Package 'rrepast'

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URL https://github.com/antonio-pgarcia/rrepast

BugReports https://github.com/antonio-pgarcia/RRepast/issues

Description An R and Repast integration tool for running individual-based (IbM) simulation models developed using 'Repast Simphony' Agent-Based framework directly from R code supporting multicore execution. This package integrates 'Repast Simphony' models within R environment, making easier the tasks of running and analyzing model output data for automated parameter calibration and for carrying out uncertainty and sensitivity analysis using the power of R environment.

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Imports lhs, sensitivity, ggplot2, digest, xlsx, doSNOW, rJava, gridExtra, parallel, foreach

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NeedsCompilation no

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R topics documented:

AddFactor *Adds a paramter to factor collection*

Description

Builds up the factor collection.

Usage

```
AddFactor(factors = c(), lambda = "qunif", name, min, max,
  int = FALSE)
```

Arguments

factors	The current factor collection
lambda	The function to apply FUN(p,min,max)
name	The name of factor
min	The minimun of parameter p
max	The maximun of parameter p
int	Boolean for truncating the factor value

Value

The collection of created factors

Examples

```
## Not run:
   f<- AddFactor(name="Age",min=20,max=60)
   f<- AddFactor(factors=f, name="Weight",min=50,max=120)
## End(Not run)
```

AddFactor0 *AddFactor0*

Description

Creates or appends the factor collection

Usage

```
AddFactor0(factors = c(), ...)
```

Arguments

factors	The current factor collection
...	The variadic parameter list

Value

The factor collection

Examples

```
## Not run:
   f<- AddFactor0(name="Age",min=20,max=60)
   f<- AddFactor0(factors=f, name="Weight",min=50,max=120)
## End(Not run)
```

AddResults *Concatenate results of multiple runs*

Description

This function stores the output of the last model execution and it is intended to be used internally.

Usage

```
AddResults(d)
```

Arguments

d	A data frame containing one replication data

AoE.Base *AoE.Base*

Description

The Design Of Experiments Base function

Usage

```
AoE.Base(m, factors = c(), fun = NULL)
```

Arguments

m	The base design matrix
factors	A subset of model parameters
fun	The function which will be applied to m

Value

The design matrix

`AoE.ColumnCoV` *AoE.ColumnCoV*

Description

This function Calculates the relative squared deviation (RSD or CoV) for an used provided column name `key` in the parameter `dataset`.

Usage

```
AoE.ColumnCoV(dataset, key)
```

Arguments

`dataset`	A model output dataset
`key`	Column name from output dataset

Value

A data frame with Coefficient of variations

`AoE.CoV` *AoE.CoV*

Description

A simple funcion for calculate the Coefficient of Variation

Usage

```
AoE.CoV(d)
```

Arguments

`d`	The data collection

Value

The coefficient of variation for data

AoE.FullFactorial *AoE.FullFactorial design generator*

Description

Generate a Full Factorial sampling for evaluating the parameters of a model.

Usage

```
AoE.FullFactorial(n = 10, factors = c())
```

Arguments

n	The number of samples
factors	The model's parameters which will be evaluated

Value

The Full Factorial design matrix for provided parameters

Examples

```
## Not run:
 f<- AddFactor(name="cyclePoint",min=40,max=90)
 f<- AddFactor(factors=f, name="conjugationCost",min=1,max=80)
 d<- AoE.FullFactorial(2,f)
## End(Not run)
```

AoE.GetMorrisOutput *AoE.GetMorrisOutput*

Description

Returns a dataframe holding the Morris result set

Usage

```
AoE.GetMorrisOutput(obj)
```

Arguments

obj	A reference to a morris object instance

Value

The results of Morris method

AoE.LatinHypercube *AoE.LatinHypercube*

Description

Generate a LHS sample for model parameters

Usage

```
AoE.LatinHypercube(n = 10, factors = c(), convert = TRUE)
```

Arguments

n	The number of samples
factors	The model's parameters which will be evaluated
convert	Adjust experiment matrix to parameter scale

Details

Generate the LHS sampling for evaluating the parameters of a model.

Value

The LHS design matrix for provided parameters

Examples

```
## Not run:
 f<- AddFactor(name="cyclePoint",min=40,max=90)
 f<- AddFactor(factors=f, name="conjugationCost",min=1,max=80)
 d<- AoE.LatinHypercube(2,f)
## End(Not run)
```

AoE.MAE *AoE.MAE*

Description

Calculates the average-error magnitude (MAE)

Usage

```
AoE.MAE(xs, xe)
```

Arguments

xs	The simulated data set
xe	The experimental data set

Value

The MAE value for provided datasets

`AoE.Morris` *AoE.Morris*

Description

This is a wrapper for performing Morris's screening method on repast models. We rely on morris method from sensitivity package.

Usage

```
AoE.Morris(k = c(), p = 5, r = 4)
```

Arguments

k	The factors for morris screening.
p	The number of levels for the model's factors.
r	Repetitions. The number of random sampling points of Morris Method.

References

Gilles Pujol, Bertrand Iooss, Alexandre Janon with contributions from Sebastien Da Veiga, Jana Fruth, Laurent Gilquin, Joseph Guillaume, Loic Le Gratiet, Paul Lemaitre, Bernardo Ramos and Taieb Touati (2015). sensitivity: Sensitivity Analysis. R package version 1.11.1. https://CRAN.R-project.org/package=sensitivity

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`AoE.NRMSD` *AoE.NRMSD*

Description

A simple Normalized Root-Mean-Square Deviation calculation using max and min values. NRMSD = RMSD(x) / (max(x) - min(x))

Usage

```
AoE.NRMSD(xs, xe)
```

Arguments

xs	The simulated data set
xe	The experimental data set

Value

The NRRMSD value for provided datasets

AoE.RandomSampling *AoE.RandomSampling experiment desing generator*

Description

Generate a Simple Random Sampling experiment design matrix.

Usage

```
AoE.RandomSampling(n = 10, factors = c())
```

Arguments

n	The number of samples
factors	The model's parameters which will be evaluated

Value

The random sampling design matrix

Examples

```
## Not run:
 f<- AddFactor(name="cyclePoint",min=40,max=90)
 f<- AddFactor(factors=f, name="conjugationCost",min=1,max=80)
 d<- AoE.RandomSampling(2,f)
## End(Not run)
```

AoE.RMSD *AoE.RMSD*

Description

A simple Root-Mean-Square Deviation calculation.

Usage

```
AoE.RMSD(xs, xe)
```

Arguments

xs	The simulated data set
xe	The experimental data set

Value

The RMSD value for provided datasets

AoE.Sobol *AoE.Sobol*

Description

This is a wrapper for performing Global Sensitivity Analysis using the Sobol Method provided by sensitivity package.

Usage

```
AoE.Sobol(n = 100, factors = c(), o = 2, nb = 100,
  fun.doe = AoE.LatinHypercube, fun.sobol = sobolmartinez)
```

Arguments

n	The number of samples
factors	The model's parameters which will be evaluated
o	Maximum order in the ANOVA decomposition
nb	Number of bootstrap replicates
fun.doe	The sampling function to be used for sobol method
fun.sobol	The sobol implementation

Details

This function is not intended to be used directly from user programs.

References

Gilles Pujol, Bertrand Iooss, Alexandre Janon with contributions from Sebastien Da Veiga, Jana Fruth, Laurent Gilquin, Joseph Guillaume, Loic Le Gratiet, Paul Lemaitre, Bernardo Ramos and Taieb Touati (2015). sensitivity: Sensitivity Analysis. R package version 1.11.1. https://CRAN.R-project.org/package=sensitivity

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`AoE.Stability` *AoE.Stability*

Description

This function verifies the stability of CoV for all columns given by parameter `keys` or all dataset columns if keys is empty.

Usage

```
AoE.Stability(dataset, keys = c())
```

Arguments

`dataset`	A model output dataset
`keys`	A list of column names

Value

A data frame with Coefficient of variations

`ApplyFactorRange` *Corrects the LHS design matrix*

Description

Correct the LHS sampling matrix for a specific range applying the lambda function. The default value of 'lambda' is 'qunif'.

Usage

```
ApplyFactorRange(design, factors)
```

Arguments

`design`	The LHS design matrix
`factors`	THe collection of factors

Value

The corrected design matrix

`BuildParameterSet` *Builds the simulation parameter set*

Description

Merges the design matrix with parameters which will be keep fixed along simulation runs.

Usage

```
BuildParameterSet(design, parameters)
```

Arguments

`design`	The experimental desing matrix for at least one factor
`parameters`	All parameters of the repast model.

Value

A data frame holding all parameters required for running the model

Examples

```
## Not run:
   modeldir<- "c:/usr/models/BactoSim(HaldaneEngine-1.0)"
   e<- Model(modeldir=modeldir,dataset="ds::Output")
   Load(e)

   f<- AddFactor(name="cyclePoint",min=40,max=90)

   p<- GetSimulationParameters(e)

   d<- AoE.LatinHypercube(factors=f)

   p1<- BuildParameterSet(d,p)
## End(Not run)
```

`Calibration.GetMemberKeys`
Calibration.GetMemberKeys

Description

Gets the list of keys (the factor names)

Usage

```
Calibration.GetMemberKeys(obj)
```

Arguments

obj	An instance of the object returned by Easy methods

Value

The collection of keys

`Calibration.GetMemberList` *Calibration.GetMemberList*

Description

Gets the member list value

Usage

```
Calibration.GetMemberList(obj, key, name)
```

Arguments

obj	An instance of the object returned by Easy methods
key	The key value
name	The column name

Value

The member list

`check.integration` *check.integration*

Description

Check if the integration jar library is correctelly installed in the model lib directory

Usage

```
check.integration(modelpath)
```

Arguments

modelpath	The path where model is installed

Value

TRUE if the integration code is correctelly deployed

---

check.scenario *check.scenario*

Description

Check if the scenario.xml is configured with the rrepast itegration code

Usage

```
check.scenario(modelpath)
```

Arguments

modelpath	The path where model is installed

Value

TRUE if scenario is properly configured

ClearResults *Clear the results data.frame*

Description

This function is called automatically every time Run method is called.

Usage

```
ClearResults()
```

`col.sum` *col.sum*

Description

Sum all columns but one (pset) of a data frame

Usage

```
col.sum(d, skip = c())
```

Arguments

`d`	The data frame
`skip`	The columns which should not be included in the sum

Value

The original data frame with a new column (sum) holding the sum

`config.check` *config.check*

Description

Verify if the installed model is correctelly configurated.

Usage

```
config.check(modelpath)
```

Arguments

`modelpath`	The path where model is installed

Value

TRUE when all requisites are met

`config.copylib` *config.copylib*

Description

Install or uninstall the integration jar file. This function manages the installation process of required jars to the model lib dir.

Usage

```
config.copylib(modelpath, uninstall = FALSE)
```

Arguments

`modelpath`	The path where model is installed
`uninstall`	If TRUE uninstall integration jar

Value

TRUE if install operation succed

`config.scenario` *config.scenario*

Description

Add the integration library to the model's configuration

Usage

```
config.scenario(modelpath, uninstall = FALSE)
```

Arguments

`modelpath`	The path where model is installed
`uninstall`	If TRUE restore original scenario.xml file

Value

A logical TRUE if the model's scenario file has been modified

createOutputDir *Create output directory*

Description

A simple function to make a directory to save the model's data.

Usage

```
createOutputDir()
```

Details

Create the, if required, the directory to save the output data generate by the model. It is intended for internal use.

df2matrix *df2matrix*

Description

This function converts data frames to matrix data type.

Usage

```
df2matrix(d, n = c())
```

Arguments

d	The data frame
n	The column names to be converted. Null for all data frame columns

Value

The data frame converted to a matrix

`dffilterby` *dffilterby*

Description

Selects a subset of a data frame, filtering by column values.

Usage

```
dffilterby(d, key, values = c())
```

Arguments

`d`	The data frame holding data to be filtered
`key`	The column name for selection valuas
`values`	The collection of values used to filter the data set

Value

The filtered data set

`dfround` *dfround*

Description

Round all numeric columns of a data frame

Usage

```
dfround(d, p)
```

Arguments

`d`	The data frame
`p`	The number of decimal digits to be keept

Value

A data frame with rounded columns

dfsumcol *dfsumcol*

Description

Sum data frame columns but tho

Usage

```
dfsumcol(d, lst = c(), invert = FALSE)
```

Arguments

d	The data frame
lst	Skip columns included. Sum columns NOT included
invert	Sum only the columns included in lst

Value

The original data frame with a new column (sum) holding the sum

Easy.Calibration *Easy.Calibration*

Description

Search for the best set of parameters trying to minimize the calibration function provided by the user. The function has to operational models, the first based on the experimental setup where all parameters are defined a priori and the second using optimization techniques. Currently the only supported optimization technique is the particle swarm optimization.

Usage

```
Easy.Calibration(m.dir, m.ds, m.time = 300, parameters, exp.n = 100,
  exp.r = 1, smax = 4, design = "lhs", FUN, default = NULL)
```

Arguments

m.dir	The installation directory of some repast model
m.ds	The name of any model aggregate dataset
m.time	The total simulated time
parameters	The input factors
exp.n	The experiment sample size
exp.r	The number of experiment replications

smax	The number of solutions to be generated
design	The sampling scheme ["lhs"|"mcs"|"ffs"]
FUN	The objective or cost function. A function defined over the model output.
default	The alternative values for parameters which should be kept fixed

Value

A list with holding experiment, object and charts

Examples

```
## Not run:
 my.cost<- function(params, results) {
   criteria<- c()
   Rate<- AoE.RMSD(results$X.Simulated,results$X.Experimental)
   G<- AoE.RMSD(results$G.T.,52)
   total<- Rate + G
   criteria<- cbind(total,Rate,G)
   return(criteria)
 }

 Easy.Setup("/models/BactoSim")
 v<- Easy.Calibration("/models/BactoSim","ds::Output",360,
                      f,exp.n = 1000, exp.r=1, smax=4,
                      design="mcs", my.cost)


## End(Not run)
```

Easy.getChart *Easy.getChart*

Description

Returns the chart instance

Usage

```
Easy.getChart(obj, key)
```

Arguments

obj	A reference to the output of Easy.Stability
key	The param name

Value

The plot instance

Easy.getPlot *Easy.getPlot*

Description

Returns the chart instance

Usage

```
Easy.getPlot(obj, c, key)
```

Arguments

obj	A reference to the output of an "Easy" API method
c	The output name
key	The param name

Value

The plot instance

Easy.Morris *Easy API for Morris's screening method*

Description

This function wraps all calls to perform Morris method.

Usage

```
Easy.Morris(m.dir, m.ds, m.time = 300, parameters, mo.p, mo.r, exp.r,
  FUN, default = NULL)
```

Arguments

m.dir	The installation directory of some repast model
m.ds	The name of any model aggregate dataset
m.time	The total simulated time
parameters	The factors for morris screening.
mo.p	The number of levels for the model's factors.
mo.r	Repetitions. The number of random sampling points of Morris Method.
exp.r	The number of experiment replications
FUN	The objective or cost function. A function defined over the model output.
default	The alternative values for parameters which should be kept fixed

Value

A list with holding experimnt, object and charts

`Easy.Run` *Easy API for running a model*

Description

This function provides a simple wrapper for performing a single or replicated model execution with a single set of parameters.

Usage

```
Easy.Run(m.dir, m.ds, m.time = 300, r = 1, default = NULL)
```

Arguments

`m.dir`	The installation directory of some repast model
`m.ds`	The name of any model aggregate dataset
`m.time`	The total simulated time
`r`	The number of replications
`default`	The alternative values for the default model parameters

`Easy.RunExperiment` *Easy API for Runnning Experiments*

Description

This function provides a simple wrapper for performing experimental setups using a design matrix

Usage

```
Easy.RunExperiment(m.dir, m.ds, m.time = 300, r = 1, design, FUN,
  default = NULL)
```

Arguments

`m.dir`	The installation directory of some repast model
`m.ds`	The name of any model aggregate dataset
`m.time`	The total simulated time
`r`	The number of replications
`design`	The design matrix holding parameter sampling
`FUN`	The objective or cost function. A function defined over the model output.
`default`	The alternative values for parameters which should be kept fixed

Value

The experiment results

`Easy.Setup` *Easy.Setup*

Description

This function configures the deployment directory where logs and output dataset will be generated. By default the deployment directory will be created under the model installation directory. The output generated by the Repast model will be redirected to the SystemOut.log file.

Usage

```
Easy.Setup(model, multicore = FALSE, deployment = c())
```

Arguments

`model`	The base directory where Repast model is installed.
`multicore`	Bolean flag indicating to use multiplecore.
`deployment`	The directory to save the output and logs.

Details

If the deployment directory is empty the installation directory given by the parameter `model` is used instead as the base directory. The deployment directory is `/rrepast-deployment/`.

`Easy.ShowModelParameters`
Easy.ShowModelParameters

Description

Returns the list current model parameters

Usage

```
Easy.ShowModelParameters(v)
```

Arguments

`v`	The installation directory of some repast model

Value

The model parameters

Easy.Sobol *Easy API for Sobol's SA method*

Description

This functions wraps all required calls to perform Sobol method for global sensitivity analysis.

Usage

```
Easy.Sobol(m.dir, m.ds, m.time = 300, parameters, exp.n = 500,
  bs.size = 200, exp.r = 1, FUN, default = NULL,
  fsobol = sobol2002, fsampl = AoE.LatinHypercube)
```

Arguments

m.dir	The installation directory of some repast model
m.ds	The name of any model aggregate dataset
m.time	The total simulated time
parameters	The input factors
exp.n	The experiment sample size
bs.size	The bootstrap sample size for sobol method
exp.r	The number of experiment replications
FUN	The objective or cost function. A function defined over the model output.
default	The alternative values for parameters which should be kept fixed
fsobol	The alternative function for calculating sobol indices
fsampl	The function for sampling data

Value

A list with holding experimnt, object and charts

Easy.Stability *Easy API for output stability*

Description

This functions run model several times in order to determine how many experiment replications are required for model's output being stable (i.e. the convergence of standard deviation)

Usage

```
Easy.Stability(m.dir, m.ds, m.time = 300, parameters, samples = 1,
  tries = 100, vars = c(), FUN, default = NULL)
```

Arguments

m.dir	The installation directory of some repast model
m.ds	The name of any model aggregate dataset
m.time	The total simulated time
parameters	The factors or model's parameter list
samples	The number of factor samples.
tries	The number of experiment replications
vars	The model's output variables for compute CoV
FUN	The objective or cost function. A function defined over the model output.
default	The alternative values for parameters which should be kept fixed

Value

A list with holding experiment, object and charts

Engine *Engine*

Description

Creates an instance of Engine

Usage

```
Engine()
```

Details

This function creates an instance of Repast model wrapper class. Before invoking the function Engine, make sure that environment was correctly initialized.

Value

An onject instance of Engine class

Engine.endAt *Engine.endAt*

Description

Configure the maximun simulated time for the current model run

Usage

```
Engine.endAt(e, v)
```

Arguments

e	An engine object instance
v	The number of Repast time ticks

Engine.Finish *Engine.Finish*

Description

Performs a cleanup on a engine instance.Finalize and destroy repast controller data.

Usage

```
Engine.Finish(e)
```

Arguments

e	An engine object instance

Engine.getId *Returns the model id*

Description

This function provides a wrapper to the method getId() from repast context. The id is basically a String with the currently instantiated model name.

Usage

```
Engine.getId(e)
```

Arguments

e	An engine object instance

Engine.GetModelOutput *Engine.GetModelOutput*

Description

Gets the model output data as a CSV String array. Calls the engine method GetModelOutput to drain model output data.

Usage

```
Engine.GetModelOutput(e)
```

Arguments

e	An engine object instance

Value

An array of strings containing the model's output

Examples

```
## Not run:
   d<- "c:/usr/models/your-model-directory"
   m<- Model(d)
   csv<- Engine.GetModelOutput(m)
## End(Not run)
```

Engine.getParameter *Engine.getParameter*

Description

The function gets the value of model parameter k as java.lang.Object

Usage

```
Engine.getParameter(e, k)
```

Arguments

e	An engine object instance
k	The parameter name

Value

The parameter value

`Engine.getParameterAsDouble`
Engine.getParameterAsDouble

Description

Get the value of model parameter `k` as `java.lang.Double`

Usage

```
Engine.getParameterAsDouble(e, k)
```

Arguments

`e`	An engine object instance
`k`	The parameter name

Value

The parmeter value as double

`Engine.getParameterAsNumber`
Engine.getParameterAsNumber

Description

Get the value of model parameter `k` as `java.lang.Number`

Usage

```
Engine.getParameterAsNumber(e, k)
```

Arguments

`e`	An engine object instance
`k`	The parameter name

Value

The parmeter value as number

`Engine.getParameterAsString`
Engine.getParameterAsString

Description

Get the value of model parameter `k` as `java.lang.String`

Usage

```
Engine.getParameterAsString(e, k)
```

Arguments

`e`	An engine object instance
`k`	The parameter name

Value

The parameter value as string

`Engine.getParameterNames`
Engine.getParameterNames

Description

Get the parameter names

Usage

```
Engine.getParameterNames(e)
```

Arguments

`e`	An engine object instance

Details

Returns the names of all declared model's parameters in the parameter.xml file in the scenario directory.

Value

A collection of parameter names

Engine.getParameterType *Engine.getParameterType*

Description

Returns the declared type of a Repast model parameter

Usage

```
Engine.getParameterType(e, k)
```

Arguments

e	An engine object instance
k	The parameter name

Value

The parameter type string

Engine.LoadModel *Engine.LoadModel*

Description

Loads the model's scenario files

Usage

```
Engine.LoadModel(e, f)
```

Arguments

e	An engine object instance
f	The full path of scenario directory

Details

This function loads the scenario of a Repast Model and initialize de model.

Engine.resetModelOutput *Engine.resetModelOutput*

Description

Resets the the model output holder

Usage

```
Engine.resetModelOutput(e)
```

Arguments

e	An engine object instance

Engine.RunModel *Engine.RunModel*

Description

Performs the execution of Repast model

Usage

```
Engine.RunModel(e)
```

Arguments

e	An engine object instance

Engine.SetAggregateDataSet *Engine.SetAggregateDataSet*

Description

Sets the model's dataset

Usage

```
Engine.SetAggregateDataSet(e, k)
```

Arguments

e	An engine object instance
k	The repast model's data set name

Details

Configure a dataset with the desired output values to be "drained" by the function Engine.GetModelOutput.

Examples

```
## Not run:
   d<- "C:/usr/models/your-model-directory"
   m<- Model(d)
   setAggregateDataSet(m,"dataset-name")
## End(Not run)
```

Engine.setParameter *Engine.setParameter*

Description

Set the value of model parameter

Usage

```
Engine.setParameter(e, k, v)
```

Arguments

e	An engine object instance
k	The parameter name
v	The parameter value

enginestats.calls *enginestats.calls*

Description

Return the current calls to the 'Engine.RunModel' function

Usage

```
enginestats.calls(increment = FALSE)
```

Arguments

increment	A flag telling to increment and update the counter

Value

The number of calls to 'Engine.RunModel'

enginestats.reset *enginestats.reset*

Description

Reset internal statistics

Usage

```
enginestats.reset()
```

getExperimentDataset *Helper function to get experiment* dataset

Description

The RunExperiment function returns a list holding the paramset, output and dataset collection. The paramset collection contains the parameters used for running the experimental setup. The output has the results from user provided calibration function. The dataset collection has the raw output of 'Repast' aggregated dataset.

Usage

```
getExperimentDataset(e)
```

Arguments

e	The experiement object returned by RunExperiment

Value

The reference to dataset container.

---

getExperimentOutput *Helper function to get experiment* output

---

Description

The RunExperiment function returns a list holding the paramset, output and dataset collection. The paramset collection contains the parameters used for running the experimental setup. The output has the results from user provided calibration function. The dataset collection has the raw output of 'Repast' aggregated dataset.

Usage

```
getExperimentOutput(e)
```

Arguments

e	The experiement object returned by RunExperiment

Value

The reference to output container.

---

getExperimentParamSet *Helper function to get experiment* paramset

---

Description

The RunExperiment function returns a list holding the paramset, output and dataset collection. The paramset collection contains the parameters used for running the experimental setup. The output has the results from user provided calibration function. The dataset collection has the raw output of 'Repast' aggregated dataset.

Usage

```
getExperimentParamSet(e)
```

Arguments

e	The experiement object returned by RunExperiment

Value

The reference to output container.

Examples

```
## Not run:
   d<- "C:/usr/models/your-model-directory"
   m<- Model(d)
   ...
   e<- RunExperiment(e,r=1,exp.design,my.cost)
   p<- getExperimentParamSet(e)
## End(Not run)
```

GetFactorLevels *GetFactorLevels*

Description

Returns the fator's levels

Usage

```
GetFactorLevels(factors, name)
```

Arguments

factors	The current factor collection
name	The factor name

Value

Levels

Examples

```
## Not run:
   f<- AddFactor0(name="Age",levels=c(25,30,40,65))
   f<- AddFactor0(factors=f, name="Weight",levels=c(60,70,80,90))

   GetFactorLevels(factors=f, "Age")
## End(Not run)
```

GetFactorsSize *Get the number of factors*

Description

Returns the total number of factors

Usage

```
GetFactorsSize(factors)
```

Arguments

factors	A collection of factors created with AddFactor

Value

The number of parameters in factors collection

getId *Gets the model name*

Description

Provides the name of the model currently instantiated.

Usage

```
getId()
```

getKeyRandom *Gets Repast randomSeed name*

Description

Returns the Repast randomSeed parameter name.

Usage

```
getKeyRandom()
```

Value

A string value holding the randomSeed name.

getLogDir *getLogDir()*

Description

Returns the value for log directory

Usage

```
getLogDir()
```

GetOutput *Gets the output*

Description

Returns the results of a model a data.frame from the last RUN. Should be used only if model replication is equal to 1, otherwise GetResults must be used.

Usage

```
GetOutput(e)
```

Arguments

e	An engine object instance

Value

Returns a data.frame with output data

Examples

```
## Not run:
   d<- "C:/usr/models/your-model-directory"
   m<- Model(d)
   ...
   data<- GetOutput(m)
## End(Not run)
```

getOutputDir *Gets output directory*

Description

Returns the value of module variable for storing the current output directory.

Usage

```
getOutputDir()
```

getpkgcores *getpkgcores*

Description

Returns the maximum number of cores to be used in parallel computations

Usage

```
getpkgcores()
```

Value

The number of cores

getpkgdefaultcores *getpkgdefaultcores*

Description

Provides the package default parallelism level which is 80% of total cores available

Usage

```
getpkgdefaultcores()
```

Value

Cores used by R/Repast

GetResults *Returns the model results*

Description

Returns the model results

Usage

```
GetResults()
```

GetResultsParameters *Gets the parameters*

Description

Returns the current set of paramters used for the last model run.

Usage

```
GetResultsParameters()
```

Value

A data.frame with parameters of the model.

GetSimulationParameters *Gets the simulation parameters*

Description

Returns a dataframe with the current set of input parameters for the last model run.

Usage

```
GetSimulationParameters(e)
```

Arguments

e	An engine object instance

Value

A data frame with simulation parameters

GetSimulationParameterType *GetSimulationParameterType*

Description

Returns the declared parameter type.

Usage

```
GetSimulationParameterType(e, k)
```

Arguments

e	An instance of 'Engine' object
k	The parameter name

Value

The parameter type as string

GoToPreviousDir *GoToPreviousDir*

Description

Returns to the saved work directory

Usage

```
GoToPreviousDir()
```

GoToWorkDir *GoToWorkDir*

Description

Changes the current work directory saving the previous one which is used in GoToPreviousDir. This function is called by Easy.Setup

Usage

```
GoToWorkDir()
```

`hybrid.distance` *hybrid.distance*

Description

Calculates the distance between some value a reference target value. It is an hybrid distance because when the value falls whithin a reference range the distance is 0, otherwise the distance between the value and the reference value is calculated using the user provided distance function.

Usage

```
hybrid.distance(value, reference, FUN = AoE.NRMSD)
```

Arguments

`value`	The value which will be compared against the reference
`reference`	The reference value. It should be a list holding the value, the range of values.
`FUN`	The distance function. The default is the NRMSD

Value

The distance metric

`hybrid.value` *hybrid.value*

Description

A simple helper function for generating the input list for the function 'hybrid.distance'. This list must hold the value and a range centered over the value.

Usage

```
hybrid.value(value, distance)
```

Arguments

`value`	The reference value
`distance`	The distance interval.

Value

The list holding the value and the interval 'min — value — max'

`jarfile` *jarfile*

Description

The jarfile returns the full path to some jar file available inside rrpast package

Usage

```
jarfile(fjar)
```

Arguments

`fjar`	The name of jar file

Value

The full path to jar file

`jvm.enablejmx` *jvm.enablejmx*

Description

Enable jmx for the current R/rJava session

Usage

```
jvm.enablejmx()
```

Details

Configures the JMX subsystem for the current session of R/rJava. This function must be called before any other function which initializes r/Java such as `Easy.Setup` or `Model` otherwise it will have no effect.

Examples

```
## Not run:
   jvm.enablejmx()
## End(Not run)
```

jvm.getruntime *jvm.getruntime*

Description

A wrapper for `System.getRuntime()`

Usage

```
jvm.getruntime()
```

Details

A simple wrapper for `System.getRuntime()` java method

jvm.get_parameters *jvm.get_parameters*

Description

Returns the current java virtual machine parameters

Usage

```
jvm.get_parameters()
```

Value

A string with JVM parameters.

jvm.init *Init R/JVM environment*

Description

Initialize rJava and repast environment with classpath. This function is called internally and it is not meant to be used directlly.

Usage

```
jvm.init()
```

Details

The default parameters can be changed as needed calling the primitive `jvm.set_parameters` befor instantiating the model engine.

References

[1] rJava: Low-Level R to Java Interface. Low-level interface to Java VM very much like .C/.Call and friends. Allows creation of objects, calling methods and accessing fields.

Examples

```
## Not run:
     jvm.init()
## End(Not run)
```

`jvm.memory` *jvm.memory*

Description

JVM memory state

Usage

```
jvm.memory()
```

Details

Provides information about the memory used by the JVM subsystem

---

`jvm.resetOut` *jvm.resetOut*

Description

Reset the System.out filed value to console output

Usage

```
jvm.resetOut()
```

Examples

```
## Not run:
   jvm.resetOut()
## End(Not run)
```

jvm.runtimegc *jvm.runtimegc*

Description

A wrapper for Runntime.gc()

Usage

```
jvm.runtimegc()
```

Details

Forces the execution of the JVM garbage collector

jvm.setOut *jvm.setOut*

Description

Set the System.out filed to a file

Usage

```
jvm.setOut(f)
```

Arguments

f	The output file name

Examples

```
## Not run:
   jvm.setOut("/tmp/SysteOut.log")
## End(Not run)
```

`jvm.set_parameters` *jvm.set_parameters*

Description

Configures the jvm parameters

Usage

```
jvm.set_parameters(s)
```

Arguments

`s`	The paramter string to be passed to the underlying JVM

Details

Set the underlying parameters for java virtual machine. The default values are "-server -Xms1024m -Xmx1024m". These defaults can be changed to fit the model requirements.

Examples

```
## Not run:
   jvm.set_parameters("-server -Xms512m -Xmx2048m")
## End(Not run)
```

`lcontains` *lcontains*

Description

Cheks if a list contains a name

Usage

```
lcontains(l, n)
```

Arguments

`l`	The list object
`n`	The item name

Value

Boolean TRUE if name is found on list

lget *get*

Description

Retrieve the value for a list item

Usage

```
lget(l, n)
```

Arguments

l	The list object
n	The item name

Value

The item value

Load *The Scenario loader*

Description

Loads the model's scenario. This function must be called before running the model.

Usage

```
Load(e)
```

Arguments

e	An engine object instance

Examples

```
## Not run:
   d<- "C:/usr/models/your-model-directory"
   m<- Model(d)
   Load(m)
## End(Not run)
```

Logger.setLevelInfo *Set the log level to INFO*

Description

Configures the underlying logging system

Usage

```
Logger.setLevelInfo()
```

Logger.setLevelWarning *Set the log level to WARNING*

Description

Configures the underlying logging system

Usage

```
Logger.setLevelWarning()
```

Model *The easy API for model initilization*

Description

Instantiate a repast model from the model dir without loading the scenario file.

Usage

```
Model(modeldir = "", maxtime = 300, dataset = "none", load = FALSE)
```

Arguments

modeldir	The installation directory of some repast model
maxtime	The total simulated time
dataset	The name of any model aggregate dataset
load	If true instantiate model and load scenario

Details

This is the entry point for model execution. Typically any model execution will start with this function which encapsulates all low level calls for model initialization. In order to perform simulations with repast from R code only `Model` and a few more function calls are required: `Load`, `Run`. Finally the output of model is managed with functions `GetResults` and `SaveSimulationData`.

Value

Returns the instance of repast model

References

[1] North, M.J., N.T. Collier, and J.R. Vos, "Experiences Creating Three Implementations of the Repast Agent Modeling Toolkit," ACM Transactions on Modeling and Computer Simulation, Vol. 16, Issue 1, pp. 1-25, ACM, New York, New York, USA (January 2006).

Examples

```
## Not run:
   d<- "C:/usr/models/your-model-directory"
   m<- Model(d)
## End(Not run)
```

ParallelClose *ParallelClose*

Description

Finalize the parallel execution environment for R/Repast

Usage

```
ParallelClose()
```

ParallelInit *ParallelInit*

Description

Initialize the parallel execution environment for R/Repast

Usage

```
ParallelInit()
```

parallelize *parallelize*

Description

Tells R/Repast to use multicore. Default is using just one core.

Usage

```
parallelize(v = NULL)
```

Arguments

v	A Bollean value telling if use multiple cores. When null just returns the current setting

Value

Boolean with current state

ParallellRunExperiment *ParallellRunExperiment*

Description

Run the model multiple times for different parameters given by design matrix function parameter.

Usage

```
ParallellRunExperiment(modeldir, datasource, maxtime, r = 1, design, FUN,
  default = NULL)
```

Arguments

modeldir	The installation directory of some repast model
datasource	The name of any model aggregate dataset
maxtime	The total simulated time
r	The number of experiment replications
design	The desing matrix holding parameter sampling
FUN	THe calibration function.
default	The alternative values for parameters which should be kept fixed

Details

The FUN function must return zero for perfect fit and values greater than zero otherwise.

Value

A list with output and dataset

Examples

```
## Not run:
  my.cost<- function(params, results) { # your best fit calculation, being 0 the best metric. }
   d<- "/usr/models/your-model-directory"
   f<- AddFactor(name="cyclePoint",min=40,max=90)
   f<- AddFactor(factors=f, name="conjugationCost",min=1,max=80)
   d<- AoE.LatinHypercube(factors=f)
   v<- ParallellRunExperiment()
## End(Not run)
```

`ParallelRun` *ParallelRun*

Description

Run simulations in parallel. This function executes the time steps of an instantiated model. The number of replications of model runs can be specified by the function parameter. The seed parameter may be omitted and will be generated internally. If provided, the seed collection, must contain the same number of `r` parameter.

Usage

```
ParallelRun(modeldir, datasource, maxtime, r = 1, seed = c(),
  design = NULL, default = NULL)
```

Arguments

`modeldir`	The installation directory of some repast model
`datasource`	The name of any model aggregate dataset
`maxtime`	The total simulated time
`r`	The number of experiment replications
`seed`	The random seed collection
`design`	The desing matrix holding parameter sampling
`default`	The alternative values for parameters which should be kept fixed

Value

The model output dataset

Examples

```
## Not run:
   md<- "/usr/models/your-model-directory"
   output<- ParallelRun(modeldir= md, maxtime = 360, dataset= ds, r=4)
## End(Not run)
```

PB.close *PB.close*

Description

Close the progress bar descriptor

Usage

```
PB.close()
```

PB.disable *PB.disable*

Description

Disable the progress bar visualization

Usage

```
PB.disable()
```

PB.enable *PB.enable*

Description

Enables the progress bar visualization

Usage

```
PB.enable()
```

PB.get *PB.get*

Description

Gets the the progress bar descriptor

Usage

```
PB.get()
```

PB.init *PB.init*

Description

Initialize progress bar for model execution.

Usage

```
PB.init(psets, replications)
```

Arguments

psets	– The total number of paramter sets being simulated
replications	– The number of replications per simulation round

PB.isEnabled *PB.isEnabled*

Description

Returns the global value indicating if progress bar is enabled.

Usage

```
PB.isEnabled()
```

Value

Boolean TRUE if progress bar must be shown

PB.pset *PB.pset*

Description

Update pset value

Usage

```
PB.pset(v)
```

Arguments

v	The current parameter set being simulated

PB.rnum *PB.rnum*

Description

Update run number value

Usage

```
PB.rnum(v)
```

Arguments

v	The current run number

PB.set *PB.set*

Description

Ses the progress bar descriptor

Usage

```
PB.set(obj)
```

Arguments

obj	– The progress bar descriptor

PB.update *PB.update*

Description

Update progress bar

Usage

```
PB.update(r = NULL)
```

Arguments

r	The current replication number

pick.fittest *pick.fittest*

Description

Choose the best solutions minimizing the objective function

Usage

```
pick.fittest(out, goals = c(), n = 4)
```

Arguments

out	The output data set holding the values of goals
goals	The column names which must be used as goal
n	The number of solutions

Value

The n rows holding the best results

Plot.Calibration *Plot of calibration*

Description

Generate plot for parameter sets providing best fit

Usage

```
Plot.Calibration(obj, key, title = NULL)
```

Arguments

obj	An instance of calibration Object
key	The column name
title	Chart title, may be null

Value

The resulting ggplot2 plot object

Plot.Morris *Plot of Morris output*

Description

Generate plot for Morris's screening method

Usage

```
Plot.Morris(obj, type, title = NULL)
```

Arguments

obj	An instance of Morris Object AoE.Morris
type	The chart type (mu*sigma|musigma|mu*mu)
title	Chart title, may be null

Value

The resulting ggplot2 plot object

Plot.Sobol *Plot of Sobol output*

Description

Generate plot for Sobol's GSA

Usage

```
Plot.Sobol(obj, type, title = NULL)
```

Arguments

obj	An instance of Sobol Object AoE.Sobol
type	The chart type
title	Chart title, may be null

Value

The resulting ggplot2 plot object

Plot.Stability *Plot stability of output*

Description

Generate plot for visually access the stability of coefficient of variation as function of simulation sample size.

Usage

```
Plot.Stability(obj, title = NULL)
```

Arguments

obj	An instance of Morris Object AoE.Morris
title	Chart title, may be null

Value

The resulting ggplot2 plot object

`Results.GetCharts` *Results.GetCharts*

Description

Simplify the access to the charts member

Usage

```
Results.GetCharts(obj)
```

Arguments

`obj`	An instance of the object returned by `Easy` methods

Value

The charts element inside results

`Results.GetExperiment` *Results.GetExperiment*

Description

Simplify the access to the experiment member

Usage

```
Results.GetExperiment(obj)
```

Arguments

`obj`	An instance of the object returned by `Easy` methods

Value

The experiment element inside results

Results.GetObject *Results.GetObject*

Description

Simplify the access to the object member

Usage

```
Results.GetObject(obj)
```

Arguments

obj	An instance of the object returned by Easy methods

Value

The object element inside results

Run *Run simulations*

Description

This function executes the time steps of an instantiated model. The number of replications of model runs can be specified by the function parameter. The seed parameter may be omitted and will be generated internally. If provided, the seed collection, must contain the same number of r parameter.

Usage

```
Run(e, r = 1, seed = c())
```

Arguments

e	An engine object instance
r	The number of experiment replications
seed	The random seed collection

Value

The model output dataset

Examples

```
## Not run:
   d<- "C:/usr/models/your-model-directory"
   m<- Model(d)
   Load(m)
   Run(m,r=2) # or Run(m,r=2,seed=c(1,2))
## End(Not run)
```

RunExperiment *Run an experimental setup*

Description

Run the model multiple times for different parameters given by design matrix function parameter.

Usage

```
RunExperiment(e, r = 1, design, FUN)
```

Arguments

e	An engine object instance
r	The number of experiment replications
design	The desing matrix holding parameter sampling
FUN	THe calibration function.

Details

The FUN function must return zero for perfect fit and values greater than zero otherwise.

Value

A list with output and dataset

Examples

```
## Not run:
  my.cost<- function(params, results) { # your best fit calculation, being 0 the best metric. }
   d<- "c:/usr/models/your-model-directory"
   m<- Model(d,dataset="ds::Output")
   Load(m)
   f<- AddFactor(name="cyclePoint",min=40,max=90)
   f<- AddFactor(factors=f, name="conjugationCost",min=1,max=80)
   d<- LatinHypercube(factors=f)
   p<- GetSimulationParameters(e)
   exp.design<- BuildParameterSet(d,p)
   v<- RunExperiment(e,r=1,exp.design,my.cost)
## End(Not run)
```

SaveSimulationData *Saving simulation output*

Description

Saves the simulation results of last call to Run(e) function.

Usage

```
SaveSimulationData(as = "csv", experiment = NULL)
```

Arguments

as	The desired output type, must be csv or xls
experiment	The experiment output

Details

The model must have been initialized or user must call `setId` explicitelly.

Value

The id of saved data

SequenceItem *SequenceItem*

Description

Generate a sequence from min to max using an increment based on the number of of elements in v

Usage

```
SequenceItem(v, min, max)
```

Arguments

v	A column of n x k design matrix
min	The lower boundary of range
max	The uper boundary of range

Value

A sequence between min and max value

setId — *Sets the model name*

Description

Set the name of the model currently instantiated.

Usage

```
setId(s)
```

Arguments

s	The model name

setKeyRandom — *Sets Repast randomSeed name*

Description

Configures a non-default value for Repast randomSeed parameter name.

Usage

```
setKeyRandom(k)
```

Arguments

k	The string with an alternative name for randomSeed

setOutputDir — *Sets output directory*

Description

Configure the desired directoy to save model output data.

Usage

```
setOutputDir(s)
```

Arguments

s	The full path for output directory

setpkgcores *setpkgcores*

Description

Configures the maximum number of cores to be used in parallel computations

Usage

```
setpkgcores(v)
```

Arguments

v	The number of cores

SetResults *Stores a data.frame*

Description

Stores a data.frame

Usage

```
SetResults(d)
```

Arguments

d	A data frame containing one replication data

SetResultsParameters *Sets the parameters*

Description

Save the current set of paramters used for the last model run.

Usage

```
SetResultsParameters(d)
```

Arguments

d	A data.frame with parameter values

SetSimulationParameter *SetSimulationParameter*

Description

Modify model's default parameter collection

Usage

```
SetSimulationParameter(e, key, value)
```

Arguments

e	An engine object instance
key	The paramter name
value	The parameter value

SetSimulationParameters *Set parameters for running model*

Description

Modify the repast model parameters with values provided in parameter 'p' which is a data frame with just one row.

Usage

```
SetSimulationParameters(e, p)
```

Arguments

e	An engine object instance
p	A data frame with simulation parameters

ShowClassPath *ShowClassPath*

Description

Shows the current classpath

Usage

```
ShowClassPath()
```

Value

the current setting of JVM classpath

Examples

```
## Not run:
   ShowClassPath()
## End(Not run)
```

ShowCores *ShowUsedCores*

Description

Prints the number of cores used

Usage

```
ShowCores()
```

ShowModelPaths *ShowModelPaths*

Description

Prints the paths. Shows the directories currently used to load model scenario and lib. The output of this function is informational only and can be used to check whether model data is being loaded properly from correct locations.

Usage

```
ShowModelPaths()
```

Examples

```
## Not run:
   ShowModelPaths()
## End(Not run)
```

UpdateDefaultParameters *UpdateDefaultParameters*

Description

Modify the value of the default parameters which should be kept fixed

Usage

```
UpdateDefaultParameters(e, p)
```

Arguments

e	An engine object instance
p	The collection of model fixed paramters to change

Examples

```
## Not run:
   d<- "C:/usr/models/your-model-directory"
   m<- Model(d)
   Load(m)

   p<- c(name1=value1, name2=2)
   UpdateDefaultParameters(m,p)
## End(Not run)
```

WrapperRun *WrapperRun*

Description

Wrapper for the Run and ParallelRun functions

Usage

```
WrapperRun(modeldir, datasource, maxtime, r = 1, seed = c(),
  design = NULL, default = NULL, multi = TRUE)
```

Arguments

modeldir	The installation directory of some repast model
datasource	The name of any model aggregate dataset
maxtime	The total simulated time
r	The number of experiment replications
seed	The random seed collection
design	The desing matrix holding parameter sampling
default	The alternative values for parameters which should be kept fixed
multi	allows forcing single core execution, default is using multi-core

Value

The model output dataset

WrapperRunExperiment *WrapperRunExperiment*

Description

Wrapper for the RunExperiment and ParallelRunExperiment functions

Usage

```
WrapperRunExperiment(modeldir, datasource, maxtime, r = 1, design, FUN,
  default = NULL)
```

Arguments

modeldir	The installation directory of some repast model
datasource	The name of any model aggregate dataset
maxtime	The total simulated time
r	The number of experiment replications
design	The desing matrix holding parameter sampling
FUN	The objective function.
default	The alternative values for parameters which should be kept fixed

Value

The model output dataset

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