

Package ‘farmR’

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Type Package

Title Mixed Integer model of Arable Farms

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Description A mixed integer description of an arable farm. Finds optimal farming plans given economic and social preference information.

License GPL-3

Suggests sp

LazyLoad yes

Depends rJava,methods

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CompositeFarm	<i>CompositeFarm</i>
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Description

Creates Composite Farm Objects

Usage

```
CompositeFarm(farmParams, mou = NULL, mouweights = c(1), soildata, SBFactories = NULL, haulagePerTonneP
```

Arguments

farmParams	A FarmParameters object to be used for all component farms
mou	A single ObjectiveParameters object or a list of such objects specifying the objective parameters used to define the component farms. If a list is supplied the total number of component farms will be the length of this list multiplied by the number of soil classes.
mouweights	If supplied this specifies the weightings to be used for each of the objective parameters supplied in the mou argument. The lengths of mouweights and mou must be equal.
soildata	A data.frame or SpatialDataFrame with a single row and items named (RF,X0.5,X0.75,X1.0,X1.25,X1.5) representing the yearly rainfall in mm and the proportion of land in each of the soiltype classes. All items must be present.
SBFactories	SpatialDataFrame object with the Locations of sugarbeet factories to be used to calculate sugarbeet transport costs. data(SBFactories) provides an appropriate dataframe. Requires the sp package

Author(s)

Ira Cooke

See Also

See also [Farm](#) and [FarmRepresentation](#)

Examples

```
showClass("CompositeFarm")
```

constrainArea-methods *Methods for Function constrainArea in Package 'farmR'*

Description

Constrain the area of a specific crop type

Methods

farm = "FarmRepresentation", cropName = "character", lb = "numeric" Constrain the area of a particular crop on a farm to be the value lb. If an optional ub argument is supplied the constraint is to hold the area of the crop between lb and ub

cropArea-methods *Methods for Function cropArea in Package 'farmR'*

Description

Methods for function cropArea in Package 'farmR'

Methods

farm = "FarmRepresentation", cropName = "character" Get the area cropped

cropNames-methods *Extract lists of crop names*

Description

Methods to extract lists of crop names

Methods

object = "FarmParameters" Get a string vector of crop names defined in the Parameters object

object = "FarmRepresentation" Get a string vector of crop names defined in the FarmRepresentation object

defaultArableFarmParameters

Functions to create default Parameters

Description

Create FarmParameters or ObjectiveParameters objects from default values

Usage

```
defaultArableFarmParameters()  
defaultArableObjectiveParameters()
```

Value

Both functions return an object of class Parameters. defaultArableFarmParameters returns a FarmParameters object defaultArableObjectiveParameters returns a ObjectiveParameters object

Author(s)

Ira Cooke

See Also

See also [ObjectiveParameters](#) and [FarmParameters](#)

Examples

```
op=defaultArableObjectiveParameters()  
fp=defaultArableFarmParameters()  
show(op) # Dump Objective parameters to screen in xml format  
show(fp) # Dump the Farm Parameters to screen in xml format
```

document-methods

Methods to extract java references to document objects

Description

Extract the underlying java xml document representing a Parameters object

Methods

params = "Parameters" Extract java references to xml document objects

 eo-methods

Methods for Function eo in Package 'farmR'

Description

Extract values of the "enterprise output" from FarmRepresentation objects

Methods

farm = "FarmRepresentation" Get the Enterprise output of a FarmRepresentation Object

Farm

*Farm***Description**

Create Farm objects

Usage

```
Farm(farm.params = defaultArableFarmParameters(), obj.params = NULL)
```

Arguments

farm.params	An object of class FarmParameters or the name of an xml file from which to read the parameters
obj.params	An object of class ObjectiveParameters or the name an xml file from which to read the parameters

Value

Returns a Farm object

Author(s)

Ira Cooke

See Also

See Also [CompositeFarm](#)

Examples

```
fm=Farm() # Create a default Farm object
solvep(fm) # Solve the farm
show(fm)
```

Farm-class	Class "Farm"
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Description

Represents a farm model for a single farm

Objects from the Class

Objects can be created by calls to [Farm](#)

Slots

model: Object of class "jobjRef" which is a reference to the internal java object representing the farm

cropNames: Object of class "vector" representing the crop names

Extends

Class "[FarmRepresentation](#)", directly.

Methods

set signature(farm = "Farm", input = "jobjRef"): Sets the multi objective preferences using an ObjectiveParameters document object, typically created using document(ObjectiveParameters())

set signature(farm = "Farm", input = "ObjectiveParameters"): Sets the multi objective preferences using an ObjectiveParameters object, typically created using ObjectiveParameters()

set signature(farm = "Farm", input = "character"): Sets the multi objective preferences using an xml preference file

Author(s)

Ira Cooke

See Also

See also [CompositeFarm](#) and [FarmRepresentation](#)

Examples

```
showClass("Farm")
```

Description

Create FarmParameters objects from xml files or from the defaults and customise by setting parameters

Usage

```
FarmParameters(file = defaultArableFarmParameters())
setSolverType(params, solver)
getSolverType(params)
setPriceForCrop(params, newPrice, cropName)
setSubsidyForCrop(params, newSubsidy, cropName)
setRelativePriceForCrop(params, cropName, val)
setRelativeRotationPenalties(params, val)
setRelativeLabourRequirements(params, val)
setRelativeYieldForCrop(params, cropName, val)
setRelativeCost(params, val, costType="Input", inputName="N fertiliser")
```

Arguments

file	A character string with the full path to an xml document containing the farm parameters
params	A FarmParameters object
solver	Character string with the name of the core solver to be used. Available values are "cbc" or "glpk"
newPrice	Numeric value of the absolute price per tonne for a crop
cropName	Character string with the name of the crop. A list of possible values can be obtained with cropNames(params)
newSubsidy	Numeric value of the absolute subsidy value per hectare for a crop
val	Numeric multiplier to be applied to the existing value of a parameter. A value of 1.0 leaves the parameter unchanged.
costType	A character string with one of the following values "Input", "Machinery", "Fuel", "Labour", "AreaSub" corresponding to different types of farming costs
inputName	Name of an input cost (required for costType="Input"). Available values depend on which values have been defined in params but defaults are "N fertiliser", "P fertiliser", "K fertiliser", "BGHerbicide", "WOHerbicide", "Seed Amount of crop"

Details

When creating FarmParameters objects xml document provided is parsed and stored internally as a java object. The raw xml can be viewed using the show command. Values in the xml document can be changed using the various set commands.

Use functions of the form setXXX() to set absolute values Use functions of the form setRelativeXXX() to set a multiplier on an existing value

Value

FarmParameters returns an object of the class FarmParameters

Author(s)

Ira Cooke

Examples

```
params=FarmParameters()  
show(params) # Dumps xml to the screen. It may be more useful to write to a file using the write command
```

FarmParameters-class *Class "FarmParameters"*

Description

Encapsulates an xml document containing detailed parameter information for the Farm model

Objects from the Class

Objects can be created by calls to the function [FarmParameters](#).

Slots

document: Object of class "jobjRef": a reference to an underlying java object containing the xml file

Extends

Class "[Parameters](#)", directly.

Methods

cropNames signature(object = "FarmParameters"): returns a vector of strings with the names of crops defined in the parameter file

Author(s)

Ira Cooke

See Also

See also [ObjectiveParameters](#)

Examples

```
showClass("FarmParameters")
```

FarmRepresentation-class

Class "FarmRepresentation"

Description

Abstract Class providing generic methods to access properties of Farm objects

Objects from the Class

A virtual Class: No objects may be created from it.

Methods

cropArea signature(farm = "FarmRepresentation", cropName = "character"): The area in hectares of the named crop. Should only be called on solved farm objects

cropNames signature(object = "FarmRepresentation"): A string vector with the names of all crops defined for this farm

eo signature(farm = "FarmRepresentation"): Enterprise output of the farm

guts signature(object = "FarmRepresentation"): Dump the internal representation of the farm to the screen. This is not pretty

isSolved signature(farm = "FarmRepresentation"): Returns 1 if the farm has been solved, 0 if not

model signature(farm = "FarmRepresentation"): Get a reference to the internal java reference representing this farm

objectiveNames signature(object = "FarmRepresentation"): A string vector with the names of objectives that will be optimised in a call to solvep

objectiveScaleFactors signature(farm = "FarmRepresentation"): A numeric vector with the relative weights (normalized) of objectives

objectiveValues signature(farm = "FarmRepresentation"): Get the values of the objectives. Should only be called for solved farms

profit signature(farm = "FarmRepresentation"): Get the value of the profit objective

setInputCost signature(farm = "FarmRepresentation", inputName = "character", inputCost = "numeric"): Set the value of a particular input (potential values are "Input", "Machinery", "Fuel", "Labour", "Ar

constrainArea signature(farm = "FarmRepresentation", cropName = "character", lb = "numeric"): Constrain the area of a particular crop on a farm to be the value lb. If an optional ub argument is supplied the constraint is to hold the area of the crop between lb and ub

show signature(object = "FarmRepresentation"): Print a summary of the Farm to the screen

solvelp signature(farm = "FarmRepresentation"): Solve the Model

Author(s)

Ira Cooke

See Also

See also [Farm CompositeFarm](#) and for concrete subclasses

Examples

```
showClass("FarmRepresentation")
```

guts-methods

Methods for Function guts in Package 'farmR'

Description

Spill the guts of the Farm or Composite farm all over the screen

Methods

object = "FarmRepresentation" Dump very detailed information about the internals of the model to the screen

isSolved-methods

Methods for Function isSolved in Package 'farmR'

Description

Determine whether

Methods

farm = "FarmRepresentation" Returns 1 if the farm has been solved 0 if not

 model-methods

Methods for Function model in Package 'farmR'

Description

Extract the internal java model object from a FarmRepresentation

Methods

farm = "FarmRepresentation" Returns a java object reference holding the model

objectiveNames-methods

Methods for Function objectiveNames in Package 'farmR'

Description

Get a list of the names of all the objectives defined in a FarmRepresentation or ObjectiveParameters object

Methods

object = "FarmRepresentation" Returns a list of the objectives

object = "ObjectiveParameters" Returns a list of the objectives

ObjectiveParameters

Create ObjectiveParameters objects

Description

Create ObjectiveParameters objects from xml files or from the defaults

Usage

```
ObjectiveParameters(file = defaultArableObjectiveParameters())
setWeightForObjective(params, objective, value)
getWeightForObjective(params, objective)
```

Arguments

file	A character string with the full path to an xml document containing the parameters
params	An ObjectiveParameters object
objective	A character string identifying the objective. Available values can be obtained via objectiveNames(params)
value	New weighting for objective. Objectives are renormalized so only the relative values assigned to different objectives are important.

Details

Parses the xml document provided and stores it internally as a java object. The raw xml can be viewed using the show command

Value

ObjectiveParameters returns an object of the class ObjectiveParameters
 getWeightForObjective returns the relative weight of the specified objective
 objectiveNames returns a string vector with the names of objectives

Author(s)

Ira Cooke

Examples

```
parameters=ObjectiveParameters()
show(parameters)

names=objectiveNames(parameters)
weights=sapply(names,function(x) getWeightForObjective(parameters,x))
```

ObjectiveParameters-class

Class "ObjectiveParameters"

Description

Represents multiple objective utility parameters for a Farm or CompositeFarm object

Objects from the Class

Objects can be created by calls to the function [ObjectiveParameters](#).

Slots

document: Object of class "jobRef" which is a reference to the underlying java object that holds the parameter data

Extends

Class "[Parameters](#)", directly.

Methods

set signature(farm = "Farm", input = "ObjectiveParameters"): Used to set the ObjectiveParameters for a single Farm object. Must be done before the first call to solve1p

objectiveNames signature(object="ObjectiveParameters"): Get a string vector with the objective parameters

Author(s)

Ira Cooke

See Also

See also [FarmParameters](#)

Examples

```
showClass("ObjectiveParameters")
```

objectiveScaleFactors-methods

Methods for Function objectiveScaleFactors in Package 'farmR'

Description

Get the normalised objective weights

Methods

farm = "FarmRepresentation" Returns a list of normalised objective weights

objectiveValues-methods

Methods for Function objectiveValues in Package 'farmR'

Description

Get a list of objective values

Methods

farm = "FarmRepresentation" Get a list of objective values

Parameters-class

Class "Parameters"

Description

Abstract class defining generic methods for Parameters objects

Objects from the Class

A virtual Class: No objects may be created from it.

Methods

document signature(params = "Parameters"): Get the underlying java object representing the Parameters

show signature(object = "Parameters"): Dump the parameters to screen

Author(s)

Ira Cooke

See Also

See also [ObjectiveParameters](#) [FarmParameters](#) for concrete subclasses

Examples

```
showClass("Parameters")
```

profit-methods *Methods for Function profit in Package 'farmR'*

Description

Get the profit value for a solved farm

Methods

farm = "FarmRepresentation" Return the maximum solved profit

SBFactories *Locations of Sugarbeet factories in the UK*

Description

SpatialPointsDataFrame with the locations of Sugarbeet factories in the UK

Usage

```
data(SBFactories)
```

Format

A SpatialPointsDataFrame with the locations and names of sugarbeet factories

Examples

```
data(SBFactories)
```

setInputCost-methods *Methods for Function setInputCost in Package 'farmR'*

Description

Set the cost of named inputs

Methods

farm = "FarmRepresentation", inputName = "character", inputCost = "numeric" Set the cost of a named input.

solvelp-methods

Methods for Function solvelp in Package 'farmR'

Description

Solve the model

Methods

farm = "FarmRepresentation" Solve the model

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