Package 'srn'

November 20, 2018

Title Sub-Regional Nexus Modeling Tool

Version 0.0.1

Description Package to process water-energy-land nexus data to different sub-regional levels.

Depends

License MIT + file LICENSE

Encoding UTF-8

LazyData true

Suggests testthat, knitr, rmarkdown

RoxygenNote 6.1.0

Imports RColorBrewer, rgcam, tibble, dplyr, tmap, ggplot2, scales, utils,tidyr, rlang, grDevices, processx

Remotes github::JGCRI/rgcam

VignetteBuilder knitr

R topics documented:

`srn` *srn: Sub-Regional nexus Package*

Description

The SRN package provides

SRN functions

The SRN functions ...

srn.assumptions *srn.assumptions*

Description

This function loads holds the different assumptions used throughout the srn package.

Usage

```
srn.assumptions()
```

Details

List of Assumptions

- convEJ2TWh
- convEJ2GW
- conv1975USDperGJ22017USDperMWh
- conv1975USDperGJ22017USDperMBTU
- convertGgTgMTC
- GWPType

Value

A list of assumptions

Examples

```
library(srn)
a<-srn.assumptions()
a # will give full list of assumptions
```

srn.chart *srn.chart*

Description

This function produce different kinds of charts for the srn package. iIt requires a table in the SRN format. Each figure is accompanied with a csv table.

Usage

```
srn.chart(data, chartType = "bar", position = "stack", xData = "x",
  yData = "value", class = "class1", group = "scenario",
  classPalette = "classPalette1", classLabel = "classLabel1",
  xLabel = "xLabel", yLabel = "yLabel", facet_rows = "region",
  facet_columns = "scenario", ncolrow = 4, scales = "fixed",
  useNewLabels = 0, units = "units", xBreaksMaj = 10,
  xBreaksMin = 5, yBreaksMajn = 5, yBreaksMinn = 10,
  sizeBarLines = 0.5, sizeLines = 1.5)
```

Arguments

data	data table for charting
chartType	Type of chart: "bar" or "line"
position	Position in bar charts. "identity", "stack" or "dodge"
xData	Default "x"
yData	Default "value"
class	Default "class1"
group	Default "scenario"
classPalette	Default "classPalette1"
classLabel	Default "classLabel1"
xLabel	Default "xLabel"
yLabel	Default "units"
facet_rows	Default "region"
facet_columns	Default "scenario"
ncolrow	Number of columns or Rows for Faceted plots
scales	Default "fixed"
useNewLabels	Default 0
units	Default "units"
xBreaksMaj	Default 10
xBreaksMin	Default 5
yBreaksMajn	Default 5
yBreaksMinn	Default 10
sizeBarLines	Default 0.5
sizeLines	Default 1.5

Value

Returns the formatted data used to produce chart

Examples

```
# Examples below show the default chart with minimum information
# and then adding progressively more details.

library(tibble)
tbl <- tribble (
~x,     ~value,
2010,   15,
2020,   20,
2030,   30
)
srn.chart(data=tbl,xData="x",yData="value",chartType = "line")
srn.chart(data=tbl,xData="x",yData="value",chartType = "bar")
```

`srn.chartsProcess` *srn.chartsProcess*

Description

This function produces charts given any number of tables in the srn format. The srn.chart() function produces charts for each region nd scenario. If there are more than one scenario then the function also produces a folder for diffplots. The input tables should be .csv files with the following columns: scenario, region, sources, param, x, xLabel, vintage, class1, class2, units, value, aggregate, classLabel1,classPalette1,classLabel2,classPalette2. Running the srn.readgcam automatically produces An empty template with these columns for the relevant parameters. Each column is defined below:

Usage

```
srn.chartsProcess(dataTables = NULL, rTable = NULL, scenRef = NULL,
  dirOutputs = paste(getwd(), "/outputs", sep = ""), pdfpng = "png",
  xCompare = c("2015", "2030", "2050", "2100"), paramsSelect = "All",
  regionsSelect = "All", xData = "x", yData = "value",
  xLabel = "xLabel", yLabel = "units", aggregate = "sum",
  class = "class", classPalette = "pal_Basic", regionCompareOnly = 1)
```

Arguments

`dataTables`	Vector of strings with full path to datatables to be read in. Example c("D:/srn/outputs/Colombia/regional/dataTable_Colombia_1975to2100.csv", "D:/srn/outputs/Colombia/regional/dataTableLocal_Colombia_1975to2100.csv"). Where "dataTableLocal_Colombia_1975to2100.csv" is the new datafile created based on "dataTableTemplate_Colombia_1975to2100.csv" and contains new local data.
`rTable`	If a table is created directly in R as a data.frame or tibble it can entered here.
`scenRef`	The reference scenario to compare against. Default will pick first scenario from list f all scenarios
`dirOutputs`	Full path to directory for outputs
`pdfpng`	Choose the format for outputs. Either "pdf", "png" or "both. Default is "png"
`xCompare`	Choose the years to compare scenarios for xScenSelectYears plot. Default is c("2015","2030","2050","2100")
`paramsSelect`	Default = "All". Select the paramaters to analyze from the the tables provided. Full list of parameters: c("finalNrgbySec", "primNrgConsumByFuel", "elecByTech", "watConsumBySec", "watWithdrawBySec", "watWithdrawByCrop", "watBioPhysCons", "irrWatWithBasin","irrWatConsBasin", "gdpPerCapita", "gdp", "gdpGrowthRate", "pop", "agProdbyIrrRfd", "agProdBiomass", "agProdForest", "agProdByCrop", "landIrrRfd", "aggLandAlloc", "LUCemiss", "co2emission", "co2emissionByEndUse", "ghgEmissionByGHG", "ghgEmissByGHGGROUPS")
`regionsSelect`	Default = "All". Select regions to create charts for.
`xData`	Default "x"

`yData` Default "value"

`xLabel` Default "xLabel"

`yLabel` Default "units"

`aggregate` Default "sum"

`class` Default "class"

`classPalette` Default "pal_Basic" from srn.colors()$pal_Basic

`regionCompareOnly`
Default 0. If set to 1, will only run comparison plots and not individual regions

Details

List of Assumptions

- scenario: The name of the new data scenario
- region: The region for the data
- sources: Sources for the data
- param: Name of the parameter
- x: The x axis variable values
- xLabel: X axis Label
- vintage: Vintages if any. If not relevant then just enter "Vintage"
- class1: Classes or types (eg. if param is water_demands then the classes may be Industry, Agriculture etc.)
- class2: A second category of classes if exists.
- units: Units for the parameter. These are used as the y axis label.
- value: The parameter value.
- aggregate: Either "sum" or "mean". This paramater is used to determine how to aggregate across regions or scenarios.
- classLabel1: If class1 exists then this will be legend Label. If it doesnt exist enter "classLabel1"
- classPalette1: An R or srn.colors() palette. Can leave the default as "pal_16".
- classLabel2: If class2 exists then this will be legend Label. If it doesnt exist enter "classLabel2"
- classPalette2: An R or srn.colors() palette. Can leave the default as "pal_16".

Value

Produces charts in output folder and also returns combined table in srn format.

`srn.colors` *srn.colors*

Description

This function loads various color palettes used previously in GCAM as well as new palettes for SRN modeling to the global environment

Usage

```
srn.colors(palx = NULL)
```

Arguments

`palx`	Palette name to view the palette colors. Eg. srn.colors("pal_Basic")

Details

List of Color Palettes

- pal_HDDCDD
- pal_16
- elec_tech_colors
- elec_renew_colors
- building_colors
- trn_fuel_colors
- enduse_fuel_numbered
- enduse_colors
- pal_pri_ene
- pal_pri_fuelcost
- pal_emiss_sector
- pal_landuse
- pal_hydrogen
- pal_refliq
- emiss_by_enduse_colors
- biouse_colors
- pal_Basic
- pal_Gas
- pal_Diff
- pal_Diff5
- pal_Absolute
- pal_Absolute5
- pal_Unassigned
- pal_elec_subsec
- pal_elec_finalNrgFuel

- pal_elec_techs
- pal_elec_sec
- pal_finalNrg_sec
- pal_pri_ene
- pal_elec_tech_colors

Value

A list of color palettes.

Examples

```
library(srn)
a<-srn.colors()
pie(rep(1,length(a$pal_Basic)),label=names(a$pal_Basic),col=a$pal_Basic)
```

`srn.readgcam` *srn.readgcam*

Description

This function connects to a gcamdatabase and uses a query file to out results into a table ready for plotting.

Usage

```
srn.readgcam(gcamdatabasePath, gcamdatabaseName,
  queryxml = "srnQueries.xml", scenOrigNames, scenNewNames = NULL,
  reReadData = T, dataProj = "dataProj.proj",
  dirOutputs = paste(getwd(), "/outputs", sep = ""),
  regionsSelect = NULL, queriesSelect = "All", paramsSelect = "All")
```

Arguments

`gcamdatabasePath`	Path to gcam database folder
`gcamdatabaseName`	Name of gcam database
`queryxml`	Full path to query.xml file
`scenOrigNames`	Original Scenarios names in GCAM database in a string vector. For example c('scenario1','scenario2).
`scenNewNames`	New Names which may be shorter and more useful for figures etc. Default will use Original Names. For example c('scenario1','scenario2)
`reReadData`	If TRUE will read the GCAM data base and create a queryData.proj file in the same folder as the GCAM database. If FALSE will load a '.proj' file if a file with full path is provided otherwise it will search for a dataProj.proj file in the existing folder which may have been created from an old run.
`dataProj`	Optional. A default 'dataProj.proj' is produced if no .Proj file is specified.

`dirOutputs` Full path to directory for outputs

`regionsSelect` The regions to analyze in a vector. Example c('Colombia','Argentina')

`queriesSelect` Default = "All". Vector of queries to read from the queryxml for example c("Total final energy by aggregate end-use sector", "Population by region"). The queries must be availble in the queryxml file. Current list of queries and generated paramaters are:

- "Total final energy by aggregate end-use sector". Parameters generated: finalNrgbySec.
- "primary energy consumption by region (direct equivalent)". Parameters generated: primNrgConsumByFuel
- "Electricity generation by aggregate technology". Parameters generated: elecByTech
- "water withdrawals by sector". Parameters generated: watWithdrawBySec
- "water consumption by sector". Parameters generated: watConsumBySec
- "water withdrawals by crop". Parameters generated: watWithdrawByCrop
- "biophysical water demand by crop type and land region". Parameters generated: watBioPhysCons
- "water withdrawals by water mapping source". Parameters generated: irrWatWithBasin
- "water consumption by water mapping source". Parameters generated: irrWatConsBasin
- "GDP per capita MER by region". Where MER is "Market Exchange Rate". Parameters generated: gdpPerCapita.
- "GDP MER by region". Where MER is "Market Exchange Rate". Parameters generated: gdp, gdpGrowthRate
- "Population by region". Parameters generated: pop.
- "ag production by tech". Where technologies signify irrigated or rainfed. Parameters generated: agProdbyIrrRfd
- "Ag Production by Crop Type". Parameters generated: agProdBiomass, agProdForest, agProdByCrop
- "land allocation by crop and water source". Parameters generated: landIrrRfd
- "aggregated land allocation". Parameters generated: aggLandAlloc
- "Land Use Change Emission". Parameters generated: LUCemissFut
- "CO2 Emissions by enduse". Parameters generated: co2emission, co2emissionByEndUse,
- "GHG emissions by subsector". Parameters generated: ghgEmissByGHGGROUPS, ghgEmissionByGHG

Full list of parameters: c("finalNrgbySec", "primNrgConsumByFuel", "elecByTech", "watConsumBySec", "watWithdrawBySec", "watWithdrawByCrop", "watBioPhysCons", "irrWatWithBasin","irrWatConsBasin", "gdpPerCapita", "gdp", "gdpGrowthRate", "pop", "agProdbyIrrRfd", "agProdBiomass", "agProdForest", "agProdByCrop", "landIrrRfd", "aggLandAlloc", "LUCemiss", "co2emission", "co2emissionByEndUse", "ghgEmissionByGHG", "ghgEmissByGHGGROUPS")

Value

A list with the scenarios in the gcam database, queries in the queryxml file and a tibble with gcam data formatted for srn charts.

`srn.templates` *srn.templates*

Description

This script holds various templates used for different scripts.

Usage

```
srn.printPdfPng(figure, dir, filename, figWidth = 13, figHeight = 9,
  pdfpng = "png")

srn.chartsThemeLight()

srn.tmapAnimate(map, filename = "animation.gif", width, height,
  delay = 60)

srn.tmapLayout()
```

Arguments

`figure`	Figure to be printed in function srn.printPdfPng
`dir`	Directory to print figure to in function srn.printPdfPng
`filename`	Filename for figure printed in function srn.printPdfPng
`figWidth`	Figure Width in inches for figures to be printed in function srn.printPdfPng
`figHeight`	Figure height in inches for figures to be printed in function srn.printPdfPng
`pdfpng`	Either "pdf", "png" or "both" to define the format of output
`map`	A tmap object with facets which will be converted to animations
`width`	Width of map in inches.
`height`	Hieght of map
`delay`	Delay. Time between animations = delay/100. Default is 60 or 0.6 seconds.

Details

List of Templates in this script:

- srn.printPdfPng: Function used to print charts to a pdf or png or both.
- srn.chartsThemeLight: A light ggplot theme for charts
- srn.tmapAnimate: A function to animate tmaps across a variable.
- srn.tmapLayout: A fucntion to define tmap layouts

Value

A list of different templates

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