB series. It is a lenght of 2 number character and can be derived using getDWBSeries function.
height	numeric, Total tree height.
method	character, Specifies the method between FIZ and KBEC to categorize the risk group. The FIZ method derives risk group by species, pathIndex, series and height. KBEC method derives the risk group using species and pathIndex.

Value

Risk group, which is character

Author(s)

Yong Luo

---

siteAgeCompiler *Compile breast age, total age, and site index where possible-VRI specific*

Description

This function takes site age tree data ie., vi_h, an output of VRIInit_siteTree to compute the breast height age, total age, and site index where possible. This function is equivalent to site_age.sas. The function heavily depends on site tools program.

Usage

```
siteAgeCompiler(siteAgeData, siteToolsDLLPath, sasExePath)

## S4 method for signature 'data.table,character,character'
siteAgeCompiler(siteAgeData,
  siteToolsDLLPath, sasExePath)

## S4 method for signature 'data.table,character,missing'
siteAgeCompiler(siteAgeData,
  siteToolsDLLPath)
```

Arguments

siteAgeData	data.table, Site age data with plot header information. An output from VRIInit_siteTree function.
siteToolsDLLPath	character, Path to SINDEX33.DLL.
sasExePath	character, Path to sas executable, i.e., sas.exe. If missing, the function takes C:/Program Files/SASHome/x86/SASFoundation/9.3 as default. However, it will cause crush if sas executable is not located in default path.

Value

A data table and a log file.

Author(s)

Yong Luo

`siteAgeSummary` *Summarize site age data by cluster and cluster/species-VRI specific*

Description

This function takes compiled site age tree data, an output of `siteAgeCompiler`, to derive mean age and height results. The compiled data must have breast height age, total age, and site index. This function is equivalent to `mean_htl.sas`.

Usage

```
siteAgeSummary(cpldSiteAgeData, siteToolsDLLPath, sasExePath)

## S4 method for signature 'data.table,character,character'
siteAgeSummary(cpldSiteAgeData,
  siteToolsDLLPath, sasExePath)

## S4 method for signature 'data.table,character,missing'
siteAgeSummary(cpldSiteAgeData,
  siteToolsDLLPath)
```

Arguments

`cpldSiteAgeData`	data.table, Compiled site age tree data, an output of `siteAgeCompiler`.
`siteToolsDLLPath`	character, Path to `SINDEX33.DLL`
`sasExePath`	character, Path to sas executable, i.e., `sas.exe`. If missing, the function takes `C:/Program Files/SASHome/x86/SASFoundation/9.3` as default. However, it will cause crush if sas executable is not located in default path.

Value

Two data tables: cl_ah is the age/height summary at cluster level and spc_ah is the age/height summary at cluster and species level

Author(s)

Yong Luo

siteToolsSpeciesConvertor

Convert VRI species code to site tools species code

Description

This function converts BC VRI species code to site tools species code. The convertion is based on a hardcoded lookup table spv_frd.

Usage

```
siteToolsSpeciesConvertor(species)

## S4 method for signature 'character'
siteToolsSpeciesConvertor(species)
```

Arguments

species	character, Species code in VRI data sets.

Value

Converted species codes that can be recognized by site tools program. NA is the species that failed to be converted.

Author(s)

Yong Luo

SiteTools_HTBoredAge2SI

Calculate site index using site tools

Description

This function calculates site index based on bored age (boredAge), tree height (height), species (species) and region (ICRegion) using site tools program. This function is equivalent to sindex_httoage.sas.

Usage

```
SiteTools_HTBoredAge2SI(boredAge, height, species, ICRegion, ageType,
  estimateMethod, siteToolsDLLPath, sasExePath)


  ## S4 method for signature
## 'numeric,
##   numeric,
##   character,
##   character,
```

```
##   numeric,
##   numeric,
##   character,
##   character'
SiteTools_HTBoredAge2SI(boredAge,
  height, species, ICRegion, ageType, estimateMethod, siteToolsDLLPath,
  sasExePath)
```

Arguments

boredAge	numeric, Age at bored height.
height	numeric, Total tree height.
species	character, Species code, must be consistent with the species code in site tools, which can be converted from the original species code by using siteToolsSpeciesConvertor.
ICRegion	character, Must be either I (interior) and C (coastal). IC regions can be derived using BEC2IC.
ageType	numeric, Must be either 0 or 1. 0 stands for total age, for which site index is calculated for 50 years of total tree age. While 1 stands for breast height age, for which site index is calculated for 50 year old at breast height.
estimateMethod	numeric, Defines how the site tools estimate site index. Valued as 0 and 1, 0 is interative and while 1 is directive. Default is 1, which is directive.
siteToolsDLLPath	character, Path to SINDEX33.DLL
sasExePath	character, Path to sas executable, i.e., sas.exe.

Value

Site index

Author(s)

Yong Luo

SiteTools_Y2BH *Derive years to breast height using site tools*

Description

Derive years to breast height based on species (species), region (ICRegion) and site index (siteIndex) using site tools. This function is equivalent to sindex_httoage.sas.

Usage

```
SiteTools_Y2BH(species, ICRegion, siteIndex, siteToolsDLLPath, sasExePath)


  ## S4 method for signature 'character,character,numeric,character,character'
SiteTools_Y2BH(species,
  ICRegion, siteIndex, siteToolsDLLPath, sasExePath)
```

```
  ## S4 method for signature 'character,character,numeric,character,missing'
SiteTools_Y2BH(species,
  ICRegion, siteIndex, siteToolsDLLPath)
```

Arguments

species	character, Species code, must be consistent with the species code in site tools, which can be converted from the original species code by using siteToolsSpeciesConvertor.
ICRegion	character, Must be either I (interior) and C (coastal). IC regions can be derived using BEC2IC function.
siteIndex	numeric, Site index. Defined as tree height at 50 years old.
siteToolsDLLPath	character, Path to SINDEX33.DLL
sasExePath	character, Path to sas executable, i.e., sas.exe. If missing, the function takes C:/Program Files/SASHome/x86/SASFoundation/9.3 as default. However, it will cause crush if sas executable is not located in default path.

Value

Years to breast height

Author(s)

Yong Luo

---

smallTreeVolSmry *Summarizes the volume for small trees - VRI specific*

Description

Calculates and summarizes volume of small trees at both cluster/species level and cluster. This function is equivalent to sml_tree.sas in original compiler.

Usage

```
smallTreeVolSmry(smallTreeData, smallTreePlotHeader)

## S4 method for signature 'data.table,data.table'
smallTreeVolSmry(smallTreeData,
  smallTreePlotHeader)
```

Arguments

smallTreeData	data.table, Small tree data. This data is from card f, i.e., vi_f.
smallTreePlotHeader	data.table, Plot header data for stump and small tree data. The data is from card e, i.e., vi_e.

Value

Two tables: stmp_c is summarized volume at cluster level; stmp_cs is summarized volume at cluster/species level.

Author(s)

Yong Luo

---

speciesCode2speciesType *Group species into deciduous and coniferous species group*

Description

This function is to group species into deciduous and coniferous species types based on BC species code and `sp_type` lookup table. This function uses hardcoded `sp_type` lookup table.

Usage

```
speciesCode2speciesType(species)

## S4 method for signature 'character'
speciesCode2speciesType(species)
```

Arguments

`species`	character, Tree basic species code, which is SP0 in VRI original data.

Value

Species type: `D`-deciduous species and `C`-coniferous species. `NA`, with a warning message, is given if a species fails to be grouped.

Author(s)

Yong Luo

---

speciesComp_byC *Calculates species composition based on cluster/species summary*

Description

Calculates species composition at cluster level based on cluster/species summary. The cluster/species-level summaries is an output of `volSmry_byCS` function. This function is equivalent to `sp_comp.sas` in original compiler.

Usage

```
speciesComp_byC(CSSmryTable, basedOn, speciesMaxNO, smallTreeCompile)

## S4 method for signature 'data.table,character,numeric,logical'
speciesComp_byC(CSSmryTable,
  basedOn, speciesMaxNO, smallTreeCompile)

## S4 method for signature 'data.table,character,numeric,missing'
speciesComp_byC(CSSmryTable,
  basedOn, speciesMaxNO)
```

Arguments

CSSmryTable	data.table, Summarized volume components for both measured and counted trees at cluster and species level. See volSmry_byCS for details.
basedOn	character, Specifies which component is used for species composition summary.
speciesMaxNO	numeric, Maximum number of species entries to calculate.
smallTreeCompile	logical, Defines whether the function is used for calculate species composition for small trees. If missing, FALSE is used.

Value

A data table that contains species composition at cluster level.

Author(s)

Yong Luo

---

standardizeSpeciesName

Standardize species name from different forest inventory data, this function to make all the species compatible to biomassCalculation function

---

Description

Standardize species name from different forest inventory data, this function to make all the species compatible to biomassCalculation function

Usage

```
standardizeSpeciesName(speciesTable, forestInventorySource)

## S4 method for signature 'data.table,character'
standardizeSpeciesName(speciesTable,
  forestInventorySource)
```

Arguments

speciesTable	data table. It must at least have one column species
forestInventorySource,	Character string. Give the forest inventory data source Currently support MBPSP, MBTSP, ABPSP, BCPSP, SKPSP, SKTSP and NFIPSP

Value

a data tables, the first one contains successfully standardized species. the newSpeciesName is the standardized name, unknown means the species in the original species table can not be found according to manual

Note

no note

Author(s)

Yong Luo

See Also

no

---

stumpVolSmry *Summarizes the volume for stumps - VRI specific*

Description

Calculates stump volume at cluster/species level and cluster. This function is equivalent to `stmpvol.sas` in original compiler.

Usage

```
stumpVolSmry(stumpData, stumpPlotHeader)

## S4 method for signature 'data.table,data.table'
stumpVolSmry(stumpData, stumpPlotHeader)
```

Arguments

stumpData	data.table, Stump data. This data is from card g, i.e., vi_g.
stumpPlotHeader	data.table, Plot header data for stump and small tree data. The data is from card e, i.e., vi_e.

Value

Two tables: stmp_c is summarized volume at cluster level; stmp_cs is summarized volume at cluster/species level.

Author(s)

Yong Luo

`ST_CurveName` *Derive site index curve name based on site index curve reference*

Description

Derive site index curve name based on site index curve reference (`SICurveRef`) in site tools.

Usage

```
ST_CurveName(SICurveRef, siteToolsDLLPath, sasExePath)

## S4 method for signature 'numeric,character,character'
ST_CurveName(SICurveRef,
  siteToolsDLLPath, sasExePath)

## S4 method for signature 'numeric,character,missing'
ST_CurveName(SICurveRef, siteToolsDLLPath)
```

Arguments

`SICurveRef`	numeric, Site index curve reference in site tools. It can be derived using `ST_DefCurve` function.
`siteToolsDLLPath`	character, Path to `SINDEX33.DLL`
`sasExePath`	character, Path to sas executable, i.e., `sas.exe`. If missing, the function takes `C:/Program Files/SASHome/x86/SASFoundation/9.3` as default. However, it will cause crush if sas executable does not located in default folder.

Value

site index curve name

Author(s)

Yong Luo

ST_DefCurve *Assign site index curve reference in site tools*

Description

Assign site index curve reference that can be recognized by site tools for a given site index reference. The site index can be generated using ST_SpecRemap function.

Usage

```
ST_DefCurve(siteIndexRef, siteToolsDLLPath, sasExePath)

## S4 method for signature 'numeric,character,character'
ST_DefCurve(siteIndexRef,
  siteToolsDLLPath, sasExePath)

## S4 method for signature 'numeric,character,missing'
ST_DefCurve(siteIndexRef,
  siteToolsDLLPath)
```

Arguments

siteIndexRef	numeric, Site index reference. It can be derived using ST_SpecRemap function.
siteToolsDLLPath	character, Path to SINDEX33.DLL
sasExePath	character, Path to sas executable, i.e., sas.exe. If missing, the function takes C:/Program Files/SASHome/x86/SASFoundation/9.3 as default. However, it will cause crush if sas executable does not located in default folder.

Value

Site index curve reference that can be recognized by site tools

Author(s)

Yong Luo

See Also

ST_SpecRemap, ST_DefGICurve, ST_HTAgeToSI and ST_YrsToBH

ST_DefGICurve *Assign growth intercept curve reference by site index reference in site-tools*

Description

Assign growth intercept curve reference that can be recognized by site tools for a given site index reference.

Usage

```
ST_DefGICurve(siteIndexRef, siteToolsDLLPath, sasExePath)

## S4 method for signature 'numeric,character,character'
ST_DefGICurve(siteIndexRef,
  siteToolsDLLPath, sasExePath)

## S4 method for signature 'numeric,character,missing'
ST_DefGICurve(siteIndexRef,
  siteToolsDLLPath)
```

Arguments

siteIndexRef	numeric, Site index reference. It can be derived using ST_SpecRemap function.
siteToolsDLLPath	character, Path to SINDEX33.DLL
sasExePath	character, Path to sas executable, i.e., sas.exe. If missing, the function takes C:/Program Files/SASHome/x86/SASFoundation/9.3 as default. However, it will cause crush if sas executable does not located in default folder.

Value

Growth intercept curve reference that can be recognized by sitetools

Author(s)

Yong Luo

See Also

ST_SpecRemap, ST_DefCurve, ST_HTAgeToSI and ST_YrsToBH

ST_HTAgeToSI *Calculate site index in site tools*

Description

Calculate site index based on bored age (boredAge), height (height) and curve reference (curveRef) in site tools. The site index is defined as height at 50 years old. Curve reference can be either site index curve reference or growth intercept curve reference. Site index curve reference can be derived using ST_DefCurve function, while growth intercept curve reference can be derived using ST_DefGICurve function.

Usage

```
ST_HTAgeToSI(curveRef, boredAge, ageType, height, estimateMethod,
  siteToolsDLLPath, sasExePath)


  ## S4 method for signature
## 'numeric,numeric,numeric,numeric,numeric,character,character'
ST_HTAgeToSI(curveRef,
  boredAge, ageType, height, estimateMethod, siteToolsDLLPath, sasExePath)


  ## S4 method for signature
## 'numeric,numeric,numeric,numeric,missing,character,missing'
ST_HTAgeToSI(curveRef,
  boredAge, ageType, height, siteToolsDLLPath)


  ## S4 method for signature
## 'numeric,numeric,numeric,numeric,numeric,character,missing'
ST_HTAgeToSI(curveRef,
  boredAge, ageType, height, estimateMethod, siteToolsDLLPath)
```

Arguments

curveRef	numeric, Either site index curve reference or growth intercept curve reference
boredAge	numeric, Tree age at the bored height
ageType	numeric, Must be either 0 or 1. 0 stands for total age, for which site index is calculated for 50 years of total tree age. While 1 stands for breast height age, for which site index is calculated for 50 year old at breast height.
height	numeric, Tree height
estimateMethod	numeric, Defines how the site tools estimate site index. Valued as 0 and 1, 0 is interative and while 1 is directive. Default is 1, which is directive.
siteToolsDLLPath	character, Path to SINDEX33.DLL
sasExePath	character, Path to sas executable, i.e., sas.exe. If missing, the function takes C:/Program Files/SASHome/x86/SASFoundation/9.3 as default. However, it will cause crush if sas executable does not located in default folder.

Value

A list of `output` and `error`. `output` is the site index. `error` the flag in calculation, with a negative value represents failure.

Author(s)

Yong Luo

See Also

`ST_SpecRemap`, `ST_DefCurve`, `ST_DefGICurve` and `ST_YrsToBH`

`ST_SpecRemap` *Calculate site index reference by species and region*

Description

This function is to extract site index reference for a given species and region in siteTools program.

Usage

```
ST_SpecRemap(species, ICRegion, siteToolsDLLPath, sasExePath)

## S4 method for signature 'character,character,character,character'
ST_SpecRemap(species,
  ICRegion, siteToolsDLLPath, sasExePath)

## S4 method for signature 'character,character,character,missing'
ST_SpecRemap(species,
  ICRegion, siteToolsDLLPath)
```

Arguments

`species`	character, Species code, must be consistent with the species code in site tools.
`ICRegion`	character, Must be either `I` (interior) and `C` (coastal). In VRI compiler, IC regions are derived using `BEC2IC` function.
`siteToolsDLLPath`	character, Path to `SINDEX33.DLL`
`sasExePath`	character, Path to sas executable, i.e., `sas.exe`. If missing, the function takes `C:/Program Files/SASHome/x86/SASFoundation/9.3` as default. However, it will cause crush if sas executable is not located in default path.

Value

Site index reference that can be recognized by sitetools

Author(s)

Yong Luo

See Also

ST_DefCurve, ST_DefGICurve, ST_HTAgeToSI and ST_YrsToBH

ST_YrsToBH *Derive years between ground and breast height in site tools*

Description

Derive years between ground and breast height based on site index curve reference (SICurveRef) and site index (siteIndex) in site tools.

Usage

```
ST_YrsToBH(SICurveRef, siteIndex, siteToolsDLLPath, sasExePath)

## S4 method for signature 'numeric,numeric,character,character'
ST_YrsToBH(SICurveRef,
  siteIndex, siteToolsDLLPath, sasExePath)

## S4 method for signature 'numeric,numeric,character,missing'
ST_YrsToBH(SICurveRef, siteIndex,
  siteToolsDLLPath)
```

Arguments

SICurveRef	numeric, Site index curve reference in site tools. It can be derived using ST_DefCurve function.
siteIndex	numeric, Site index. Defined as tree height at 50 years old.
siteToolsDLLPath	character, Path to SINDEX33.DLL
sasExePath	character, Path to sas executable, i.e., sas.exe. If missing, the function takes C:/Program Files/SASHome/x86/SASFoundation/9.3 as default. However, it will cause crush if sas executable does not located in default folder.

Value

A list of output and error. output is the derived years to breast height. error is the flag in calculation, with negative value represents failure.

Author(s)

Yong Luo

See Also

ST_SpecRemap, ST_DefCurve, ST_DefGICurve and ST_HTAgeToSI

taperCoeffsGenerator *Generate the coefficients table of taper equations*

Description

Generates the coefficients of the taper equations for based on specific taper equation form (`taperEquationForm`)

Usage

```
taperCoeffsGenerator(taperEquationForm)

## S4 method for signature 'character'
taperCoeffsGenerator(taperEquationForm)

## S4 method for signature 'missing'
taperCoeffsGenerator()
```

Arguments

`taperEquationForm`
: character, Specifies a taper equation form one of KBEC, KBECQCI, KFIZ3.

Value

A coeffients table

Author(s)

Yong Luo

taperImplementor *Implement taper equation for a given tree*

Description

Implement taper equation for a given tree

Usage

```
taperImplementor(taperEquationForm, taperCoeffs, FIZorBEC, species, height_I,
  heightTotal, DBH, volMultiplier)


  ## S4 method for signature
## 'character,
##   data.table,
##   character,
##   character,
##   numeric,
##   numeric,
```

```
##   numeric,
##   numeric'
taperImplementor(taperEquationForm,
  taperCoeffs, FIZorBEC, species, height_I, heightTotal, DBH, volMultiplier)
```

Arguments

taperEquationForm	character, Specifies a taper equation form one of KBEC, KBECQCI, KFIZ3.
taperCoeffs	data.table, Table that stores the coefficients that match the taper equation.
FIZorBEC	character, FIZ or BEC.
species	character, Species code.
height_I	numeric, Height from ground.
heightTotal	numeric, Total height of a tree.
DBH	numeric, Diameter at breast height.
volMultiplier,	Volume multiplier adjustment.

Value

DIB_I diameter inside bark at height_I

Note

This function is inside of the VRIVolTree function

Author(s)

Yong Luo

---

toWSVRatio *Calculate to whole stem volume ratios*

Description

This function calculates a bunch of ratio to adjust volume components based on whole stem volume WSV. For each combination of project group, live and dead status and species. Specifically, the function calculates the ratios of whole stem volume (WSV), net stem volume (NET), merchantable volume (MER), net merchantable volume (NETM), net volume after waste 2 (NTW2), volume of less top, stemp, crurser decay, waste and breakage (NTWB), volume of less top, stump and decay (D), volume of less top, stump, waste and decay (DW), volume of less top, stump, waste, decay and breakage (DWB) to whole stem volume. The ratios are calculated as the mean of tree with DBH >= 10. The function is equivalent to calc_ratio_2017.sas.

Usage

```
toWSVRatio(ratioData, minDBH, minObs)

## S4 method for signature 'data.table,numeric,numeric'
toWSVRatio(ratioData, minDBH, minObs)

## S4 method for signature 'data.table,missing,numeric'
toWSVRatio(ratioData, minObs)

## S4 method for signature 'data.table,numeric,missing'
toWSVRatio(ratioData, minDBH)

## S4 method for signature 'data.table,missing,missing'
toWSVRatio(ratioData)
```

Arguments

ratioData	data.table, The data used to calculated for deriving toWSV ratios.
minDBH	numeric, Defines minimum DBH threshold to select trees in deriving the ratios. If missing 10 cm is used.
minObs	numeric, Defined minimum of observations that for each conbination that used in deriving ratios. If missing, 3 is used.

Value

A ratio table

Author(s)

Yong Luo

---

treeVolCalculator *Calculate volume for trees*

Description

This function is to calculate tree volume using taper equations on a basis of 10 cm slice. As default, the function is to calculate whole tree volume (VOL_WSV), total merchantable volume (VOL_BELOW_UTOP) and non-merchantable volume (VOL_ABOVE_UTOP) based on FIZorBEC, species, height, DBH using Kozak BEC taper equations. The function also handles broken top trees by specifying BTOPEstimateType, BTOPHeight and BTOPDIB. Accordingly, VOL_BELOW_BTOP and VOL_ABOVE_BTOP are produced. Lastly, the function derives volume (denoted as LOG_V_X), merchantable volume (denoted as LOG_VM_X) and top inside bark diameter (denoted as LOG_D_X) for each log when the logLengthMatrix is provided. For all the scenarioes, stump height (HT_STUMP), inside bark diameter at stump height (DIB_STUMP), breast height (HT_BH), inside bark diameter at breast height (DIB_BH) are generated.

Usage

```
treeVolCalculator(FIZorBEC, species, height, DBH, taperEquationForm,
  volMultiplier, stumpHeight, breastHeight, UTOPDIB, BTOPEstimateType,
  BTOPHeight, BTOPDIB, logLengthMatrix, logMinLength)


  ## S4 method for signature
## 'character,
##   character,
##   numeric,
##   numeric,
##   character,
##   numeric,
##   numeric,
##   numeric,
##   numeric,
##   integer,
##   numeric,
##   numeric,
##   data.table,
##   numeric'
treeVolCalculator(FIZorBEC,
  species, height, DBH, taperEquationForm, volMultiplier, stumpHeight,
  breastHeight, UTOPDIB, BTOPEstimateType, BTOPHeight, BTOPDIB, logLengthMatrix,
  logMinLength)


  ## S4 method for signature
## 'character,
##   character,
##   numeric,
##   numeric,
##   missing,
##   numeric,
##   missing,
##   missing,
##   missing,
##   integer,
##   numeric,
##   numeric,
##   data.table,
##   numeric'
treeVolCalculator(FIZorBEC,
  species, height, DBH, volMultiplier, BTOPEstimateType, BTOPHeight, BTOPDIB,
  logLengthMatrix, logMinLength)


  ## S4 method for signature
## 'character,
##   character,
##   numeric,
##   numeric,
```

```
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   integer,
##   numeric,
##   numeric,
##   data.table,
##   numeric'
treeVolCalculator(FIZorBEC,
  species, height, DBH, BTOPEstimateType, BTOPHeight, BTOPDIB, logLengthMatrix,
  logMinLength)


  ## S4 method for signature
## 'character,
##   character,
##   numeric,
##   numeric,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   integer,
##   numeric,
##   numeric,
##   missing,
##   numeric'
treeVolCalculator(FIZorBEC,
  species, height, DBH, BTOPEstimateType, BTOPHeight, BTOPDIB, logLengthMatrix,
  logMinLength)


  ## S4 method for signature
## 'character,
##   character,
##   numeric,
##   numeric,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   data.table,
##   numeric'
treeVolCalculator(FIZorBEC,
  species, height, DBH, logLengthMatrix, logMinLength)
```

```
  ## S4 method for signature
## 'character,
##   character,
##   numeric,
##   numeric,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   numeric'
treeVolCalculator(FIZorBEC,
  species, height, DBH, logLengthMatrix, logMinLength)


  ## S4 method for signature
## 'character,
##   character,
##   numeric,
##   numeric,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing,
##   missing'
treeVolCalculator(FIZorBEC,
  species, height, DBH)
```

Arguments

FIZorBEC	character, Specifies which FIZ or BEC (depends on taperEquation) zones the tree located in BC.
species	character, Tree species, must be BC species code.
height	numeric, Total tree height in meter.
DBH	numeric, DBH of the tree in cm.
taperEquationForm	character, Specifies which taper equaiton will be used, currently support KFIZ3 or KBEC. See function DIB_ICalculator for details. Default is KBEC, if missing.
volMultiplier	numeric, Volume adjustment multiplier. If missing, 1 (no adjustment) is used.

stumpHeight	numeric, Defines stump height. If missing, 0.3 m is used.
breastHeight	numeric, Defines the breast height. If missing, 1.3 m is used.
UTOPDIB	numeric, Merchantable inside-bark diameter. If missing, UTOP is 10.
BTOPEstimateType	integer, Must among NA, 1, 2, 3. Defines whether a tree has broken top and which field observation (height at broken or DIB at broken) is used to define broken point. NA means that tree is not broken top. 1 and 3 means diameter at broken top is not available, height at broken top is used to define broken point. 2 means diameter at broken top is available and is used to define broken point. Default is NA: tree does not have broken top.
BTOPHeight	numeric, Height at broken top.
BTOPDIB	numeric, Diameter inside bark at height of broken top.
logLengthMatrix	data.table, Log length matrix. If missing, there is no log-level volume returned.
logMinLength	numeric, Minimum log length. This argument is activated when logLengthMatrix is provided.

Value

A volume table

Author(s)

Yong Luo

`treeVolEst_RegRatioMethod`

Estimate volume for H-enhanced and non-enhanced trees-VRI specific

---

Description

This function estimates the volumes for JH-enhanced and non-enhanced trees using `BA-WSV` equation and `toWSV` ratio methods. For H-enhanced trees, the whole stem volume and gross merchantable volume are already calculated directly using taper equations; and rest of volume components will be calculated using ratio method in this function. For non-enhanced trees, the whole stem volume is derived using regression equation between basal area and whole stem volume and the rest of volume components will be computed using ratio method in this function.

Usage

```
treeVolEst_RegRatioMethod(nonVolTrees, regressionTable, ratioTable)


  ## S4 method for signature 'data.table,data.table,data.table'
treeVolEst_RegRatioMethod(nonVolTrees,
  regressionTable, ratioTable)
```

Arguments

nonVolTrees	data.table, H-enhanced trees and non-enhanced trees.
regressionTable	data.table, Specifies the WSV-BA equations by project group PRJ_GRP, live and dead status LV_D, stand and falling status SF_COMPILE and species code SP0. The table can be generated using WSV_BARegression.
ratioTable	data.table, Specifies toWSV ratio by project group PRJ_GRP, live and dead status LV_D, stand and falling status SF_COMPILE and species code SP0. The table can be generated using toWSVRatio.

Value

A data table that has compiled non volume trees.

Author(s)

Yong Luo

UTM_Convertor *Convert UTM to other coordinate reference system.*

Description

Converts UTM coordinates to the other coordinate reference system.

Usage

```
UTM_Convertor(point_ID, zone, northing, easting, CRS_To, class)


  ## S4 method for signature
## 'character,integer,integer,integer,character,character'
UTM_Convertor(point_ID,
  zone, northing, easting, CRS_To, class = "character")


  ## S4 method for signature
## 'character,integer,integer,integer,missing,character'
UTM_Convertor(point_ID,
  zone, northing, easting, class)


  ## S4 method for signature
## 'character,integer,integer,integer,character,missing'
UTM_Convertor(point_ID,
  zone, northing, easting, CRS_To)


  ## S4 method for signature 'character,integer,integer,integer,missing,missing'
UTM_Convertor(point_ID,
```

```
  zone, northing, easting)

## S4 method for signature 'missing,integer,integer,integer,missing,missing'
UTM_Convertor(zone,
  northing, easting)


 ## S4 method for signature 'missing,integer,integer,integer,missing,character'
UTM_Convertor(zone,
  northing, easting, class)
```

Arguments

point_ID	character, Data point ID.
zone	integer, UTM zone.
northing	integer, UTM northing.
easting	integer, UTM easting.
CRS_To	character, Defines the spatial coordination reference that you wish to transform. Default is BC Albers reference system.
class	character, Define the class of returned objective. Currently this function supports either table or sp class. Default is table.

Value

Reprojected objective.

Author(s)

Yong Luo

---

valueCalculator *Calcualte tree value-VRI specific*

Description

This function calculates tree value for each tree based on ground called grade. From the second column to the last column, the grossVolMatrix table should have same dimensions (i.e., number of rows and columns) of callGradeMatrix and grossMerchVolMatrix if they are provided. Furthermore, be aware of the correspondingness among the matrix. In the function, two lookup table are hardcoded (i.e., spv_spc and sp_cost). This function is part of the log_valu_2017.sas.

Usage

```
valueCalculator(species, grossVolMatrix, grossMerchVolMatrix, callGradeMatrix)

## S4 method for signature 'character,data.table,data.table,data.table'
valueCalculator(species,
  grossVolMatrix, grossMerchVolMatrix, callGradeMatrix)
```

Arguments

species	character, Species codes in BC inventory system.
grossVolMatrix	data.table, Calculated gross volume for each log. The first column of this table is the volume for the stump. If missing, the function calculates the total net merchantable volume.
grossMerchVolMatrix	data.table, Calculated gross merchantable volume for each log. If missing, all the merchantable volume is assigned as 0.
callGradeMatrix	data.table, Ground call grading table.

Value

Data table that contains net value (VAL_NET) and net merchantable value (VAL_MER).

Author(s)

Yong Luo

---

volSmry_byC *Summarize volume components at cluster level-VRI specific*

Description

This function summarizes the cluster-level volume components using cluster/species-level summaries. The cluster/species-level summaries is an output of volSmry_byCS function.

Usage

```
volSmry_byC(volSmryByCS)

## S4 method for signature 'data.table'
volSmry_byC(volSmryByCS)
```

Arguments

volSmryByCS	data.table, Summarized volume components for both measured and counted trees. See volSmry_byCS for details.

Value

A data table

Author(s)

Yong Luo

volSmry_byCS *Summarize volume components per hectare by cluster and species-VRI specific*

Description

Summarizes volume components per hectare by cluster and species. The function is last part of vol_ha_2017.sas.

Usage

```
volSmry_byCS(treeMC, utilLevel, weirdUtil, equation)

## S4 method for signature 'data.table,numeric,character,character'
volSmry_byCS(treeMC,
  utilLevel, weirdUtil, equation)

## S4 method for signature 'data.table,missing,character,character'
volSmry_byCS(treeMC,
  weirdUtil, equation)

## S4 method for signature 'data.table,numeric,missing,character'
volSmry_byCS(treeMC, utilLevel,
  equation)

## S4 method for signature 'data.table,numeric,numeric,character'
volSmry_byCS(treeMC, utilLevel,
  weirdUtil, equation)

## S4 method for signature 'data.table,numeric,character,missing'
volSmry_byCS(treeMC, utilLevel,
  weirdUtil)

## S4 method for signature 'data.table,missing,missing,missing'
volSmry_byCS(treeMC)
```

Arguments

treeMC	data.table, Tree-level compiled data for all volume trees.
utilLevel	numeric, Utilization levels. Default is 4.
weirdUtil	character, Weird util. Default is No. Otherwise need to be specified as a number.
equation	character, Specifies whether the compiler is based on KBEC or KFIZ. Default is KBEC.

Value

A data table summarizes volume components by cluster and species. Equevalent to smy_cs.

Author(s)

Yong Luo

VRICompiler *VRI compiler - VRI specific*

Description

This function compiles VRI data by calling specific VRI functions. Unlike the original compiler (i.e., SAS compiler), the R version compiler hardcodes all the lookup tables in the compilation process. Please refer the descriptions for lookup table to see whether they are same as the original lookup table.

Usage

```
VRICompiler(dataSourcePath, outputPath = ".", equation = "KBEC",
  walkThru = TRUE, logMinLength = 0.1, stumpHeight = 0.3,
  breastHeight = 1.3, UTOPDIB = 10, utilLevel = 4, weirdUtil = "No",
  siteToolsDLLPath,
  sasExePath = "C:/Program Files/SASHome/x86/SASFoundation/9.3")
```

Arguments

dataSourcePath	character, Specifies the path that directs to the VRI original data soruce.
outputPath	character, Specifies the folder to save all the outputs.
equation	character, Specifies the taper equation that is used for compiler. Currently supports BEC-based (KBEC) and FIZ-based (KFIZ).
walkThru	logical, Speciefies whether the data had been collected using work through method. Default is TRUE, if it is not specified.
logMinLength	numeric, Specifies minimum length of log when doing log length adjustment, see logMatrixAdjustment for details. If missing 0.1 is used.
stumpHeight	numeric, Stump height. If missing 0.3 is used.
breastHeight	numeric, Breast height. If missing 1.3 is used.
UTOPDIB	numeric, Threshold inside-bark diameter for merchantable volume. If missing, UTOPDIB is 10.
utilLevel	numeric, Specifies utilization level in summrizing tree volumes at cluster and species level. Default is 4.
weirdUtil	character, Specifies weird utilization in summarizing tree volumes at cluster and species level. Default is no, if missing. Otherwise, a number should be provided.
siteToolsDLLPath	character, Path to SINDEX33.DLL.
sasExePath	character, Path to sas executable, i.e., sas.exe. If missing, the function takes C:/Program Files/SASHome/x86/SASFoundation/9.3 as default. However, it will cause crush if sas executable is not located in default path.

Value

This function compiles data and save outputs in outputPath and no file is returned.

Author(s)

Yong Luo

References

VRI compiler manual

`VRIInit_auxTree` *Load and select auxiliary plot trees-VRI specific*

Description

This function loads and selects auxiliary data (`vi_i`, cardi) based on cluster/plot header.

Usage

```
VRIInit_auxTree(clusterplotHeader, dataSourcePath)

## S4 method for signature 'data.table,character'
VRIInit_auxTree(clusterplotHeader,
  dataSourcePath)
```

Arguments

`clusterplotHeader`	data.table, Cluster and plot level attributes, an output from `VRIInit_clusterplot`.
`dataSourcePath`	character, Specifies the path that directs to the VRI original data soruce, i.e., `//Mayhem/GIS_TIB/RDW/RDW_Data2/Work_Areas/VRI_ASCII_PROD/vri_sa`.

Value

A data table that contains auxiliary plot tree data. A log file documents the detailed process

Author(s)

Yong Luo

`VRIInit_clusterplot` *Load and select cluster and plot level data- VRI specific*

Description

This function prepares the cluster/plot-level inputs for VRI compiler. Specifically, it standardizes names for the variables; reports and removes the duplicate observations at cluster, cluster/plot.

Usage

```
VRIInit_clusterplot(dataSourcePath)

## S4 method for signature 'character'
VRIInit_clusterplot(dataSourcePath)
```

Arguments

dataSourcePath	character, Specifies the path that directs to the VRI original data soruce, i.e., //Mayhem/GIS_TIB/RDW/RDW_Data2/Work_Areas/VRI_ASCII_PROD/vri_sa.

Value

A data table that contains key information at cluster/plot level and compiler log file.

Author(s)

Yong Luo

VRIInit_lossFactor *Load and select trees that have loss factor information-VRI specific*

Description

This function loads and selects trees that have loss factor information (vi_d, cardd) based on selected trees from vi_c.

Usage

```
VRIInit_lossFactor(fullMeasuredTrees, dataSourcePath)

## S4 method for signature 'data.table,character'
VRIInit_lossFactor(fullMeasuredTrees,
  dataSourcePath)
```

Arguments

fullMeasuredTrees	data.table, Selected trees in vi_c, which includes full, enhanced and H-enhanced trees. An output of VRIInit_measuredTree.
dataSourcePath	character, Specifies the path that directs to the VRI original data soruce, i.e., //Mayhem/GIS_TIB/RDW/RDW_Data2/Work_Areas/VRI_ASCII_PROD/vri_sa.

Value

A data table that contains loss factor data. A log file documents the detailed process

Author(s)

Yong Luo

VRIInit_measuredTree *Load and select fully measured tree data-VRI specific*

Description

This function selects the tree-level data from vi_c (cardc) based on selected cluster/plot headers. Additonally, the function calculates basal area and tree per ha factor.

Usage

```
VRIInit_measuredTree(clusterplotHeader, dataSourcePath, walkThru)


  ## S4 method for signature 'data.table,character,logical'
VRIInit_measuredTree(clusterplotHeader,
  dataSourcePath, walkThru)


  ## S4 method for signature 'data.table,character,missing'
VRIInit_measuredTree(clusterplotHeader,
  dataSourcePath)
```

Arguments

clusterplotHeader	data.table, Cluster and plot-level attributes, an output from VRIInit_clusterplot.
dataSourcePath	character, Specifies the path that directs to the VRI original data soruce, i.e., //Mayhem/GIS_TIB/RDW/RDW_Data2/Work_Areas/VRI_ASCII_PROD/vri_sa.
walkThru	logical, Indicates whether walkthrough sampling protocal is used, Tree weight is determined by walkthrough method. In walkthrough method, a tree is identified as NA (no walkthrough applied), 0 for out tree (not counted), and W for double counted tree.

Value

A data table that contains tree-level information. A log file that describes the detailed process.

Author(s)

Yong Luo

VRIInit_siteTree *Load and select site trees-VRI specific*

Description

This function connects site tree data (vi_h, cardh) to selected cluster/plot-level data. Site tree data is located in //Mayhem/GIS_TIB/RDW/RDW_Data2/Work_Areas/VRI_ASCII_PROD/vri_sa

Usage

```
VRIInit_siteTree(clusterplotHeader, dataSourcePath)

## S4 method for signature 'data.table,character'
VRIInit_siteTree(clusterplotHeader,
  dataSourcePath)
```

Arguments

clusterplotHeader	data.table, contains cluster/plot-level attributes, an output from VRIInit_clusterplot.
dataSourcePath	character, Specifies the path that directs to the VRI original data soruce, i.e., //Mayhem/GIS_TIB/RDW/RDW_Data2/Work_Areas/VRI_ASCII_PROD/vri_sa.

Value

A data table that contains site tree data information. A log file documents the detailed process

Note

VRI specific

Author(s)

Yong Luo

VRISummaries *Summarize the tree-level data at cluster or cluster/species level-VRI specific*

Description

Summarizes the compiled tree data (including both enhanced tree data and non-enhanced tree data) at cluster level. This function is equevalent to the summary part in sas compiler in cp_vegi_2017.sas. Different from the original compiler, this function outputs the summaries by summarized components, rather than putting all together.

Usage

```
VRISummaries(allVolumeTrees, clusterPlotHeader, utilLevel, weirdUtil, equation)


  ## S4 method for signature 'data.table,data.table,numeric,character,character'
VRISummaries(allVolumeTrees,
  clusterPlotHeader, utilLevel, weirdUtil, equation)
```

Arguments

allVolumeTrees	data.table, All tree data from vi_c and vi_i that have been compiled with tree volume.
clusterPlotHeader	data.table, Cluster and plot-level information. An output of VRIInit_clusterplot.
utilLevel	numeric, Utilization levels.
weirdUtil	character, Weird util. Default is No. Otherwise need to be specified as a number.
equation	character, Specifies whether the compiler is based on KBEC or KFIZ.

Value

Cluster and species-level volume summaries; cluster-level volume summaries; cluster-level height summaries; cluster-level species composition summaries and log file.

Author(s)

Yong Luo

VRIVolTree *Calcualte tree volume-VRI specific*

Description

This function use BEC(or FIZ) and species-specific taper equation to calculate tree volume. Before calculation, the function adjusts height for broken top trees: scenario 1 (D scenario): availability of DBH, DIB at broken height; scenario 2 (H scenario): availability of projected tree height in the field. This functions also assigns the volume multiplier adjustment. The function is equivalent to vir_vol_tree_2011 macro in orignal SAS compiler.

Usage

```
VRIVolTree(treeData, equation, logMinLength, stumpHeight, breastHeight, UTOPDIB)


  ## S4 method for signature
## 'data.table,character,numeric,numeric,numeric,numeric'
VRIVolTree(treeData,
  equation, logMinLength, stumpHeight, breastHeight, UTOPDIB)


 ## S4 method for signature 'data.table,missing,missing,missing,missing,missing'
VRIVolTree(treeData)
```

Arguments

treeData	data.table, An output from VRIInit_measuredTree function, i.e., vi_c data.
equation	character, Specifies which taper equation form will be used to calculate diameter inside bark for a given height. Must be either KBEC or KFIZ3. If missing, default is KBEC

logMinLength	numeric, Specifies a minimum length for a log.
stumpHeight	numeric, Specifies stump height. If missing, 0.3 m will be used.
breastHeight	numeric, Specifies breast height. 1.3 m will be used when this arguement is missing.
UTOPDIB	numeric, Specifies minimum merchantable inside bark diameter. 10 cm is used as a default.

Value

A data table

Author(s)

Yong Luo

`WSV_BARegression` *Create regression equation to link whole stem volume and basal area in VRI data-VRI specific*

Description

This function develops regression equations between whole stem volume (`WSV`) and basal area (`BA`) for both alive and dead trees. The equation is derived at project group and species level. When sample size is small or the model's performance is poor for a given species, the species type, i.e., deciduous or coniferious species, is used as this species in developing the model. The function is equivalent to `reg_wsv_2017.sas`. To estimate tree volume for non-enhanced trees, the resultant equations will be used.

Usage

```
WSV_BARegression(regressionData, minObs, minR2)

## S4 method for signature 'data.table,numeric,numeric'
WSV_BARegression(regressionData, minObs,
  minR2)

## S4 method for signature 'data.table,missing,numeric'
WSV_BARegression(regressionData, minR2)

## S4 method for signature 'data.table,numeric,missing'
WSV_BARegression(regressionData, minObs)

## S4 method for signature 'data.table,missing,missing'
WSV_BARegression(regressionData)
```

Arguments

regressionData	numeric, Specifies whole stem volume.
minObs	numeric, Defines the minimum number of observations (included) that used for the regression. If missing, 3 is used to be consistent with the compilation manual.

`minR2`	numeric, Defines the minimum R square to identify the models goodness of fit. If missing, 0.3 is used.

Value

A data table that contains key statistics of whole stem volume and basal area regression.

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