

Package ‘PDATK’

May 1, 2024

Type Package

Title Pancreatic Ductal Adenocarcinoma Tool-Kit

Version 1.12.0

Date `r Sys.Date()`

Description Pancreatic ductal adenocarcinoma (PDA) has a relatively poor prognosis and is one of the most lethal cancers. Molecular classification of gene expression profiles holds the potential to identify meaningful subtypes which can inform therapeutic strategy in the clinical setting. The Pancreatic Cancer Adenocarcinoma Tool-Kit (PDATK) provides an S4 class-based interface for performing unsupervised subtype discovery, cross-cohort meta-clustering, gene-expression-based classification, and subsequent survival analysis to identify prognostically useful subtypes in pancreatic cancer and beyond. Two novel methods, Consensus Subtypes in Pancreatic Cancer (CSPC) and Pancreatic Cancer Overall Survival Predictor (PCOSP) are included for consensus-based meta-clustering and overall-survival prediction, respectively. Additionally, four published subtype classifiers and three published prognostic gene signatures are included to allow users to easily recreate published results, apply existing classifiers to new data, and benchmark the relative performance of new methods.

The use of existing Bioconductor classes as input to all PDATK classes and methods enables integration with existing Bioconductor datasets, including the 21 pancreatic cancer patient cohorts available in the MetaGxPancreas data package. PDATK has been used to replicate results from Sandhu et al (2019) [<https://doi.org/10.1200/cci.18.00102>] and an additional paper is in the works using CSPC to validate subtypes from the included published classifiers, both of which use the data available in MetaGxPancreas. The inclusion of subtype centroids and prognostic gene signatures from these and other publications will enable researchers and clinicians to classify novel patient gene expression data, allowing the direct clinical application of the classifiers included in PDATK. Overall, PDATK provides a rich set of tools to identify and validate useful prognostic and molecular subtypes based on gene-expression data, benchmark new classifiers against existing ones, and apply discovered classifiers on novel patient data to inform clinical decision making.

License MIT + file LICENSE

Encoding UTF-8

Depends R (>= 4.1), SummarizedExperiment

Imports data.table, MultiAssayExperiment, ConsensusClusterPlus, igraph, ggplotify, matrixStats, RColorBrewer, clusterRepro, CoreGx, caret, survminer, methods, S4Vectors, BiocGenerics, survival, stats, plyr, dplyr, MatrixGenerics, BiocParallel, rlang, piano, scales, survcomp, genefu, ggplot2, switchBox, reportROC, pROC, verification, utils

Suggests testthat (>= 3.0.0), msigdb, BiocStyle, rmarkdown, knitr, HDF5Array

VignetteBuilder knitr

Roxygen list(markdown = TRUE, r6=FALSE)

biocViews GeneExpression, Pharmacogenetics, Pharmacogenomics, Software, Classification, Survival, Clustering, GenePrediction

BugReports <https://github.com/bhklab/PDATK/issues>

RoxygenNote 7.1.2

Collate 'class-S4Model.R' 'class-CohortList.R'
 'class-SurvivalExperiment.R' 'class-SurvivalModel.R'
 'class-ClinicalModel.R' 'class-ConsensusMetaclusteringModel.R'
 'class-CoxModel.R' 'class-GeneFuModel.R'
 'class-ModelComparison.R' 'class-NCSModel.R' 'class-PCOSP.R'
 'class-RGAModel.R' 'class-RLSModel.R' 'classUnions.R' 'data.R'
 'globals.R' 'methods-assignSubtypes.R'
 'methods-barPlotModelComparison.R' 'methods-coerce.R'
 'methods-compareModels.R'
 'methods-densityPlotModelComparison.R'
 'methods-dropNotCensored.R' 'methods-findCommonGenes.R'
 'methods-findCommonSamples.R' 'methods-forestPlot.R'
 'methods-getTopFeatures.R' 'methods-merge.R'
 'methods-normalize.R' 'methods-plotNetworkGraph.R'
 'methods-plotROC.R' 'methods-plotSurvivalCurves.R'
 'methods-predictClasses.R' 'methods-rankFeatures.R'
 'methods-runGSEA.R' 'methods-subset.R' 'methods-trainModel.R'
 'methods-validateModel.R' 'utilities.R'

git_url <https://git.bioconductor.org/packages/PDATK>

git_branch RELEASE_3_19

git_last_commit 857690d

git_last_commit_date 2024-04-30

Repository Bioconductor 3.19

Date/Publication 2024-04-30

Author Vandana Sandhu [aut],
 Heewon Seo [aut],
 Christopher Eeles [aut],

Neha Rohatgi [ctb],
Benjamin Haibe-Kains [aut, cre]

Maintainer Benjamin Haibe-Kains <benjamin.haibe.kains@utoronto.ca>

Contents

.findAllCohortPairs	6
.randomSampleIndex	7
assignColDataColumn	7
assignSubtypes	8
assignSubtypes,CohortList,list-method	9
assignSubtypes,SurvivalExperiment,data.frame-method	10
barPlotModelComparison	11
barPlotModelComparison,ClinicalModel,PCOSP_or_RLS_or_RGA-method	12
birnbaum	13
chen	13
ClinicalModel	14
ClinicalModel-class	15
CohortList	15
CohortList-class	16
cohortSubtypeDFs	16
compareModels	16
compareModels,ModelComparison,SurvivalModel-method	17
compareModels,SurvivalModel,SurvivalModel-method	18
ConsensusMetaclusteringModel	19
ConsensusMetaclusteringModel-class	20
CoxModel	20
CoxModel-class	21
CSPC_MAE	21
densityPlotModelComparison	22
densityPlotModelComparison,PCOSP_or_RLS_or_RGA,PCOSP_or_RLS_or_RGA-method	22
dropNotCensored	23
dropNotCensored,CohortList-method	24
dropNotCensored,SurvivalExperiment-method	24
existingClassifierData	25
findCommonGenes	26
findCommonGenes,CohortList-method	26
findCommonGenes,MultiAssayExperiment-method	27
findCommonSamples	27
findCommonSamples,CohortList-method	28
forestPlot	29
forestPlot,ModelComparison-method	29
forestPlot,PCOSP_or_ClinicalModel-method	31
GeneFuModel	32
GeneFuModel-class	33
getModelSeed	33
getModelSeed,SurvivalModel-method	34

getTopFeatures	34
getTopFeatures,MultiAssayExperiment-method	35
getTopFeatures,PCOSP-method	36
getTopFeatures,SummarizedExperiment-method	36
haiderSigScores	37
hasColDataColumns	37
merge,SurvivalExperiment,SurvivalExperiment-method	38
ModelComparison	39
ModelComparison-class	40
modelParams	40
modelParams,S4Model-method	41
modelParams<-	41
modelParams<- ,S4Model,List_or_list_or_NULL-method	42
models	42
models,S4Model-method	43
models,SurvivalModel-method	44
models<-	44
models<- ,S4Model,List_or_list_or_NULL-method	45
models<- ,SurvivalModel,SimpleList-method	45
NCSModel-class	46
NetworkCommunitySearchModel	46
normalize,data.frame_or_matrix-method	47
normalize,DFrame-method	47
normalize,MultiAssayExperiment-method	48
normalize,SummarizedExperiment-method	49
normalsMAE	50
optimalKMinimizeAmbiguity	50
PCOSP	51
PCOSP-class	52
PCOSP_or_ClinicalModel-class	52
PCOSP_or_RLS_or_RGA-class	52
plotNetworkGraph	53
plotNetworkGraph,NCSModel-method	53
plotROC	54
plotROC,PCOSP-method	54
plotSurvivalCurves	55
plotSurvivalCurves,CoxModel-method	55
predictClasses	56
predictClasses,CohortList,ClinicalModel-method	57
predictClasses,CohortList,GeneFuModel-method	58
predictClasses,CohortList,PCOSP_or_RLS_or_RGA-method	58
predictClasses,ConsensusMetaclusteringModel,ANY-method	59
predictClasses,NCSModel,ANY-method	60
predictClasses,SurvivalExperiment,ClinicalModel-method	60
predictClasses,SurvivalExperiment,GeneFuModel-method	61
predictClasses,SurvivalExperiment,PCOSP_or_RLS_or_RGA-method	62
preprocessCaret	63
RandomGeneAssignmentModel	64

RandomLabelShufflingModel	64
rankFeatures	65
rankFeatures,MultiAssayExperiment-method	66
rankFeatures,SummarizedExperiment-method	67
removeColDataFactorColumns	68
removeFactorColumns	68
renameColDataColumns	69
renameColumns	69
RGAModel-class	70
RLSModel-class	70
runGSEA	70
runGSEA,PCOSP,data.frame-method	71
S4Model-class	72
sampleClinicalModel	72
sampleCohortList	73
sampleCGCmicro	73
samplePCOSPmodel	74
samplePCOSPpredList	74
samplePCSI survExp	75
sampleRGAModel	75
sampleRLSmodel	76
sampleTrainedPCOSPmodel	76
sampleValPCOSPmodel	77
show,S4Model-method	77
subset,CohortList-method	78
SurvivalExperiment	78
SurvivalExperiment-class	79
SurvivalModel	80
SurvivalModel-class	80
trainData	81
trainData,S4Model-method	82
trainData<-	82
trainData<- ,S4Model-method	83
trainModel	83
trainModel,ClinicalModel-method	84
trainModel,ConsensusMetaclusteringModel-method	85
trainModel,CoxModel-method	86
trainModel,GeneFuModel-method	86
trainModel,NCSModel-method	87
trainModel,PCOSP-method	87
trainModel,RGAModel-method	88
trainModel,RLSModel-method	89
validateModel	90
validateModel,ClinicalModel,CohortList-method	91
validateModel,ClinicalModel,SurvivalExperiment-method	92
validateModel,ConsensusMetaclusteringModel,ConsensusMetaclusteringModel-method	93
validateModel,GeneFuModel,CohortList-method	94
validateModel,GeneFuModel,SurvivalExperiment-method	95

validateModel,PCOSP_or_RLS_or_RGA,CohortList-method	95
validateModel,PCOSP_or_RLS_or_RGA,SurvivalExperiment-method	96
validationData	97
validationData,S4Model-method	98
validationData,SurvivalModel-method	98
validationData<-	99
validationData<-,S4Model,List_or_list_or_NULL-method	99
validationData<-,SurvivalModel,CohortList-method	100
validationStats	100
validationStats,S4Model-method	101
validationStats,SurvivalModel-method	102
validationStats<-	102
validationStats<-,S4Model,DFrame_or_data.frame_data.table_or_NULL-method	103
validationStats<-,SurvivalModel,data.frame-method	103

Index**105**

.findAllCohortPairs *Find all non-self pair-wise combinations of cohorts*

Description

Find all non-self pair-wise combinations of cohorts

Usage

```
.findAllCohortPairs(clusterNames)
```

Arguments

`clusterNames` A character vector of cohort names

Value

A data.frame with the index of all non-self pair-wise cohort combinations. Rownames are the names of the two clusters being compared.

.randomSampleIndex *Generate a random sample from each group*

Description

Returns a list of equally size random samples from two or more sample groupings.

Usage

```
.randomSampleIndex(n, labels, groups)
```

Arguments

n	The sample size
labels	A vector of the group labels for all rows of the
groups	A vector of group labels for the data to sample from
numSamples	The number of samples to take

Value

A subset of your object with n random samples from each group in groups. The number of rows returned will equal the number of groups times the sample size.

assignColDataColumn *assignColDataColumn* Assign a new column directly to the colData slot of a SummarizedExperiment.

Description

assignColDataColumn
Assign a new column directly to the colData slot of a SummarizedExperiment.

Usage

```
assignColDataColumn(SE, colname, values)
```

Arguments

SE	A SummarizedExperiment object to assign colData columns to
colname	The name of the column to assign values to.
values	The values to assign to the col

Value

The SE object with the new column in the objects colData slot.

Examples

```
SE <- SummarizedExperiment(matrix(rnorm(100), 10, 10))
updatedSE <- assignColDataColumn(SE, 'test', rep(1, 10))
```

assignSubtypes	<i>Assign Sample Subtypes to an S4 Object</i>
----------------	---

Description

Assign Sample Subtypes to an S4 Object

Usage

```
assignSubtypes(object, subtypes, ...)
```

Arguments

object	An S4 object containing a slot representing samples or patients.
subtypes	A mapping to assign subtypes to the samples or patients in the object.
...	Allow new parameters to be defined for this generic.

Value

object with subtypes assigned to the sample metadata and the isSubtyped metadata item set to TRUE.

Examples

```
data(sampleICGCmicro)
data(cohortSubtypeDFs)

cohortList <- assignSubtypes(sampleICGCmicro,
  subtypes=cohortSubtypeDFs$ICGCMICRO,
  sampleCol='sample_name',
  subtypeCol='subtype')
```

assignSubtypes, CohortList, list-method

Assign Subtype Annotations to a SurvivalExperiment Object

Description

Assign Subtype Annotations to a SurvivalExperiment Object

Usage

```
## S4 method for signature 'CohortList,list'  
assignSubtypes(  
  object,  
  subtypes,  
  ...,  
  sampleCol = "sample_name",  
  subtypeCol = "subtype"  
)
```

Arguments

object	A CohortList.
subtypes	A list of data.frame objects, one per cohort, with to subtypes to assign to the colData slot of cohorts with a matching name.
...	Catch unnamed parameters. Not used.
sampleCol	A character vector indicating the name of the column with sample identifiers in the subtype column. Must match the name of the sample identifier in colData.
subtypeCol	A character vector indicating the name of the column with the subtype labels in the subtypes data.frame.

Value

The CohortList with the subtypes in the subtypes column of the colData slot and a metadata item, hasSubtypes, set to TRUE for each SurvivalExperiment.

Examples

```
data(sampleCohortList)  
data(cohortSubtypeDFs)  
  
cohortList <- assignSubtypes(sampleCohortList,  
  subtypes=cohortSubtypeDFs[names(sampleCohortList)],  
  sampleCol='sample_name',  
  subtypeCol='subtype')
```

 assignSubtypes, SurvivalExperiment, data.frame-method

Assign Subtype Annotations to a SurvivalExperiment Object

Description

Assign Subtype Annotations to a SurvivalExperiment Object

Usage

```
## S4 method for signature 'SurvivalExperiment,data.frame'
assignSubtypes(
  object,
  subtypes,
  ...,
  sampleCol = "sample_name",
  subtypeCol = "subtype"
)
```

Arguments

object	A SurvivalExperiment object where the subtype annotations will be added to the colData slot as the subtype column.
subtypes	A data.frame with
...	Force subsequent arguments to be named. Not used.
sampleCol	A character vector specifying the name of the column containing the sample names. These must match the colnames of the SurvivalExperiment. If the sample names are the rownames of the subtypes data.frame then set this parameter to 'rownames'. Defaults to 'sample_name'.
subtypeCol	A character vector specifying the name of the subtype column in the subtypes data.frame object. Defaults to 'subtype'.

Value

The SurvivalExperiment with the subtypes in the subtypes column of the colData slot and a metadata item, hasSubtypes, set to TRUE.

Examples

```
data(sampleICGCmicro)
data(cohortSubtypeDFs)

cohortList <- assignSubtypes(sampleICGCmicro,
  subtypes=cohortSubtypeDFs$ICGCMICRO,
  sampleCol='sample_name',
  subtypeCol='subtype')
```

`barPlotModelComparison`

Make A Bar Plot Comparing Performance Between Two S4 Objects Representing Mathematical Models.

Description

Make A Bar Plot Comparing Performance Between Two S4 Objects Representing Mathematical Models.

Usage

```
barPlotModelComparison(model1, model2, ...)
```

Arguments

<code>model1</code>	AnS4 object containing results of a mathematical model
<code>model2</code>	An S4 object containing results of a different mathematical model, but with the same or overlapping samples.
<code>...</code>	Allow new parameters to be defined for this generic.

Value

A bar plot comparing some aspect of `model1` and `model2`

Examples

```
data(sampleCohortList)
data(sampleValPCOSModel)
data(sampleICGmicro)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Setup the models
set.seed(1987)
clinicalModel <- ClinicalModel(sampleICGmicro,
  formula='prognosis ~ sex + age + T + N + M + grade',
  randomSeed=1987)

# Train the models
trainedClinicalModel <- trainModel(clinicalModel)

# Make predictions
clinicalPredCohortList <- predictClasses(sampleCohortList[c('PCSI', 'TCGA')],
  model=trainedClinicalModel)

# Validate the models
```

```

validatedClinicalModel <- validateModel(trainedClinicalModel,
  valData=clinicalPredCohortList)

# Plot the comparison
modelCompBarPlot <- barPlotModelComparison(validatedClinicalModel,
  sampleValPCOSPmodel, stat='AUC')

```

```

barPlotModelComparison, ClinicalModel, PCOSP_or_RLS_or_RGA-method
Make a Bar Plot Comparison Model Performance Between a ClinicalModel and a PCOSP, RLSModel or RGAModel object.

```

Description

Make a Bar Plot Comparison Model Performance Between a ClinicalModel and a PCOSP, RLSModel or RGAModel object.

Usage

```

## S4 method for signature 'ClinicalModel,PCOSP_or_RLS_or_RGA'
barPlotModelComparison(model1, model2, stat, ...)

```

Arguments

model1	A ClinicalModel object.
model2	A PCOSP or RLSModel or RGAModel object.
stat	A character vector specifying which statistic to compare the models using. Options are 'AUC', 'log_D_index' or 'concordance_index'.
...	Not used.

Value

A ggplot2 object showing a barplot coloured by the model and comparing the stat between all cohorts that both models were validated with.

Examples

```

data(sampleValPCOSPmodel)
data(sampleCohortList)
data(sampleICGCmicro)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Setup the models
clinicalModel <- ClinicalModel(sampleICGCmicro,
  formula='prognosis ~ sex + age + T + N + M + grade',

```

```
    randomSeed=1987)

# Train the models
trainedClinicalModel <- trainModel(clinicalModel)

# Make predctions
clinicalPredCohortList <- predictClasses(sampleCohortList[c('PCSI', 'TCGA')],
    model=trainedClinicalModel)

# Validate the models
validatedClinicalModel <- validateModel(trainedClinicalModel,
    valData=clinicalPredCohortList)

# Plot the comparison
modelCompBarPlot <- barPlotModelComparison(validatedClinicalModel,
    sampleValPCOSPmodel, stat='AUC')
```

birnbaum

Published classifier gene signature for Birnbaum

Description

The genes and coefficients for the gene signature from Birnbaum *et al.* (2017)

Examples

```
# Loads chen, birnbaum and haiderSigScores objects
data(existingClassifierData)
```

chen

Published classifier gene signature for Chen

Description

The genes and coefficients for the gene signature from Chen *et al.* (2015)

Examples

```
# Loads chen, birnbaum and haiderSigScores objects
data(existingClassifierData)
```

ClinicalModel *Constructor for the ClinicalModel Class*

Description

Constructor for the ClinicalModel Class

Usage

```
ClinicalModel(trainData, formula, minDaysSurvived = 365, ..., randomSeed)
```

Arguments

trainData	A SurvivalExperiment or CohortList object to construct a clinical model using
formula	A formula object or a character vector coercible to one. All columns specified in the formula must be in the colData slot of the all SurvivalExperiments in trainData.
minDaysSurvived	An integer specifying the minimum number of days required to be 'good' prognosis. Default is 365.
...	Force all subsequent parameters to be named. Not used.
randomSeed	An integer randomSeed that was used to train the model. Users should specify this when initializing a model to ensure reproducibility.

Value

A ClinicalModel object.

Examples

```
data(sampleICGCmicro)
set.seed(1987)
clinicalModel <- ClinicalModel(sampleICGCmicro,
  formula='prognosis ~ sex + age + T + N + M + grade', randomSeed=1987)
```

ClinicalModel-class *ClinicalModel Class Definition*

Description

An S4 class with a number of predefined methods for accessing slots relevant to a survival model. More specific model types will inherit from this class for their accessor methods and constructor.

Examples

```
data(sampleICGcmicro)
set.seed(1987)
survModel <- SurvivalModel(sampleICGcmicro, minDaysSurvived=385,
  randomSeed=1987)
```

CohortList *Constructor for the CohortList class, a specialized list for storing SurvivalExperiment objects.*

Description

Constructor for the CohortList class, a specialized list for storing SurvivalExperiment objects.

Usage

```
CohortList(..., mDataTypes)
```

Arguments

... One or more SurvivalExperiment objects.

mDataTypes A character vector with the same length as ... which indicates the molecular data type in each cohort. This will be assigned to mcols for the CohortList as well as to the metadata of each item in the list as mDataType.

Value

A CohortList object containing one or more SurvivalExperiment objects.

Examples

```
data(sampleICGcmicro)
set.seed(1987)
cohortList <- CohortList(list(survExp1=sampleICGcmicro,
  survExp2=sampleICGcmicro), mDataTypes=c('rna_micro', 'rna_micro'))
```

CohortList-class	<i>CohortList Class Definition</i>
------------------	------------------------------------

Description

A list containing only SurvivalExperiment objects.

cohortSubtypeDFs	<i>A list of sample subtypes for the data in sampleCohortList</i>
------------------	---

Description

A list of data.frames containing clinical subtypes for the data in the cohortSubtypeDFs object.

Examples

```
data(cohortSubtypeDFs)
```

compareModels	<i>Compare Two Mathematical Models Represented as S4 Objects</i>
---------------	--

Description

Compare Two Mathematical Models Represented as S4 Objects

Usage

```
compareModels(model1, model2, ...)
```

Arguments

model1	A S4 object representing some kind of mathematical model.
model2	A S4 object representing some kind of mathematical model.
...	Allow new parameters to be defined for this generic.

Value

A S4 object with statistics about the performance of each model.

Examples

```

data(sampleValPCOSModel)
data(sampleClinicalModel)
data(sampleCohortList)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Train the model
trainedClinicalModel <- trainModel(sampleClinicalModel)

# Predict risk/risk-class
ClinicalPredPCSI <- predictClasses(sampleCohortList[c('PCSI', 'TCGA')],
  model=trainedClinicalModel)

# Validate the models
validatedClinicalModel <- validateModel(trainedClinicalModel,
  valData=ClinicalPredPCSI)

# Compare the models
modelComp <- compareModels(sampleValPCOSModel, validatedClinicalModel)
head(modelComp)

```

compareModels, ModelComparison, SurvivalModel-method

Compare Two SurvivalModel Objects, Returning A ModelComparison Object With Statistics Comparing the Performance of Each Model.

Description

Compare Two SurvivalModel Objects, Returning A ModelComparison Object With Statistics Comparing the Performance of Each Model.

Usage

```

## S4 method for signature 'ModelComparison, SurvivalModel'
compareModels(model1, model2, model2Name)

```

Arguments

model1	An object inheriting from the SurvivalModel class.
model2	Another object inheriting from the SurvivalModel class
model2Name	A character vector with the name of the second model.

Value

A ModelComparison object with statistics comparing the two models.

Examples

```

data(sampleValPCOSPmodel)
data(sampleClinicalModel)
data(sampleCohortList)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Train the models
trainedClinicalModel <- trainModel(sampleClinicalModel)

# Predict risk/risk-class
clinicalPredCohortL <- predictClasses(sampleCohortList[c('PCSI', 'TCGA')],
  model=trainedClinicalModel)

# Validate the models
validatedClinicalModel <- validateModel(trainedClinicalModel,
  valData=clinicalPredCohortL)

# Compare the models
modelComp <- compareModels(sampleValPCOSPmodel, validatedClinicalModel)
head(modelComp)

# Compare model comparison to another model
modelCompComp <- compareModels(modelComp, sampleValPCOSPmodel)

```

```
compareModels, SurvivalModel, SurvivalModel-method
```

Compare Two SurvivalModel Objects, Returning A ModelComparison Object With Statistics Comparing the Performance of Each Model.

Description

Compare Two SurvivalModel Objects, Returning A ModelComparison Object With Statistics Comparing the Performance of Each Model.

Usage

```
## S4 method for signature 'SurvivalModel, SurvivalModel'
compareModels(model1, model2, modelNames)
```

Arguments

model1	An object inheriting from the SurvivalModel class.
model2	Another object inheriting from the SurvivalModel class
modelNames	Optional character vector with a name for each model. Defaults to the class of the model plus 1 and 2 if missing.

Value

A ModelComparison object with statistics comparing the two models.

Examples

```
data(sampleValPCOSModel)
data(sampleClinicalModel)
data(sampleCohortList)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Train the model
trainedClinicalModel <- trainModel(sampleClinicalModel)

# Predict risk/risk-class
ClinicalPredPCSI <- predictClasses(sampleCohortList[c('PCSI', 'TCGA')],
  model=trainedClinicalModel)

# Validate the models
validatedClinicalModel <- validateModel(trainedClinicalModel,
  valData=ClinicalPredPCSI)

# Compare the models
modelComp <- compareModels(sampleValPCOSModel, validatedClinicalModel)
head(modelComp)
```

ConsensusMetaclusteringModel

Constructor for a ConsensusClusterModel Object.

Description

Constructor for a ConsensusClusterModel Object.

Usage

```
ConsensusMetaclusteringModel(trainData, ..., randomSeed)
```

Arguments

trainData	A MultiAssayExperiment or SummarizedExperiment containing molecular data to be used for consensus clustering with ConsensusClusterPlus::ConsensusClusterPlus
...	Force subsequent parameters to be named. Not used.
randomSeed	An integer randomSeed that will be passed to the randomSeed parameter of the ConsensusClusterPlus::ConsensusClusterPlus function when training the model.

Value

A ConsensusMetaclusteringModel object containing the training data and ready to be trained.

See Also

[ConsensusClusterPlus::ConsensusClusterPlus](#)

Examples

```
data(CSPC_MAE)
set.seed(1987)
conMetaclustModel <- ConsensusMetaclusteringModel(CSPC_MAE, randomSeed=1987)
```

ConsensusMetaclusteringModel-class

An S4Model Containing Molecular Data to be Consensus Clustered

Description

An S4 wrapper class providing an interface to the ConsensusClusterPlus function from the package with the same name.

CoxModel

CoxModel constructor

Description

Build a CoxModel object from a MultiAssayExperiment of SurvivalExperiments. Allows easy application of the survival::coxph function to many SurvivalExperiment at once, assuming they share the survivalPredictor column.

Usage

```
CoxModel(object, survivalPredictor = "metacluster_labels")
```

Arguments

object A MultiAssayExperiment containing only SurvivalExperiment objects.

survivalPredictor A character vector indicating the name of the one or more columns in the colData slot of each SurvivalExperiment to use for testing survival differences between different groups. Must be a valid column in the colData of ALL experiments.

Value

A CoxModel object, with object in the trainData slot.

Examples

```
library(MultiAssayExperiment)
data(CSPC_MAE)
experiments(CSPC_MAE) <- endoapply(experiments(CSPC_MAE), SurvivalExperiment,
  event_occurred='vital_status', survival_time='days_to_death')
coxModel <- CoxModel(CSPC_MAE, survivalPredictor='sample_type')
```

CoxModel-class

CoxModel-class

Description

Fit a cox proportional hazards model (survival::coxph) to one or more experiments inside a MultiAssayExperiment object.

CSPC_MAE

A MultiAssayExperiment *containing cohorts of pancreatic cancer patients, for use in package examples.*

Description

A MultiAssayExperiment containing cohorts of pancreatic cancer patients, for use in package examples.

Examples

```
data(CSPC_MAE)
```

`densityPlotModelComparison`*Render A Density Plot of Model Performance for an S4 Object*

Description

Render A Density Plot of Model Performance for an S4 Object

Usage

```
densityPlotModelComparison(object, refModel, ...)
```

Arguments

<code>object</code>	An S4 object representing a statistical or ML model.
<code>refModel</code>	An S4 object representing a statistical or ML model to compare object against.
<code>...</code>	Allow additional parameters to be defined for this generic.

Value

A ggplot object containing the plot.

`densityPlotModelComparison, PCOSP_or_RLS_or_RGA, PCOSP_or_RLS_or_RGA-method`*Render a Density Plot Comparing Model Performance Between Two PCOSP, RLSModel or RGAModel object.*

Description

Render a Density Plot Comparing Model Performance Between Two PCOSP, RLSModel or RGAModel object.

Usage

```
## S4 method for signature 'PCOSP_or_RLS_or_RGA, PCOSP_or_RLS_or_RGA'  
densityPlotModelComparison(  
  object,  
  refModel,  
  ...,  
  title,  
  xlab,  
  ylab,  
  mDataTypeLabels  
)
```

Arguments

object	A PCOSP, RLSModel or RGAModel object.
refModel	A PCOSP, RLSModel or RGAModel object to compare performance against.
...	Catch unnamed parameters. Not used.
title	Optional character vector with plot title.
xlab	Optional character vector with x-axis label.
ylab	Optional character vector with y-axis label.
mDataTypeLabels	Optional character vector whos names are one or more existing mDataTypes in object and refModel and whos values are the desired mDataType labels in the plot facets.

Value

A ggplot object with a density plot of model AUCs for object and a vertical line for the average AUC of refModel, faceted by mDataType.

dropNotCensored	<i>Remove Censored Patient Samples from An S4 Object.</i>
-----------------	---

Description

Remove Censored Patient Samples from An S4 Object.

Usage

```
dropNotCensored(object, ...)
```

Arguments

object	An S4 object containing survival data which needs to have patients who were not censored before some criteria.
...	Allow new parameters to be defined for this generic.

Value

S4 The object subset to only those patients which pass the censoring criteria.

Examples

```
data(sampleICGcmicro)
ICGcmicro <- dropNotCensored(sampleICGcmicro)
```

dropNotCensored, CohortList-method

Remove Censored Patients from Each SurvivalExperiment in a CohortList

Description

Remove Censored Patients from Each SurvivalExperiment in a CohortList

Usage

```
## S4 method for signature 'CohortList'
dropNotCensored(object, minDaysSurvived = 365)
```

Arguments

object A CohortList for which to drop patients who died before each SurvivalExperiment item a specified date.

minDaysSurvived An integer specifying the minimum number of days a patient needs to have survived to be included in the cohort.

Value

The CohortList with censored samples removed.

Examples

```
data(sampleCohortList)
valCohortList <- dropNotCensored(sampleCohortList)
```

dropNotCensored, SurvivalExperiment-method

Remove Censored Patients from A SurvivalExperiment Object

Description

Remove Censored Patients from A SurvivalExperiment Object

Usage

```
## S4 method for signature 'SurvivalExperiment'
dropNotCensored(object, minDaysSurvived = 365)
```


Arguments

`object` A SurvivalExperiment to censor.
`minDaysSurvived` An integer specifying the minimum number of days a patient needs to have survived to be included in the cohort.

Details

Censored means no event before end of measurement. Since we want not censored, we keep patients who had an event before `minDaysSurvived`. Therefore we keep individuals surviving $>$ `minDaysSurvived`, or who had an event (died) before `minDaysSurvived`.

Value

The SurvivalExperiment with censored samples removed.

Examples

```
data(sampleICGCmicro)
ICGCmicro <- dropNotCensored(sampleICGCmicro)
```

existingClassifierData
existingClassifierData

Description

existingClassifierData

Value

Three objects:

- `chen`: The genes and coefficients for the gene signature from Chen *et al.* (2015)
- `birnbaum`: The genes and coefficients for the gene signature from Birnbaum *et al.* (2017)
- `haiderSigScores`: The classifier risk scores from Haider *et al.* (2014)

Examples

```
# Loads chen, birnbaum and haiderSigScores objects
data(existingClassifierData)
```

findCommonGenes *Find the common genes in an S4 object.*

Description

Find the common genes in an S4 object.

Usage

```
findCommonGenes(object, ...)
```

Arguments

object An S4 object to find common genes for.
 ... Allow new parameters to be defined for this generic.

Value

A character vector of common gene names.

Examples

```
data(sampleCohortList)
commonGenes <- findCommonGenes(sampleCohortList)
head(commonGenes)
```

findCommonGenes,CohortList-method

Intersect Gene Names for All SurvivalExperiments in a CohortList

Description

Intersect Gene Names for All SurvivalExperiments in a CohortList

Usage

```
## S4 method for signature 'CohortList'
findCommonGenes(object)
```

Arguments

object A CohortList of SurvivalExperiments to find common genes between.

Value

A character vector of genes common to all SurvivalExperiments in the CohortList.

Examples

```
data(sampleCohortList)
commonGenes <- findCommonGenes(sampleCohortList)
head(commonGenes)
```

findCommonGenes,MultiAssayExperiment-method

*Intersect Gene Names for All experiments in a
MultiAssayExperiment*

Description

Intersect Gene Names for All experiments in a MultiAssayExperiment

Usage

```
## S4 method for signature 'MultiAssayExperiment'
findCommonGenes(object)
```

Arguments

object A MultiAssayExperiment where rownames represent genes.

Value

A character vector of genes common to all experiments in the MutliAssayExperiment.

findCommonSamples

*Find Common Samples in a List-like S4 Object where The Columns of
Each Item Represent Samples*

Description

Find Common Samples in a List-like S4 Object where The Columns of Each Item Represent Samples

Usage

```
findCommonSamples(object, ...)
```

Arguments

object A S4 object, where the columns of each element represent samples.
 ... Allow new parameters to be defined for this generic.

Value

A character vector of common sample names.

Examples

```
data(sampleCohortList)
commonSamples <- findCommonSamples(sampleCohortList)
head(commonSamples)
```

findCommonSamples, CohortList-method

Find Common Samples in a CohortList Object where The Columns of Each Item Represent Samples

Description

Find Common Samples in a CohortList Object where The Columns of Each Item Represent Samples

Usage

```
## S4 method for signature 'CohortList'
findCommonSamples(object)
```

Arguments

object A CohortList for which we want to find common samples between all SurvivalExperiment objects.

Value

A character vector of common sample names.

Examples

```
data(sampleCohortList)
commonSamples <- findCommonSamples(sampleCohortList)
head(commonSamples)
```

forestPlot	<i>Generate a forest plot from an S4 object</i>
------------	---

Description

Generate a forest plot from an S4 object

Usage

```
forestPlot(object, ...)
```

Arguments

object	An S4 object to create a forest plot of.
...	Allow new parameters to this generic.

Value

None, draws a forest plot.

Examples

```
data(sampleValPCOSPmodel)

# Plot
dIndexForestPlot <- forestPlot(sampleValPCOSPmodel, stat='log_D_index')
```

forestPlot,ModelComparison-method

Render a forest plot from the validationStats slot of a PCOSP model object.

Description

Render a forest plot from the validationStats slot of a PCOSP model object.

Usage

```
## S4 method for signature 'ModelComparison'
forestPlot(
  object,
  stat,
  groupBy = "cohort",
  colourBy = "model",
  vline,
```

```

    ...,
    xlab,
    ylab,
    transform,
    colours,
    title
  )

```

Arguments

<code>object</code>	A ModelComparison object to forest plot.
<code>stat</code>	A character vector specifying a statistic to plot.
<code>groupBy</code>	A character vector with one or more columns in <code>validationStats</code> to group by. These will be the facets in your forestplot.
<code>colourBy</code>	A character vector specifying the columns in <code>validationStats</code> to colour by.
<code>vline</code>	An integer value on the x-axis to place a dotted vertical line.
<code>...</code>	Force subsequent parameters to be named, not used.
<code>xlab</code>	A character vector specifying the desired x label. Automatically guesses based on the <code>stat</code> argument.
<code>ylab</code>	A character vector specifying the desired y label. Defaults to 'Cohort (P-value)'.
<code>transform</code>	The name of a numeric function to transform the statistic before making the forest plot.
<code>colours</code>	A character vector of colours to pass into <code>ggplot2::scale_fill_manual</code> , which modify the <code>colourBy</code> argument.
<code>title</code>	A character vector with a title to add to the plot.

Value

A `ggplot2` object.

Examples

```

data(sampleValPCOSModel)
data(sampleClinicalModel)
data(sampleCohortList)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Train the models
trainedClinicalModel <- trainModel(sampleClinicalModel)

# Predict risk/risk-class
ClinicalPredCohortL <- predictClasses(sampleCohortList[c('PCSI', 'TCGA')],
  model=trainedClinicalModel)

```

```

# Validate the models
validatedClinicalModel <- validateModel(trainedClinicalModel,
  valData=ClinicalPredCohortL)

# Compare the models
modelComp <- compareModels(sampleValPCOSPmodel, validatedClinicalModel)

# Make the forest plot
modelComp <- modelComp[modelComp$isSummary == TRUE, ]
modelCindexCompForestPlot <- forestPlot(modelComp, stat='concordance_index')

```

forestPlot,PCOSP_or_ClinicalModel-method

Render a forest plot from the validationStats slot of a PCOSP model object.

Description

Render a forest plot from the validationStats slot of a PCOSP model object.

Usage

```

## S4 method for signature 'PCOSP_or_ClinicalModel'
forestPlot(
  object,
  stat,
  groupBy = "mDataType",
  colourBy = "isSummary",
  vline,
  ...,
  xlab,
  ylab,
  transform,
  colours,
  title
)

```

Arguments

object	A PCOSP model which has been validated with validateModel and therefore has data in the validationStats slot.
stat	A character vector specifying a statistic to plot.
groupBy	A character vector with one or more columns in validationStats to group by. These will be the facets in your forestplot.
colourBy	A character vector specifying the columns in validationStats to colour by.
vline	An integer value on the x-axis to place a dotted vertical line.

...	Force subsequent parameters to be named, not used.
xlab	A character vector specifying the desired x label. Automatically guesses based on the stat argument.
ylab	A character vector specifying the desired y label. Defaults to 'Cohort (P-value)'.
transform	The name of a numeric function to transform the statistic before making the forest plot.
colours	A character vector of colours to pass into <code>ggplot2::scale_fill_manual</code> , which modify the colourBy argument.
title	A character vector with a title to add to the plot.

Value

A ggplot2 object.

Examples

```
data(sampleValPCOSPmodel)

# Plot
dIndexForestPlot <- forestPlot(sampleValPCOSPmodel, stat='log_D_index')
```

GeneFuModel

GeneFuModel *Constructor Method*

Description

GeneFuModel Constructor Method

Usage

```
GeneFuModel(
  trainCohorts = SurvivalExperiment(),
  minDaysSurvived = 365,
  ...,
  randomSeed
)
```

Arguments

`trainCohorts` A `CohortList` or `SurvivalExperiment` containing training data for the `geneFu` model. If you don't have training data, but have a trained model this will default to an empty `SurvivalExperiment`. You can then assign the model using the `models` setter method.

minDaysSurvived	An integer specifying the minimum days survived to be considered in the 'good' survival prognosis group.
...	Fall through parameter to SurvivalModel constructor.
randomSeed	An integer randomSeed that was used to train the model. Users should specify this when initializing a model to ensure reproducibility.

Value

A GeneFuModel object, with model parameters in the

Examples

```
set.seed(1987)
geneFuModel <- GeneFuModel(randomSeed=1987)
```

GeneFuModel-class	<i>A SurvivalModel Sub-class Designed to Hold A Survival Model Generated Using the geneFu R package.</i>
-------------------	--

Description

A SurvivalModel Sub-class Designed to Hold A Survival Model Generated Using the geneFu R package.

getModelSeed	<i>Generic for retrieving the randomSeed parameter from a SurvivalModel object.</i>
--------------	---

Description

This should be used to set the seed before model training to ensure reproducible results.

Usage

```
getModelSeed(object)
```

Arguments

object	An S4 object to get the seed from.
--------	------------------------------------

Value

An integer seed to be used when training the a SurvivalModel.

Examples

```
data(samplePCOSPmodel)
getModelSeed(samplePCOSPmodel)
```

getModelSeed, SurvivalModel-method

Method for retrieving the random seed used for training a specific survival model object.

Description

This should be used to set the seed before model training to ensure reproducible results.

Usage

```
## S4 method for signature 'SurvivalModel'
getModelSeed(object)
```

Arguments

object A SurvivalModel object to get the seed from.

Value

An integer seed to be used when training the a SurvivalModel.

Examples

```
data(samplePCOSPmodel)
getModelSeed(samplePCOSPmodel)
```

getTopFeatures

Get the Top Predictive Features from an S4 Object

Description

Get the Top Predictive Features from an S4 Object

Usage

```
getTopFeatures(object, ...)
```

Arguments

object An S4 object to get top scoring features from.
... Allow additional parameters to be defined for this generic.

Value

A character vector of top predictive features.

Examples

```
data(sampleTrainedPCOSPmodel)

# Get the top features
topFeatures <- getTopFeatures(sampleTrainedPCOSPmodel, numModels=2)
```

getTopFeatures,MultiAssayExperiment-method

Get the Top Ranked Features in a MultiAssayExperiment object

Description

Get the Top Ranked Features in a MultiAssayExperiment object

Usage

```
## S4 method for signature 'MultiAssayExperiment'
getTopFeatures(object, numFeats, ...)
```

Arguments

object A SummarizedExperiment to extract top features from
numFeats An integer number of top ranked features to extract.
... Fall through arguments to rankFeatures.

Value

A character vector of top ranked features, with the features in order of rank ascending.

See Also

[rankFeatures,MultiAssayExperiment-method](#)

```
getTopFeatures, PCOSP-method
```

Get the top features for classification using a PCOSP model object.

Description

Get the top features for classification using a PCOSP model object.

Usage

```
## S4 method for signature 'PCOSP'
getTopFeatures(object, numModels)
```

Arguments

<code>object</code>	A PCOSP model object which has been trained with <code>trainModel</code> .
<code>numModels</code>	An integer specifying the number of top models to use features from. Defaults to top 10% of KTSPs models.

Value

A character vector of gene names representing the unique genes from the top `numModels` KTSPs models in the model object.

Examples

```
data(sampleTrainedPCOSPmodel)

# Get the top features
topFeatures <- getTopFeatures(sampleTrainedPCOSPmodel, numModels=5)
```

```
getTopFeatures, SummarizedExperiment-method
```

Get the Top Ranked Features in a SummarizedExperiment object

Description

Get the Top Ranked Features in a SummarizedExperiment object

Usage

```
## S4 method for signature 'SummarizedExperiment'
getTopFeatures(object, numFeats, ..., rankCol = "feature_rank")
```

Arguments

object	A SummarizedExperiment to extract top features from
numFeats	An integer number of top ranked features to extract.
...	Fall through arguments to rankFeatures, which is used to calculate the ranks if rankCol is not present the object rowData.
rankCol	The name of the column containing the integer feature ranks. Defaults to feature_rank, as calculated with rankFeatures, but users can alternatively specify their own custom rank column if desired.

Value

A character vector of top ranked features, with the features in order of rank ascending.

Examples

```
data(sampleICGCmicro)
getTopFeatures(sampleICGCmicro, numFeats=20)
```

haiderSigScores	<i>Classifier survival scores for Haider</i>
-----------------	--

Description

The classifier risk scores from Haider *et al.* (2014)

Examples

```
# Loads chen, birnbaum and haiderSigScores objects
data(existingClassifierData)
```

hasColDataColumns	<i>Check for Column Names in the colData Slot of a SummarizedExperiment</i>
-------------------	---

Description

Check for Column Names in the colData Slot of a SummarizedExperiment

Usage

```
hasColDataColumns(SE, values)
```

Arguments

SE A SummarizedExperiment object to check for the existence of colData columns.
 values A character vector with one or more column name to check for in the column data.

Value

logical True if all of values are column names in the SummarizedExperiment object, FALSE otherwise.

Examples

```
SE <- SummarizedExperiment(matrix(rnorm(100), 10, 10),
  colData=data.frame(test=rep(1, 10)))
hasColDataColumns(SE, 'test')
```

merge, SurvivalExperiment, SurvivalExperiment-method

Merge two SurvivalExperiments, subsetting to shared rows and columns

Description

Merge two SurvivalExperiments, subsetting to shared rows and columns

Usage

```
## S4 method for signature 'SurvivalExperiment, SurvivalExperiment'
merge(x, y, cohortNames)
```

Arguments

x A SurvivalExperiment.
 y A SurvivalExperiment.
 cohortNames An optional character vector specifying the a name for each SurvivalExperiment.

Value

A SurvivalExperiment object with merge data from x and y, and the assay from each in the assays slot.

Examples

```
data(sampleICGmicro)
survExp2 <- sampleICGmicro
mergedSurvExp <- merge(survExp2, sampleICGmicro,
  cohortNames=c('copyICGmicro', 'ICGmicro'))
mergedSurvExp
```

ModelComparison

ModelComparison Constructor

Description

ModelComparison Constructor

Usage

```
ModelComparison(model1, model2, ...)
```

Arguments

model1	An object with a validationStats method which returns a data.table. Probably this object should inherit from SurvivalModel.
model2	An object with a validationStats method which returns a data.table. Probably this object should inherit from SurvivalModel.
...	Not used.

Value

A ModelComparison object, which is a wrapper for DataFrame which is used for method dispatch.

Examples

```
data(sampleValPCOSModel)
data(sampleClinicalModel)
data(sampleCohortList)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Train the models
trainedClinicalModel <- trainModel(sampleClinicalModel)

# Predict risk/risk-class
clinicalPredCohortL <- predictClasses(sampleCohortList[c('PCSI', 'TCGA')],
  model=trainedClinicalModel)

# Validate the models
```

```

validatedClinicalModel <- validateModel(trainedClinicalModel,
  valData=clinicalPredCohortL)

# Compare the models
modelComp <- ModelComparison(sampleValPCOSPmodel, validatedClinicalModel)
head(modelComp)

```

ModelComparison-class *ModelComparison Class Definition*

Description

ModelComparison Class Definition

modelParams *Generic for Accessing the Model Parameters of an S4 Object*

Description

Generic for Accessing the Model Parameters of an S4 Object

Usage

```
modelParams(object, ...)
```

Arguments

object	A S4 Object.
...	Allow additional arguments to be defined for this generic.

Value

A List- or list-like object containing all the parameters needed to reproduce a specific model training run, including environmental settings like the random seed and RNGkind.

Examples

```

data(CSPC_MAE)
set.seed(1987)
metaclustModel <- ConMetaclustModel(CSPC_MAE, randomSeed=1987)
modelParams(metaclustModel)

```

 modelParams,S4Model-method

Accessor for the Model Parameters of an S4Model Object

Description

Accessor for the Model Parameters of an S4Model Object

Usage

```
## S4 method for signature 'S4Model'
modelParams(object)
```

Arguments

object A S4Model Object

Value

A List- or list-like object containing all the parameters needed to reproduce a specific model training run, including environmental settings like the random seed and RNGkind.

 modelParams<-

Generic for Setting the Model Parameters of An S4 Object

Description

Generic for Setting the Model Parameters of An S4 Object

Usage

```
modelParams(object, ...) <- value
```

Arguments

object An S4 Object
 ... Allow additional parameters to be defined for this generic.
 value A List- or list-like object containing the parameters for the model.

Value

None, modifies the object.

Examples

```
data(CSPC_MAE)
set.seed(1987)
metaclustModel <- ConMetaclustModel(CSPC_MAE, randomSeed=1987)
modelParams(metaclustModel) <- list(alpha=0.05)
```

```
modelParams<-, S4Model, List_or_list_or_NULL-method
      Setter for the modelParams of an S4Model
```

Description

Setter for the modelParams of an S4Model

Usage

```
## S4 replacement method for signature 'S4Model,List_or_list_or_NULL'
modelParams(object) <- value
```

Arguments

object	An S4Model
value	A List- or list-like object containing the parameters for the model.

Details

This method is not intended for interactive use and will throw a warning when used interactively.

Value

None, modifies the object.

```
models      Accessor for the models slot of an S4 object
```

Description

Accessor for the models slot of an S4 object

Usage

```
models(object, ...)
```

Arguments

object An S4 object to retrieve models from.
... Allow new parameters to be defined for this generic.

Value

An S4 object representing a model.

Examples

```
data(CSPC_MAE)
set.seed(1987)
metaclustModel <- ConMetaclustModel(CSPC_MAE, randomSeed=1987)
models(metaclustModel)
```

models, S4Model-method *Getter for the models slot of an S4Model Object*

Description

Getter for the models slot of an S4Model Object

Usage

```
## S4 method for signature 'S4Model'
models(object)
```

Arguments

object An S4Model object to retrieve models from.

Value

An List- or list-like object representing a model.

models, SurvivalModel-method

Getter for the models slot of a SurvivalModel object

Description

Getter for the models slot of a SurvivalModel object

Usage

```
## S4 method for signature 'SurvivalModel'
models(object)
```

Arguments

object A SurvivalModel model object to retrieve the models slot from.

Value

A SimpleList of top scoring KTSPmodels

Examples

```
data(samplePCOSPmodel)
models(samplePCOSPmodel)
```

models<-

Accessor for the models slot of an S4 object

Description

Accessor for the models slot of an S4 object

Usage

```
models(object, ...) <- value
```

Arguments

object An S4 object to retrieve models from.
 ... Allow new parameters to be defined for this generic.
 value A List- or list-like object.

Value

None, updates the object.

Examples

```
data(CSPC_MAE)
set.seed(1987)
metaclustModel <- ConMetaclustModel(CSPC_MAE, randomSeed=1987)
models(metaclustModel) <- list(model1='some_kind_of_model')
```

models<-,S4Model,List_or_list_or_NULL-method
Setter for the Models Slot of an S4Model Object

Description

Setter for the Models Slot of an S4Model Object

Usage

```
## S4 replacement method for signature 'S4Model,List_or_list_or_NULL'
models(object) <- value
```

Arguments

object An S4Model object to retrieve models from.
value A List- or list-like object.

Value

An List- or list-like object representing a model.

models<-,SurvivalModel,SimpleList-method
Setter for the models slot of a SurvivalModel object

Description

Setter for the models slot of a SurvivalModel object

Usage

```
## S4 replacement method for signature 'SurvivalModel,SimpleList'
models(object) <- value
```

Arguments

object A SurvivalModel object to update
 value A SimpleList of trained KTSP models

Value

None, updates the object.

Examples

```
data(samplePCOSPmodel)
models(samplePCOSPmodel) <- SimpleList(model1=NA)
```

NCSModel-class *S4Model Class for Metaclustering Using Network Community Search*

Description

S4Model Class for Metaclustering Using Network Community Search

NetworkCommunitySearchModel
Constructor for a NetworkCommunitySearchModel (NCSModel)

Description

Use `igraph::fastgreedy.community` cross-cohort metaclusters for a `ConsensusMetaclusteringModel` which has been validated with `validateModel`.

Usage

```
NetworkCommunitySearchModel(model)
```

Arguments

model A validated `ConsensusMetaclusteringModel` object.

Value

An `NCSModel` object containing the relevant data from the `ConsensusMetaclusteringModel`.

normalize,data.frame_or_matrix-method
Normalize a data.frame Object

Description

Normalize a data.frame Object

Usage

```
## S4 method for signature 'data.frame_or_matrix'
normalize(object, MARGIN = 2, FUN = "proprocessCaret", ...)
```

Arguments

object	A data.frame object to normalize.
MARGIN	An integer indicating if rows (1) or columns (2) should be normalized. Defaults to 2 for columns.
FUN	A function to normalize your data with. Should accept a rectangular object such as a matrix, data.frame, or data.table and return an object of the same class with the data normalized using FUN.
...	Fall through parameters to FUN. For the default FUN, these are passed to caret::preProcess to allow configuration of the normalization method. Omitting any arguments with the default FUN will scale and center the data.

Value

The data.frame normalized.

normalize,DFrame-method
Normalize a S4 DFrame Object

Description

Normalize a S4 DFrame Object

Usage

```
## S4 method for signature 'DFrame'
normalize(object, MARGIN = 2, FUN = "preprocessCaret", ...)
```

Arguments

object	A DFrame or DataFrame object to normalize.
MARGIN	An integer indicating if rows (1) or columns (2) should be normalized. Defaults to 2 for columns.
FUN	A function to normalize your data with. Should accept a rectangular object such as a matrix, data.frame, or data.table and return an object of the same class with the data normalized using FUN.
...	Fall through parameters to FUN. For the default FUN, these are passed to caret::preProcess to allow configuration of the normalization method. Omitting any arguments with the default FUN will scale and center the data.

Value

A normalized DFrame object.

normalize,MultiAssayExperiment-method

Normalize the assays of a MutliAssayExperiment Object

Description

For this method to work, there must be a normalize method defined for all classes of experiments in the MultiAssayExperiment

Usage

```
## S4 method for signature 'MultiAssayExperiment'
normalize(
  object,
  MARGIN = 2,
  FUN = "preprocessCaret",
  ...,
  whichAssays = seq_along(assays(object))
)
```

Arguments

object	A SummarizedExperiment object with assays to normalize.
MARGIN	An integer indicating if rows (1) or columns (2) should be normalized. Defaults to 2 for columns.
FUN	A function to normalize your data with. Should accept a rectangular object such as a matrix, data.frame, or data.table and return an object of the same class with the data normalized using FUN.
...	Fall through parameters to FUN. For the default FUN, these are passed to caret::preProcess to allow configuration of the normalization method. Omitting any arguments with the default FUN will scale and center the data.

`whichAssays` A numeric or character vector specifying the indices of the assays to normalize. Defaults to all assays.

Details

When using the default FUN, it is also possible to impute missing values. See `?caret::preProcess` for information on available methods.

Value

The `MultiAssayExperiment` with one or more of the assays normalized and information about the normalization method in the `normalization` item of the object metadata.

See Also

[preprocessCaret](#), `caret::preProcess`

normalize, SummarizedExperiment-method

Normalize the assays in a SummarizedExperiment Object

Description

Normalize the assays in a `SummarizedExperiment` Object

Usage

```
## S4 method for signature 'SummarizedExperiment'
normalize(
  object,
  MARGIN = 2,
  FUN = "preprocessCaret",
  ...,
  whichAssays = seq_along(assays(object))
)
```

Arguments

`object` A `SummarizedExperiment` object with assays to normalize.

`MARGIN` An integer indicating if rows (1) or columns (2) should be normalized. Defaults to columns. Defaults to 2.

`FUN` A function to normalize your data with. The function should accept a matrix, normalize the columns then return a matrix. The data will be transposed before applying FUN if `MARGIN=1`.

`...` Fall through parameters to FUN. When using the default FUN, the data is scaled and centered when no additional arguments are specified.

`whichAssays` A numeric or character vector specifying the indices or names of the assays to normalize. Defaults to all assays.

Details

When using the default FUN, it is also possible to impute missing values. See `?caret::preProcess` for information on available methods.

Value

The SummarizedExperiment with one or more of the matrices in assays normalized and the normalization details in the normalization item of the object metadata.

See Also

[preprocessCaret](#), `caret::preProcess`

normalsMAE	<i>A MultiAssayExperiment containing cohorts of normal patients, for package examples.</i>
------------	--

Description

A MultiAssayExperiment containing cohorts of normal patients, for package examples.

Examples

```
data(normalsMAE)
```

optimalKMinimizeAmbiguity	<i>Predict optimal K values by minimizing the difference between the ECDF of clustering consensus at two points in a subinterval.</i>
---------------------------	---

Description

Predict optimal K values by minimizing the difference between the ECDF of clustering consensus at two points in a subinterval.

Usage

```
optimalKMinimizeAmbiguity(assayClusters, subinterval = c(0.1, 0.9))
```

Arguments

- `assayClusters` A SimpleList of clustering results from a ConsensusMetaclusteringModel, as returned by `models(object)` where `object` is a trained ConsensusMetaclusteringModel object.
- `subinterval` A numeric vector of two float values, the first being the lower and second being the upper limit of the subinterval to compare cluster ambiguity over. Default is `c(0.1, 0.9)`, i.e. comparing the 10th and 90th percentile of cluster consensus to calculate the ambiguity of a given clustering solution. This is the value used to select the optimal K value from the potential solutions for each assay in the training data.

Value

A numeric vector the same length as `assayClusters`, with an optimal K prediction for each assay in the `rawdata` slot of the trained ConsensusMetaclusteringModel object which `assayClusters` came from.

 PCOSP

Pancreatic Cancer Overall Survival Predictor (PCOSP) Constructor

Description

Pancreatic Cancer Overall Survival Predictor (PCOSP) Constructor

Usage

```
PCOSP(trainCohorts, minDaysSurvived = 365, ..., randomSeed)
```

Arguments

- `trainCohorts` A CohortList or SurvivalExperiment containing the training data for the PCOSP model.
- `minDaysSurvived` An integer indicating the minimum number of day required to be in the 'good' survival group. Any patients below this cut-off will be considered low survival. Default is 365 days.
- `...` Force subsequent parameters to be named. This parameter is not used.
- `randomSeed` An integer `randomSeed` that was used to train the model. Users should specify this when initializing a model to ensure reproducibility.

Details

This function assumes there is only 1 assay per SurvivalExperiment.

Value

A PCOSP object with training data in the assays slot, concatenating together the molecular data types and labelling the genes with the data type to ensure the results are easily interpretable.

Examples

```
data(sampleICGcmicro)
set.seed(1987)
PCOSPmodel <- PCOSP(sampleICGcmicro, minDaysSurvived=365, randomSeed=1987)
```

PCOSP-class

Pancreatic Cancer Overall Survival Predictor (PCOSP) Class

Description

Pancreatic Cancer Overall Survival Predictor (PCOSP) Class

PCOSP_or_ClinicalModel-class

Class Union for PCOSP and ClinicalModel Types

Description

Class union used for method dispatch without inheritance

PCOSP_or_RLS_or_RGA-class

Class Union for PCOSP, RLSModel and RGAModel Types

Description

Class union used for method dispatch without inheritance

plotNetworkGraph *A Generic for Plotting a Network Graph From an S4 Object*

Description

A Generic for Plotting a Network Graph From an S4 Object

Usage

```
plotNetworkGraph(object, ...)
```

Arguments

object	An S4 object with a valid plotNetworkGraph method set.
...	Allow additional arguments to be defined for this generic.

Value

A network plot, either as an object or via side effects.

plotNetworkGraph, NCSModel-method
Plot a Network Graph for a Classified NCSModel Object

Description

Visualize metaclusters predicted using network community search on the consensus clustering results for a MultiAssayExperiment of patient cohorts.

Usage

```
## S4 method for signature 'NCSModel'
plotNetworkGraph(object, ..., palette = "Set1", clusterLabels)
```

Arguments

object	A classified NCSModel object, as returned by the predictClasses method.
...	Not used, force subsequent arguments to be named.
palette	character A valid palette for use in RColourBrewer::brewer.pal
clusterLabels	A character vector of names for the metaclusters. Defaults to the cluster number.

Value

A ggplot object containing the network graph, showing the relative edge distances between each cluster in each cohort along with the predicted metacluster label.

plotROC *Plot ROC curves for an S4 object*

Description

Plot ROC curves for an S4 object

Usage

```
plotROC(object, ...)
```

Arguments

object An S4 object with a defined plotROC method.
 ... Allow new parameters to be added to this generic.

Value

A ggplot object containing the ROC curves.

plotROC, PCOSP-method *Plot ROC curves for a PCOSP model object.*

Description

Plot ROC curves for a PCOSP model object.

Usage

```
## S4 method for signature 'PCOSP'  

plotROC(object, alpha = 0.05, ..., xlabel, ylabel, title)
```

Arguments

object A PCOSP model which has been validated with with the validateModel method.
 alpha A float specifying the significance level for the plot. Non- significant cohorts
 will have dotted lines.
 ... Catch unnamed parameters. Not used.
 xlabel A character vector specifying the x label.
 ylabel A character vector specifying the y label.
 title A character vector speciyfing the plot tile.

Value

A ggplot object containing the ROC curves.

Examples

```
data(sampleValPCOSModel)

# Plot ROC curves
AUROCplot <- plotROC(sampleValPCOSModel)
```

plotSurvivalCurves *Generic for Plotting Survival Curves from an S4 Object*

Description

Generic for Plotting Survival Curves from an S4 Object

Usage

```
plotSurvivalCurves(object, ...)
```

Arguments

object An S4 object to plot survival curves for.
... Allow new parameters to be defined on this generic.

Value

A plot, either via side-effects or as the return value.

plotSurvivalCurves, CoxModel-method
 Plot Survival Curves from a Fit CoxModel Object

Description

Plot Survival Curves from a Fit CoxModel Object

Usage

```
## S4 method for signature 'CoxModel'  
plotSurvivalCurves(object, byCohort = TRUE, ..., facet.by = "cohort")
```

Arguments

object	A CoxModel object with survival curves fit via the trainModel method.
byCohort	TRUE to return a single plot object faceted by facet.by, FALSE to get a list of individual survival curves per cohort.
...	Fall through parameters to survminer::ggsurvplot function.
facet.by	What column of the object modelDT to use for faceting the survival plot. Defaults to 'cohorts'. Only used if byCohort is TRUE.

Value

A ggplot or list of ggplot objects containing the survival curves for each cohort in the trainData slot of the CoxModel.

predictClasses	<i>Predict Classes for New Data Based on a Train Classifier Model</i>
----------------	---

Description

Predict Classes for New Data Based on a Train Classifier Model

Usage

```
predictClasses(object, model, ...)
```

Arguments

object	An S4 object containing data to predict classes from.
model	An S4 object containing one or more trained classification models.
...	Allow further parameters to be defined on this generic.

Value

The S4 object with class predictions added to the metadata.

Examples

```
data(sampleTrainedPCOSPmodel)
data(samplePCSIurvExp)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Make predictions
PCOSPpredSurvExp <- predictClasses(samplePCSIurvExp,
  model=sampleTrainedPCOSPmodel)
head(colData(PCOSPpredSurvExp))
```

predictClasses, CohortList, ClinicalModel-method

Use a Clinical GLM to Predict Classes for a CohortList of SurvivalExperiment Objects.

Description

Use a Clinical GLM to Predict Classes for a CohortList of SurvivalExperiment Objects.

Usage

```
## S4 method for signature 'CohortList,ClinicalModel'
predictClasses(object, model, ..., na.action = "na.exclude", type = "response")
```

Arguments

object	A CohortList with SurvivalExperiments to predict classes for. The colData slot in ALL SurvivalExperiments must have column names which match the formula in the model object.
model	A trained ClinicalModel object, as return by trainModel.
...	Fall through parameters to <code>stats::predict</code> .
na.action	The na.action paramter passed to <code>stats::predict.glm</code> .
type	The type parameter passed to <code>stats::predict.glm</code>

Value

A CohortList with the model predictions in the colData slot as clinical_prob_good for each SurvivalExperiment, and the model in the metadata as predictionModel.

Examples

```
data(sampleClinicalModel)
data(sampleCohortList)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Train Model
trainedClinicalModel <- trainModel(sampleClinicalModel)

# Make predictions
ClinicalPredCohortList <- predictClasses(sampleCohortList[c('PCSI', 'TCGA')],
  model=trainedClinicalModel)
head(colData(ClinicalPredCohortList[[1]]))
```

predictClasses,CohortList, GeneFuModel-method

Use a Gene Signature Based Prediction Model from the geneFu Package to Predict Signature Scores for Each Sample

Description

Use a Gene Signature Based Prediction Model from the geneFu Package to Predict Signature Scores for Each Sample

Usage

```
## S4 method for signature 'CohortList, GeneFuModel'
predictClasses(object, model, ..., annot = NA)
```

Arguments

object	A CohortList with SurvivalExperiments to predict classes for.
model	A trained GeneFuModel object.
...	Fall through parameters to <code>geneFu::sig.score</code> .
annot	The annot parameter passed to <code>geneFu::sig.score</code> . Defaults to NA, which assumes your assay rowname match the gene labels in the model.

Value

A CohortList with the model predictions in the colData slot as `geneFu_score` for each SurvivalExperiment, and the model in the metadata as `predictionModel`.

predictClasses,CohortList,PCOSP_or_RLS_or_RGA-method

Predict Survival Prognosis Classes and Risk Scores for A CohortList Using a PCOSP, RLSModel or RGAModel object.

Description

Predict Survival Prognosis Classes and Risk Scores for A CohortList Using a PCOSP, RLSModel or RGAModel object.

Usage

```
## S4 method for signature 'CohortList, PCOSP_or_RLS_or_RGA'
predictClasses(object, model, ...)
```

Arguments

object A CohortList with SurvivalExperiments to predict classes for.
 model A trained PCOSP model to use for predicting classes.
 ... Fall through arguments to BiocParallel::bplapply for configuring parallelization settings.

Value

A CohortList with the model predictions attached to each SurvivalExperiment in the metadata slot and the prob_good_survival column added to the colData slot.

Examples

```
data(sampleTrainedPCOSPmodel)
data(sampleCohortList)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Make predictions
PCOSPpredCohortList <- predictClasses(sampleCohortList[seq_len(2)],
  model=sampleTrainedPCOSPmodel)
head(colData(PCOSPpredCohortList[[1]]))
```

predictClasses, ConsensusMetaclusteringModel, ANY-method

Compute the Optimal Clustering Solution for a Trained Consensus-MetaclusteringModel

Description

Compute the optimal clustering solution out of possibilities generated with trainModel. Assigns the cluster labels to the MultiAssayExperiment object.

Usage

```
## S4 method for signature 'ConsensusMetaclusteringModel,ANY'
predictClasses(object, ..., optimal_k_function = optimalKMinimizeAmbiguity)
```

Arguments

object A MutliAssayExperiment object
 ... Fall through arguments to optimal_k_function. For the default optimal_k_function, you can specify subinterval argument which defines the interval of the ECDF to minimize ambiguity over. Defaults to c(0.1, 0.9) if not specified. See ?optimalKMinimizeAmbiguity for more details on the subinterval parameter.

optimal_k_function

A function which accepts as its input models(object) of a trained ConsensusMetaclusteringModel object, and returns a vector of optimal K values, one for each assay in rawdata(object). The default method is optimalKMinimizeAmbiguity, see ?optimalKMinimizeAmbiguity for more details. Please note this argument must be named or it will not work.

Value

A object ConsensusMetaclusteringModel, with class predictions assigned to the colData of trianData

predictClasses, NCSModel, ANY-method

Predict Metacluster Labels for a NetworkCommunitySearchModel

Description

Predict Metacluster Labels for a NetworkCommunitySearchModel

Usage

```
## S4 method for signature 'NCSModel,ANY'
predictClasses(object)
```

Arguments

object A NCSModel which has been trained.

Value

The object model with

predictClasses, SurvivalExperiment, ClinicalModel-method

Predict Survival Prognosis Classes and Risk Scores for A SurvivalModel Using a ClinicalModel Object.

Description

Predict Survival Prognosis Classes and Risk Scores for A SurvivalModel Using a ClinicalModel Object.

Usage

```
## S4 method for signature 'SurvivalExperiment, ClinicalModel'
predictClasses(object, model, ..., na.action = "na.exclude", type = "response")
```

Arguments

object	A SurvivalExperiment object with the correct columns in colData to match the formula for the ClinicalModel object.
model	A trained ClinicalModel object, as return by trainModel.
...	Fall through parameters to <code>stats::predict</code> .
na.action	The na.action paramter passed to <code>stats::predict.glm</code> .
type	The type parameter passed to <code>stats::predict.glm</code>

Value

A SurvivalExperiment with the model predictions in the colData slot as clinical_prob_good.

Examples

```
data(sampleClinicalModel)
data(samplePCSIurvExp)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Train Model
trainedClinicalModel <- trainModel(sampleClinicalModel)

# Make predictions
ClinicalPredSurvExp <- predictClasses(samplePCSIurvExp,
  model=trainedClinicalModel)
head(colData(ClinicalPredSurvExp))
```

predictClasses, SurvivalExperiment, GeneFuModel-method

Use a Gene Signature Based Prediciton Model from the genefu Package to Predict Signature Scores for Each Sample.

Description

Use a Gene Signature Based Prediciton Model from the genefu Package to Predict Signature Scores for Each Sample.

Usage

```
## S4 method for signature 'SurvivalExperiment, GeneFuModel'
predictClasses(object, model, ..., annot = NA)
```

Arguments

object	A SurvivalExperiment to predict classes for.
model	A GeneFuModel object to predict classes with.
...	Fall through parameters to <code>genefu::sig.score</code> .
annot	A named parameter with annotations mapping from the gene identifiers in the <code>genefu</code> model.

Details

A signature score should be interpreted as unit-less continuous risk predictor.

Value

The SurvivalExperiment passed to the object argument with the `genefu_score` column added to the objects `colData` slot.

`predictClasses, SurvivalExperiment, PCOSP_or_RLS_or_RGA-method`

Predict Survival Prognosis Classes and Risk Scores for A CohortList Using a PCOSP, RLSModel or RGAModel object.

Description

Predict Survival Prognosis Classes and Risk Scores for A CohortList Using a PCOSP, RLSModel or RGAModel object.

Usage

```
## S4 method for signature 'SurvivalExperiment,PCOSP_or_RLS_or_RGA'
predictClasses(object, model, ...)
```

Arguments

object	A SurvivalExperiment object to predict classes for.
model	A trained PCOSP model to use for predicting classes.
...	Fall through arguments to <code>BiocParallel::bplapply</code> for configuring parallelization settings.

Value

A SurvivalExperiment with the predictions in its metadata and a column in `colData`, `prob_good_survival`, which contains the proportion of models which predicted good prognosis for each sample.

See Also

[BiocParallel::bplapply](#), [switchBox::SWAP.KTSP.Classify](#)

Examples

```
data(sampleTrainedPCOSPmodel)
data(samplePCSIurvExp)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Make predictions
PCOSPpredSurvExp <- predictClasses(samplePCSIurvExp,
  model=sampleTrainedPCOSPmodel)
head(colData(PCOSPpredSurvExp))
```

preprocessCaret	<i>Preprocess Data Using the caret::preProcess method, then return the normalized data using predict.</i>
-----------------	---

Description

Preprocess Data Using the caret::preProcess method, then return the normalized data using predict.

Usage

```
preprocessCaret(x, ...)
```

Arguments

x	The data to be normalized with caret::preProcess and caret::predict.
...	Fall through parameters to caret::preProcess. This can be used to apply a range of different preprocessing methods from that package.

Value

x preprocessed according to the arguments in ...

See Also

[caret::preProcess](#), [stats::predict](#)

RandomGeneAssignmentModel

RandomGeneAssignmentModel Constructor

Description

RandomGeneAssignmentModel Constructor

Usage

```
RandomGeneAssignmentModel(trainCohorts, minDaysSurvived = 365, ..., randomSeed)
```

Arguments

trainCohorts	A 'SurvivalExperiment' containing training data for the SurvivalModel object.
minDaysSurvived	An integer minimum number of days survived to be classified as a 'good' prognosis.
...	Force subsequent parameters to be named. Not used.
randomSeed	An integer randomSeed that was used to train the model. Users should specify this when initializing a model to ensure reproducibility.

Value

A SurvivalModel object.

Examples

```
data(sampleICGCmicro)
set.seed(1987)
RGAModel <- RGAModel(sampleICGCmicro, minDaysSurvived=365, randomSeed=1987)
```

RandomLabelShufflingModel

RandomLabelShufflingModel Constructor

Description

RandomLabelShufflingModel Constructor

Usage

```
RandomLabelShufflingModel(trainCohorts, minDaysSurvived = 365, ..., randomSeed)
```


Arguments

trainCohorts	A 'SurvivalExperiment' containing training data for the SurvivalModel object.
minDaysSurvived	An integer minimum number of days survived to be classified as a 'good' prognosis.
...	Force subsequent parameters to be named. Not used.
randomSeed	An integer randomSeed that was used to train the model. Users should specify this when initializing a model to ensure reproducibility.

Value

A SurvivalModel object.

Examples

```
data(sampleICGCmicro)
set.seed(1987)
RLSmodel <- RLSModel(sampleICGCmicro, minDaysSurvived=365, randomSeed=1987)
```

rankFeatures

Rank the Features in a S4 Object

Description

Rank the Features in a S4 Object

Usage

```
rankFeatures(object, ...)
```

Arguments

object	An S4 object where rows represent features.
...	Allow new parameters to be defined for this generic.

Value

The object with the features per value and ranking of the features in the rowData slot of the object.

Examples

```
data(sampleICGCmicro)
rankFeatures(sampleICGCmicro)
```

 rankFeatures,MultiAssayExperiment-method

Rank the Features in a MultiAssayExperiment Object

Description

Rank the Features in a MultiAssayExperiment Object

Usage

```
## S4 method for signature 'MultiAssayExperiment'
rankFeatures(
  object,
  FUN = "mad",
  RANK_FUN = "dense_rank",
  ...,
  descending = TRUE,
  weights
)
```

Arguments

object	A MultiAssayExperiment to rank the features in.
FUN	A vectorized feature scoring function, such as var or mad. Defaults to mad from the BiocGenerics package.
RANK_FUN	A ranking function, such as rank or dense_rank. Defaults to dense_rank from dplyr.
...	Fall through arguments to FUN, such as na.rm=TRUE.
descending	Should your rank function be called with - before the values from FUN. Defaults to TRUE, which should be used if high values returned from FUN are good.
weights	A named numeric weighting vector with a weight for each experiment in the MultiAssayExperiment object. Names must match the names(experiments(object)). Passed to matrixStats::weightedMedian when aggregating feature scores per assay. Defaults to the sample size of an assay relative to the largest sample size when this paramter is missing.

Value

The MultiAssayExperiment with the item featureRanks in the object metadata, which stores a DataFrame containing ranks across all assays for each unique feature and the additional columns feature_score and feature_rank, as calculated with FUN and RANK_FUN, respectively. Information about which functions were used for each column can be found in the object mcols in the calculated_with column.

See Also

[BiocGenerics::mad](#), [dplyr::dense_rank](#), [matrixStats::weightedMedian](#)

rankFeatures, SummarizedExperiment-method

Rank the Features in a SummarizedExperiment Object

Description

Rank the Features in a SummarizedExperiment Object

Usage

```
## S4 method for signature 'SummarizedExperiment'
rankFeatures(
  object,
  FUN = "rowMads",
  RANK_FUN = "dense_rank",
  ...,
  descending = TRUE,
  assay = 1
)
```

Arguments

object	A SummarizedExperiment to rank the features in.
FUN	A row-wise summary function, such as rowVars, rowMads, etc. defaults to MatrixGenerics::rowMads.
RANK_FUN	A ranking function, such as rank or dense_rank. Defaults to dplyr::dense_rank.
...	Fall through arguments to FUN, such as na.rm=TRUE.
descending	Should your rank function be called with - before the values from FUN. Defaults to TRUE.
assay	integer assay to use for the ranking, as passed to the SummarizedExperiment::assay function. Defaults to the first assay.

Value

The SummarizedExperiment with the column feature_score and feature_rank in the rowData slot. Information about which functions were used for each column can be found in the object mcols in the calculated_with column.

Examples

```
data(sampleICGCmicro)
rankFeatures(sampleICGCmicro, FUN='rowMads', RANK_FUN='dense_rank')
```

removeColDataFactorColumns

Remove any factor columns from the colData of an S4 object

Description

Remove any factor columns from the colData of an S4 object

Usage

```
removeColDataFactorColumns(x)
```

Arguments

x An S4 object with a colData method defined for it.

Value

x with colData factor columns converted to either integer or character, as appropriate.

Examples

```
data(sampleICGmicro)
removeColDataFactorColumns(sampleICGmicro)
```

removeFactorColumns *Convert factor columns in a rectangular object*

Description

Convert factor columns in a rectangular object

Usage

```
removeFactorColumns(x)
```

Arguments

x A list-like rectangular object such as a data.frame, data.table, or DataFrame.

Value

x with factor columns converted to either integer or character, as appropriate.

Examples

```
x <- data.frame(a=factor(LETTERS[1:5]), b=factor(runif(5, 0, 1)))
removeFactorColumns(x)
```

renameColDataColumns *Rename the columns in the colData slot, or do nothing if they don't match*

Description

Rename the columns in the colData slot, or do nothing if they don't match

Usage

```
renameColDataColumns(x, values)
```

Arguments

x	An S4 object with a colData method.
values	A character vector where names are the existing column names and values are the new column names.

Value

x with updated column names, if they match any existing columns.

Examples

```
data(sampleICGCmicro)
renameColDataColumns(sampleICGCmicro, c(event_occurred='days_survived'))
```

renameColumns *Rename columns or do nothing if the names don't match*

Description

Rename columns or do nothing if the names don't match

Usage

```
renameColumns(x, values)
```

Arguments

- `x` An object for which `colnames` is defined, probably a `data.frame` or other similar object.
- `values` A character vector where names are the old column names and values are the new column names. Uses `gsub` internally to do the renaming.

Value

`x` with the updated column names if they are present. Does not fail if the column names are missing.

Examples

```
x <- data.frame(a=factor(LETTERS[1:5]), b=factor(runif(5, 0, 1)))
renameColumns(x, c(a='c'))
```

RGAModel-class	<i>RGAModel Class Definition</i>
----------------	----------------------------------

Description

RGAModel Class Definition

RLSModel-class	<i>RLSModel Class Definition</i>
----------------	----------------------------------

Description

RLSModel Class Definition

runGSEA	<i>Run Gene Set Enrichment Analysis</i>
---------	---

Description

Run Gene Set Enrichment Analysis

Usage

```
runGSEA(object, geneSet, ...)
```

Arguments

object	An S4 object to conduct Gene Set Enrichment Analysis (GSEA) with.
geneSet	An object representing a gene set, such as a data.frame.
...	Allow additional parameters to be defined for this generic.

Value

A data.frame containing the significantly enriched gene sets.

runGSEA,PCOSP,data.frame-method

Run Gene Set Enrichment Analysis On A PCOSP Model Object.

Description

Run Gene Set Enrichment Analysis On A PCOSP Model Object.

Usage

```
## S4 method for signature 'PCOSP,data.frame'
runGSEA(object, geneSet, numModels, ..., adjMethod = "fdr", allResults = FALSE)
```

Arguments

object	A PCOSP model which has been trained with trainModel.
geneSet	A data.frame with two columns, the first being the name of the gene and the second the gene set. The gene names must match the rownames of object. Additional columns will be dropped.
numModels	The number of models to use when selecting the top features from the PCOSP model in object. If missing will default to the top 10% of models.
...	Force subsequent parameters to be named. Not used.
adjMethod	An optional parameter specifying the multiple testing correction to use in piano::runGSAhyper . This parameter must be named.
allResults	Return the full results from piano::runGSAhyper instead of a data.frame of significant results? Default is FALSE. This parameter must be named.

Value

A data.table containing the significantly enriched gene sets.

S4Model-class	<i>An S4 Virtual Class For the Concept of a Statistical or ML Model</i>
---------------	---

Description

An S4 Virtual Class For the Concept of a Statistical or ML Model

Slots

`trainData` An object inheriting from `List` or `list` representing the training data for the model.

`modelParams` An object inheriting from `List` or `list` representing the parameters needed to train the model.

`models` An object inheriting from `List` or `list` representing the trained models.

`validationStats` An object inheriting from `DFrame` or `data.frame` and storing statistics assessing model performance.

`validationData` An object inheriting `List` or `list` representing the data used to validate or evaluate the performance of a model.

`elementMetadata` A `DataFrame` or `'data.frame'` of item metadata for the `models` slot.

`metadata` A `List` or `list` of model level metadata.

<code>sampleClinicalModel</code>	<i>Sample ClinicalModel Containing the ICGC micro-array cohort from MetaGxPancreas as training data.</i>
----------------------------------	--

Description

Sample ClinicalModel Containing the ICGC micro-array cohort from MetaGxPancreas as training data.

See Also

`MetaGxPancreas::loadPancreasDatasets`

Examples

```
data(sampleClinicalModel)
```

sampleCohortList	<i>A Set of Example Patient Cohorts</i>
------------------	---

Description

A CohortList object containing sample data for the PCOSP vignette. This data is a subset of the the Pancreas datasets available in MetaGxPancreas.

See Also

MetaGxPancreas::loadPancreasDatasets

Examples

```
data(sampleCohortList)
```

sampleICGCmicro	<i>A Sample SurvivalExperiment Containing Data from the ICGC micro-array cohort from MetaGxPancreas</i>
-----------------	---

Description

A Sample SurvivalExperiment Containing Data from the ICGC micro-array cohort from MetaGxPancreas

See Also

MetaGxPancreas::loadPancreasDatasets

Examples

```
data(sampleICGCmicro)
```

samplePCOSPmodel	<i>A Sample PCOSP Model Containing the ICGC micro-array cohort from MetaGxPancreas as training data.</i>
------------------	--

Description

A Sample PCOSP Model Containing the ICGC micro-array cohort from MetaGxPancreas as training data.

See Also

MetaGxPancreas::loadPancreasDatasets

Examples

```
data(samplePCOSPmodel)
```

samplePCOSPpredList	<i>Sample CohortList with PCOSP Risk Predictions</i>
---------------------	--

Description

Sample CohortList with PCOSP Risk Predictions

See Also

MetaGxPancreas::loadPancreasDatasets

Examples

```
data(samplePCOSPpredList)
```

samplePCSIurvExp	<i>Sample SurvivalExperiment Containing the PCSI rna-sequencing cohort from MetaGxPancreas.</i>
------------------	---

Description

Used as validation data for modelling examples

See Also

MetaGxPancreas::loadPancreasDatasets

Examples

```
data(samplePCSIurvExp)
```

sampleRGAmode1	<i>Sample RGA Model Containing the ICGC micro-array cohort from MetaGxPancreas as training data.</i>
----------------	--

Description

Sample RGA Model Containing the ICGC micro-array cohort from MetaGxPancreas as training data.

See Also

MetaGxPancreas::loadPancreasDatasets

Examples

```
data(sampleRGAmode1)
```

sampleRLSmodel	<i>Sample RLS Model Containing the ICGC micro-array cohort from MetaGxPancreas as training data.</i>
----------------	--

Description

Sample RLS Model Containing the ICGC micro-array cohort from MetaGxPancreas as training data.

See Also

MetaGxPancreas::loadPancreasDatasets

Examples

```
data(sampleRLSmodel)
```

sampleTrainedPCOSPmodel	<i>A Sample Trained PCOSP Model Containing the ICGC micro-array cohort from MetaGxPancreas as training data.</i>
-------------------------	--

Description

A Sample Trained PCOSP Model Containing the ICGC micro-array cohort from MetaGxPancreas as training data.

See Also

MetaGxPancreas::loadPancreasDatasets

Examples

```
data(sampleTrainedPCOSPmodel)
```

sampleValPCOSPmodel *Sample Validated PCOSP Model for Plotting Examples*

Description

Sample Validated PCOSP Model for Plotting Examples

See Also

MetaGxPancreas::loadPancreasDatasets

Examples

```
data(sampleValPCOSPmodel)
```

show, S4Model-method *Show method for Classes Inheriting from S4Model*

Description

Show method for Classes Inheriting from S4Model

Usage

```
## S4 method for signature 'S4Model'  
show(object)
```

Arguments

object A S4Model derivative to show.

Value

None, prints to console.

Examples

```
data(CSPC_MAE)  
set.seed(1987)  
metaclustModel <- ConMetaclustModel(CSPC_MAE, randomSeed=1987)  
metaclustModel
```

subset, CohortList-method

Subset method for a CohortList

Description

Works using endoapply of [] over the list SurvivalExperiments

Usage

```
## S4 method for signature 'CohortList'
subset(x, subset = TRUE, select = TRUE, invert = FALSE)
```

Arguments

x	A CohortList object
subset	The row query. Defaults to TRUE, i.e., select all.
select	The column query. Defaults to TRUE, i.e., select all.
invert	A logical vector indicating if the matches should be inverted. Default is FALSE.

Value

A CohortList containing only the rows and columns selected in i and j, respectively.

Examples

```
data(sampleCohortList)
commonGenes <- findCommonGenes(sampleCohortList)
commonGenesCohortList <- subset(sampleCohortList, subset=commonGenes)
```

SurvivalExperiment	<i>Constructor for SurvivalExperiment Class Builds a SurvivalExperiment object, which is just a wrapper for a SummarizedExperiment with mandatory survival metadata numeric columns survival_time and event_occurred.</i>
--------------------	---

Description

Constructor for SurvivalExperiment Class

Builds a SurvivalExperiment object, which is just a wrapper for a SummarizedExperiment with mandatory survival metadata numeric columns survival_time and event_occurred.

Usage

```
SurvivalExperiment(
  ...,
  survival_time = "survival_time",
  event_occurred = "event_occurred"
)
```

Arguments

... pairlist Fall through arguments to the SummarizedExperiment constructor. If the first argument to dots is a SummarizedExperiment, that object is used instead.

survival_time A character vector indicating the column name in colData which contains the integer number of days a patient has survived since treatment at the time of data collection. If event_occurred is 1/TRUE, then this is the number of days the patient lived.

event_occurred A character vector indicating the column name in colData which contains logical or integer values where 0/FALSE means a patient is alive and 1/TRUE means a patient is deceased.

Value

A SurvivalExperiment object.

Examples

```
data(sampleICGCmicro)

# build a SurvivalExperiment from raw data
ICGCmicro <- SurvivalExperiment(assays=assays(sampleICGCmicro),
  rowData=rowData(sampleICGCmicro), colData=colData(sampleICGCmicro),
  metadata=metadata(sampleICGCmicro), survival_time='survival_time',
  event_occurred='event_occurred')

# build a SurvivalExperiment from an existig SummarizedExperment
ICGCmicroSumExp <- as(sampleICGCmicro, 'SummarizedExperiment')
ICGCmicro <- SurvivalExperiment(ICGCmicroSumExp,
  survival_time='survival_time', event_occurred='event_occurred')
```

SurvivalExperiment-class

SurvivalExperiment Class

Description

A SummarizedExperiment with mandatory numeric survival metadata columns survival_time and event_occurred.

SurvivalModel	<i>Constructor for a SurvivalModel Object.</i>
---------------	--

Description

Constructor for a SurvivalModel Object.

Usage

```
SurvivalModel(trainCohorts, minDaysSurvived = 365, ..., randomSeed)
```

Arguments

trainCohorts	A 'SurvivalExperiment' containing training data for the SurvivalModel object.
minDaysSurvived	An integer minimum number of days survived to be classified as a 'good' prognosis.
...	Force subsequent parameters to be named. Not used.
randomSeed	An integer randomSeed that was used to train the model. Users should specify this when initializing a model to ensure reproducibility.

Value

A SurvivalModel object.

Examples

```
data(sampleICGcmicro)
set.seed(1987)
survModel <- SurvivalModel(sampleICGcmicro, minDaysSurvived=365,
  randomSeed=1987)
```

SurvivalModel-class	<i>A Generic Container for Storing Mathematical Models of Survival Experiments</i>
---------------------	--

Description

An S4 class with a number of predefined methods for accessing slots relevant to a survival model. More specific model types will inherit from this class for their accessor methods and constructor.

Slots

`models` A `SimpleList` containing one or more model object.

`validationData` A `CohortList` containing one or more `SurvivalExperiment` objects used to validate the model. This slot is populated by the when the `validateModel` method is called on a `SurvivalModel` object.

`validationStats` A `data.frame` object containing validation statistics calculated by the `validateModel` method.

Examples

```
data(sampleICGCmicro)
set.seed(1987)
survModel <- SurvivalModel(sampleICGCmicro, minDaysSurvived=385,
  randomSeed=1987)
```

`trainData`*Generic for Accessing the Training Data of an S4 Object*

Description

Generic for Accessing the Training Data of an S4 Object

Usage

```
trainData(object, ...)
```

Arguments

`object` An S4 object to retrieve training data from.
`...` Allow new parameters to be defined for this generic.

Value

The training data for an S4 object.

Examples

```
data(CSPC_MAE)
set.seed(1987)
metaclustModel <- ConMetaclustModel(CSPC_MAE, randomSeed=1987)
```

```
trainData,S4Model-method
```

Accessor for the Training Data in a S4Model Object

Description

Accessor for the Training Data in a S4Model Object

Usage

```
## S4 method for signature 'S4Model'
trainData(object)
```

Arguments

`object` An S4Model object to retrieve training data from.

Value

The training data for an S4Model Object.

```
trainData<-
```

Generic for Accessing the Training Data of an S4 Object

Description

Generic for Accessing the Training Data of an S4 Object

Usage

```
trainData(object, ...) <- value
```

Arguments

`object` An S4 object to retrieve training data from.
`...` Allow new parameters to be defined for this generic.
`value` An object to place in the objects training data slot.

Value

None, updates the object.

Examples

```
data(CSPC_MAE)
set.seed(1987)
metaclustModel <- ConMetaclustModel(CSPC_MAE, randomSeed=1987)
trainData(metaclustModel) <- CSPC_MAE
```

```
trainData<- ,S4Model-method
```

Accessor for the Training Data in a S4Model Object

Description

Accessor for the Training Data in a S4Model Object

Usage

```
## S4 replacement method for signature 'S4Model'
trainData(object) <- value
```

Arguments

object	An S4Model object to retrieve training data from.
value	An object to put into the model training data.

Value

The training data for an S4Model Object.

```
trainModel
```

Train a Model Based on the Data in an S4 Object

Description

Train a Model Based on the Data in an S4 Object

Usage

```
trainModel(object, ...)
```

Arguments

object	An S4 object representing an untrained statistical or machine. learning model.
...	Allow new method to be defined for this generic.

Value

The same object with the @model slot populated with the fit model

Examples

```
data(samplePCOSPmodel)
set.seed(getModelSeed(samplePCOSPmodel))

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

trainModel(samplePCOSPmodel, numModels=5, minAccuracy=0.6)
```

trainModel, ClinicalModel-method

Fit a GLM Using Clinical Predictors Specified in a ClinicalModel Object.

Description

Fit a GLM Using Clinical Predictors Specified in a ClinicalModel Object.

Usage

```
## S4 method for signature 'ClinicalModel'
trainModel(
  object,
  ...,
  family = binomial(link = "logit"),
  na.action = na.exclude
)
```

Arguments

object	A ClinicalModel object, with survival data for the model in the colData slot.
...	Fall through parameters to the <code>stats::glm</code> function.
family	Argument to the family parameter of <code>stats::glm</code> . Defaults to <code>binomial(link='logit')</code> . This parameter must be named.
na.action	Argument to the na.action parameter of <code>stats::glm</code> . Defaults to 'na.omit', dropping rows with NA values in one or more of the formula variables.

Value

A ClinicalModel object with a glm object in the models slot.

Examples

```

data(sampleClinicalModel)
set.seed(getModelSeed(sampleClinicalModel))

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

trainedClinicalModel <- trainModel(sampleClinicalModel)

```

```

trainModel,ConsensusMetaclusteringModel-method
Train A ConsensusMetaclusteringModel

```

Description

Since consensus clustering is an unsupervised learning method, there isn't really a 'training step' per se. Instead this method computes the consensus clusters and stores the results in the models slot.

Usage

```

## S4 method for signature 'ConsensusMetaclusteringModel'
trainModel(
  object,
  maxK = 5,
  reps = 10,
  distance = "pearson",
  clusterAlg = "hc",
  plot = NULL,
  ...
)

```

Arguments

object	A ConsensusMetaclusteringModel to train.
maxK	The maximum number of clusters to test. Defaults to 5.
reps	How many random samples should clustering be repeated on? Default is 10, but 1000+ is recommended for real world use.
distance	The distance method to use. Defaults to 'pearson'. See ?ConsensusClusterPlus::ConsensusClusterPlus for more options.
clusterAlg	The clustering algorithm to use. Defaults to 'hc'. See ?ConesnsusClusterPlus::ConsensusClusterPlus for more options.
plot	An optional path to output the plots generated by each call to ConsensusClusterPlus::ConsensusClusterPlus. Default is NULL, which suppresses all plots, otherwise passed to the clustering function.
...	Fall through parameters to BiocParallel::bplapply. This can be used to customize your parallelization using BPPARAM or to pass additional arguments to ConsensusClusterPlus.

Value

The ConsensusMetaclusteringModel with the clustering results in the models slot.

trainModel, CoxModel-method

Fit Models to the trainData in a CoxModel Object

Description

Computes models with the survival package for coxph, survfit, survdiff as well as computes the fit p-values using pchisq with the chisq values from survdiff. Modelling data is stored in modelData, as well as a data.table with all model data merged in modelDT. These items are all assigned to the models slot.

Usage

```
## S4 method for signature 'CoxModel'
trainModel(object)
```

Arguments

object A CoxModel object to fit models for.

Value

A CoxModel object with the results of coxph, survfit and survdiff in the models slot as lists where each item corresponds to the data in modelData. For convenience, all the model data has also been merged into a single data.table in the modelDT item of models.

trainModel, GeneFuModel-method

Train a GeneFuModel Object

Description

Train a GeneFuModel Object

Usage

```
## S4 method for signature 'GeneFuModel'
trainModel(object)
```

Arguments

object A GeneFuModel object to train.

Value

An error message, since we have not finished implementing this functionality yet.

trainModel,NCSModel-method

Train a NetworkCommunitySearchModel

Description

Train a NetworkCommunitySearchModel

Usage

```
## S4 method for signature 'NCSModel'
trainModel(object, alpha = 0.05, minRepro = 0.5, minCor = 0)
```

Arguments

object	An NCSModel object, created from a ConsensusMetaclusteringModel.
alpha	A float specifying the significance level for cluster reproducibility. Default is 0.05.
minRepro	A float specifying the minimum in-group proportion (IGP) for a cluster to be included in the metacluster labels. Default is 0.5.
minCor	A float specifying the minimum correlation between a centroid and assay cluster to be included in the metacluster labels. Default is 0.0.

Value

The NCSModel from object with the networkEdges item of the models slot filtered based on the specified criteria. The criteria are also stored in the modelParam slots to ensure reproducibility.

trainModel,PCOSP-method

Train a PCOSP Model Based on The Data the assay trainMatrix.

Description

Uses the switchBox SWAP.Train.KTSP function to fit a number of k top scoring pair models to the data, filtering the results to the best models based on the specified parameters.

Usage

```
## S4 method for signature 'PCOSP'
trainModel(object, numModels = 10, minAccuracy = 0.6, ...)
```

Arguments

object	A PCOSP object to train.
numModels	An integer specifying the number of models to train. Defaults to 10. We recommend using 1000+ for good results.
minAccuracy	A float specifying the balanced accuracy required to consider a model 'top scoring'. Defaults to 0.6. Must be in the range [0, 1].
...	Fall through arguments to BiocParallel::bplapply. Use this to configure parallelization options. By default the settings inferred in BiocParallel::bpparam() will be used.

Details

This function is parallelized with BiocParallel, thus if you wish to change the back-end for parallelization, number of threads, or any other parallelization configuration please pass BPPARAM to bplapply.

Value

A PCOSP object with the trained model in the model slot.

See Also

switchBox::SWAP.KTSP.Train BiocParallel::bplapply

Examples

```
data(samplePCOSPmodel)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

set.seed(getModelSeed(samplePCOSPmodel))
trainModel(samplePCOSPmodel, numModels=2, minAccuracy=0.6)
```

trainModel, RGAModel-method

Train a RGAModel Based on the Data in the assays slot.

Description

Uses the switchBox SWAP.Train.KTSP function to fit a number of k top scoring pair models to the data, filtering the results to the best models based on the specified parameters.

Usage

```
## S4 method for signature 'RGAModel'
trainModel(object, numModels = 10, minAccuracy = 0, ...)
```


Arguments

object	A RGAmodeL object to train.
numModels	An integer specifying the number of models to train. Defaults to 10. We recommend using 1000+ for good results.
minAccuracy	A float specifying the balanced accuracy required to consider a model 'top scoring'. Defaults to 0. Must be in the range 0 to 1.
...	Fall through arguments to BiocParallel::bplapply.

Details

This function is parallelized with BiocParallel, thus if you wish to change the back-end for parallelization, number of threads, or any other parallelization configuration please pass BPPARAM to bplapply.

Value

A RGAmodeL object with the trained model in the model slot.

See Also

switchBox::SWAP.KTSP.Train BiocParallel::bplapply

Examples

```
data(sampleRGAmodeL)
set.seed(getModelSeed(sampleRGAmodeL))

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

trainedRGAmodeL <- trainModel(sampleRGAmodeL, numModels=2, minAccuracy=0)
```

trainModel,RLSModel-method

Train a PCOSP Model Based on The Data the assay trainMatrix.

Description

Uses the switchBox SWAP.Train.KTSP function to fit a number of k top scoring pair models to the data, filtering the results to the best models based on the specified paramters.

Usage

```
## S4 method for signature 'RLSModel'
trainModel(object, numModels = 10, minAccuracy = 0, ...)
```

Arguments

object	A PCOSP object to train.
numModels	An integer specifying the number of models to train. Defaults to 10. We recommend using 1000+ for good results.
minAccuracy	This parameter should be set to zero, since we do not expect the permuted models to perform well. Setting this higher will result in an ensemble with very few models included.
...	Fall through arguments to BiocParallel::bplapply. Use this to configure parallelization options. By default the settings inferred in BiocParallel::bpparam() will be used.

Details

This function is parallelized with BiocParallel, thus if you wish to change the back-end for parallelization, number of threads, or any other parallelization configuration please pass BPPARAM to bplapply.

Value

A PCOSP object with the trained model in the model slot.

See Also

switchBox::SWAP.KTSP.Train BiocParallel::bplapply

Examples

```
data(sampleRLSmodel)
set.seed(getModelSeed(sampleRLSmodel))

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

trainedRLSmodel <- trainModel(sampleRLSmodel, numModels=2)
```

validateModel	<i>Perform Validation on an S4 Object Representing a Trained Model</i>
---------------	--

Description

Perform Validation on an S4 Object Representing a Trained Model

Usage

```
validateModel(model, valData, ...)
```

Arguments

model An S4 object.
valData Any Data to verify the model with.
... Allow new parameters to be defined for this generic.

Value

The S4 object with added model performance metadata.

Examples

```

data(sampleTrainedPCOSPmodel)
data(samplePCOSPpredList)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Validate model
validatedPCOSPmodel <- validateModel(sampleTrainedPCOSPmodel,
  valData=samplePCOSPpredList[[1]])
  
```

validateModel, ClinicalModel, CohortList-method

Evaluate the Performance of a List of Trained KTSP Models from a PCOSP Model

Description

Evaluate the Performance of a List of Trained KTSP Models from a PCOSP Model

Usage

```

## S4 method for signature 'ClinicalModel, CohortList'
validateModel(model, valData, ...)
  
```

Arguments

model A trained ClinicalModel object, as returned by the trainModel method.
valData A CohortList containing one or more SurvivalExperiments. The first assay in each SurvivalExperiment will be classified using all top scoring KTSP models in models(model).
... Fallthrough arguments to BiocParallel::bplapply, use this to configure the parallelization settings for this function. For example to specify BPARAM.

Value

The model object with the validationStats and validationData slots occupied.

See Also

[BiocParallel::bplapply](#), [switchBox::SWAP.KTSP.Classify](#)

Examples

```
data(sampleClinicalModel)
data(samplePCSIurvExp)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Train Model
trainedClinicalModel <- trainModel(sampleClinicalModel)

# Make predictions
clinicalPredSurvExp <- predictClasses(samplePCSIurvExp,
  model=trainedClinicalModel)

# Validate model
validatedClinicalModel <- validateModel(trainedClinicalModel,
  valData=clinicalPredSurvExp)
```

validateModel,ClinicalModel,SurvivalExperiment-method

Validate a ClinicalModel object with a single SurvivalExperiment object.

Description

Validate a ClinicalModel object with a single SurvivalExperiment object.

Usage

```
## S4 method for signature 'ClinicalModel,SurvivalExperiment'
validateModel(model, valData)
```

Arguments

model	A ClinicalModel object which has been trained using trainModel.
valData	A SurvivalExperiment to validate the model with.

Value

The ClinicalModel with the validation statistics in the validationStats slot and the validation data in the validationData slot.

Examples

```

data(sampleClinicalModel)
data(sampleCohortList)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Train Model
trainedClinicalModel <- trainModel(sampleClinicalModel)

# Make predictions
clinicalPredCohortList <- predictClasses(sampleCohortList[c('PCSI', 'TCGA')],
    model=trainedClinicalModel)

# Validate model
validatedClinicalModel <- validateModel(trainedClinicalModel,
    valData=clinicalPredCohortList)

```

validateModel,ConsensusMetaclusteringModel,ConsensusMetaclusteringModel-method
Compute the Inter-Cohort Cluster Correlation and Clustering Reproducibility of All Clusters in Each Cohort.

Description

Compute the Inter-Cohort Cluster Correlation and Clustering Reproducibility of All Clusters in Each Cohort.

Usage

```

## S4 method for signature
## 'ConsensusMetaclusteringModel,ConsensusMetaclusteringModel'
validateModel(model, valData, ...)

```

Arguments

model	A ConsensusMetaclusteringModel object with cluster_labels in assigned to each experiment, as returned by predictClasses.
valData	A ConsensusMetaclusteringModel object with cluster_labels assigned to each experiment, as returned by predictClasses. This consensus cluster should contain outgroup cohorts, such as normal patients to be compared against the disease cohorts being used for class discovery.
...	Fallthrough parameters to BiocParallel::bpmapply. This can also be used to customize the call to stats::cor.test used for calculating the cluster thresholds.

Value

The ConsensusMetaclusteringModel from object, with the training data from valData in the validationData slot, the models from the valData object appended to the models of object, and the validationStats slot populated with pair-wise comparisons between all experiments in both model and valData.

validateModel, GeneFuModel, CohortList-method

Evaluate the Performance of a List of Trained KTSP Models from a PCOSP Model

Description

Evaluate the Performance of a List of Trained KTSP Models from a PCOSP Model

Usage

```
## S4 method for signature 'GeneFuModel, CohortList'
validateModel(model, valData, ...)
```

Arguments

model	A GeneFuModel with a DataFrame of gene coefficients in the models slot.
valData	A CohortList containing one or more SurvivalExperiments. The first assay in each SurvivalExperiment will be classified using all top scoring KTSP models in models(model).
...	Fallthrough arguments to BiocParallel::bplapply, use this to configure the parallelization settings for this function. For example to specify BPARAM.

Value

The model object with the validationStats and validationData slots occupied.

See Also

[BiocParallel::bplapply](#), [switchBox::SWAP.KTSP.Classify](#)

Examples

```
data(sampleTrainedPCOSPmodel)
data(samplePCOSPpredList)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Validate model
validatedPCOSPmodel <- validateModel(sampleTrainedPCOSPmodel,
  valData=samplePCOSPpredList)
```

```
validateModel, GeneFuModel, SurvivalExperiment-method
    Validate a GeneFuModel object with a single SurvivalExperiment
    object.
```

Description

Validate a GeneFuModel object with a single SurvivalExperiment object.

Usage

```
## S4 method for signature 'GeneFuModel, SurvivalExperiment'
validateModel(model, valData)
```

Arguments

model	A GeneFuModel object which has been trained using trainModel.
valData	A SurvivalExperiment to validate the model with.

Value

The GeneModel with the validation statistics in the validationStats slot and the validation data in the validationData slot.

```
validateModel, PCOSP_or_RLS_or_RGA, CohortList-method
    Evaluate the Performance of a List of Trained KTSP Models from a
    PCOSP Model
```

Description

Evaluate the Performance of a List of Trained KTSP Models from a PCOSP Model

Usage

```
## S4 method for signature 'PCOSP_or_RLS_or_RGA, CohortList'
validateModel(model, valData, ...)
```

Arguments

model	A PCOSP model which has been trained using trainModel.
valData	A CohortList containing one or more SurvivalExperiments. The first assay in each SurvivalExperiment will be classified using all top scoring KTSP models in models(model).
...	Fallthrough arguments to BiocParallel::bplapply, use this to configure the parallelization settings for this function. For example to specify BPARAM.

Value

The model object with the validationStats and validationData slots occupied.

See Also

[BiocParallel::bplapply](#), [switchBox::SWAP.KTSP.Classify](#)

Examples

```
data(sampleTrainedPCOSPmodel)
data(samplePCOSPpredList)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Validate model
validatedPCOSPmodel <- validateModel(sampleTrainedPCOSPmodel,
  valData=samplePCOSPpredList)
```

```
validateModel,PCOSP_or_RLS_or_RGA,SurvivalExperiment-method
```

Validate a PCOSP model with a single SurvivalExperiment object.

Description

Validate a PCOSP model with a single SurvivalExperiment object.

Usage

```
## S4 method for signature 'PCOSP_or_RLS_or_RGA,SurvivalExperiment'
validateModel(model, valData)
```

Arguments

model	A PCOSP model which has been trained using trainModel.
valData	A SurvivalExperiment to validate the model with.

Value

The PCOSPmodel with the validation statistics in the validationStats slot and the validation data in the validationData slot.

Examples

```
data(sampleTrainedPCOSModel)
data(samplePCOSPpredList)

# Set parallelization settings
BiocParallel::register(BiocParallel::SerialParam())

# Validate model
validatedPCOSModel <- validateModel(sampleTrainedPCOSModel,
  valData=samplePCOSPpredList)
```

validationData	<i>Accessor for the validationData slot of an S4 object</i>
----------------	---

Description

Accessor for the validationData slot of an S4 object

Usage

```
validationData(object, ...)
```

Arguments

object	An S4 object
...	Allow definition of new arguments to this generic.

Value

A List- or list-like object containing one or more sets of validation data.

Examples

```
data(CSPC_MAE)
set.seed(1987)
metaclustModel <- ConMetaclustModel(CSPC_MAE, randomSeed=1987)
validationData(metaclustModel)
```

validationData, S4Model-method

Accessor for the validationData slot of an S4Model object

Description

Accessor for the validationData slot of an S4Model object

Usage

```
## S4 method for signature 'S4Model'  
validationData(object)
```

Arguments

object An S4Model object

Value

A List- or list-like object containing one or more sets of validation data.

validationData, SurvivalModel-method

Accessor for the validationData slot of a SurvivalModel object.

Description

Accessor for the validationData slot of a SurvivalModel object.

Usage

```
## S4 method for signature 'SurvivalModel'  
validationData(object)
```

Arguments

object A SurvivalModel object.

Value

A CohortList object containing the datasets used to compute validation statistics for this model.

Examples

```
data(samplePCOSPmodel)  
validationData(samplePCOSPmodel)
```

validationData<- *Generic for setting the validationData slot on an S4 object*

Description

Generic for setting the validationData slot on an S4 object

Usage

```
validationData(object, ...) <- value
```

Arguments

object	An S4 object.
...	Allow definition of additional parameters to this generic.
value	A data.frame of validation statistics.

Value

None, updates the object

Examples

```
data(CSPC_MAE)
set.seed(1987)
metaclustModel <- ConMetaclustModel(CSPC_MAE, randomSeed=1987)
validationData(metaclustModel) <- list(cohort1='This should be cohort data')
```

validationData<- ,S4Model,List_or_list_or_NULL-method
Setter Method for the validationData of an S4Model Object.

Description

Setter Method for the validationData of an S4Model Object.

Usage

```
## S4 replacement method for signature 'S4Model,List_or_list_or_NULL'
validationData(object) <- value
```

Arguments

object	An S4Model object.
value	A List- or list-like object containing the new validation data for the S4Model object.

Value

None, updates the object.

```
validationData<- ,SurvivalModel,CohortList-method
```

Setter for the validationData slot of a SurvivalModel object with a CohortList.

Description

Setter for the validationData slot of a SurvivalModel object with a CohortList.

Usage

```
## S4 replacement method for signature 'SurvivalModel,CohortList'
validationData(object) <- value
```

Arguments

object	A SurvivalModel model.
value	A CohortList of validation cohorts for the SurvivalModel model.

Value

None, updates the object.

Examples

```
data(samplePCOSModel)
validationData(samplePCOSModel) <- validationData(samplePCOSModel)
```

```
validationStats      Accessor for the validationStats slot of an S4 object
```

Description

Accessor for the validationStats slot of an S4 object

Usage

```
validationStats(object, ...)
```

Arguments

object An S4 object
... Allow definition of new arguments to this generic.

Value

A data.frame of validation statistics for the validation data provided to validateModel function for a given S4 object.

Examples

```
data(CSPC_MAE)
set.seed(1987)
metaclustModel <- ConMetaclustModel(CSPC_MAE, randomSeed=1987)
validationStats(metaclustModel)
```

validationStats,S4Model-method

Accessor for the validationStats slot of an S4Model Object

Description

Accessor for the validationStats slot of an S4Model Object

Usage

```
## S4 method for signature 'S4Model'
validationStats(object)
```

Arguments

object An S4 object

Value

A data.frame of validation statistics for the validation data provided to validateModel function for a given S4Model object.

```
validationStats, SurvivalModel-method
```

Accessor for the validationStats slot of a SurvivalModel object.

Description

Accessor for the validationStats slot of a SurvivalModel object.

Usage

```
## S4 method for signature 'SurvivalModel'
validationStats(object)
```

Arguments

object A SurvivalModel object to get validation statistics from.

Value

A data.table of validation statistics for the SurvivalModel object.

Examples

```
data(samplePCOSPmodel)
validationStats(samplePCOSPmodel)
```

```
validationStats<-        Setter for the validationStats slot on an S4 object
```

Description

Setter for the validationStats slot on an S4 object

Usage

```
validationStats(object, ...) <- value
```

Arguments

object An S4 object.
 ... Allow definition of additional parameters to this generic.
 value A DataFrame- or data.frame-like object of validation statistics.

Value

None, updates the object

Examples

```
data(CSPC_MAE)
set.seed(1987)
metaclustModel <- ConMetaclustModel(CSPC_MAE, randomSeed=1987)
validationStats(metaclustModel) <- data.frame()
```

```
validationStats<-,S4Model,DFrame_or_data.frame_data.table_or_NULL-method
Setter for the validationStats slot on an S4Model object
```

Description

Setter for the validationStats slot on an S4Model object

Usage

```
## S4 replacement method for signature 'S4Model,DFrame_or_data.frame_data.table_or_NULL'
validationStats(object) <- value
```

Arguments

object	An S4Model object.
value	A DataFrame- or data.frame-like object of validation statistics.

Value

None, updates the object

```
validationStats<-,SurvivalModel,data.frame-method
Setter for the validationStats slot of a SurvivalModel object with a data.frame
```

Description

Setter for the validationStats slot of a SurvivalModel object with a data.frame

Usage

```
## S4 replacement method for signature 'SurvivalModel,data.frame'
validationStats(object) <- value
```

Arguments

object A *SurvivalModel* model.
value A *data.frame* of validation statistics for a *SurvivalModel* object.

Value

None, updated the object.

Examples

```
data(samplePCOSPmodel)
validationStats(samplePCOSPmodel) <- data.frame()
```


Index

* **internal**

- .findAllCohortPairs, 6
- .randomSampleIndex, 7
- CoxModel-class, 21
- modelParams<-, 41
- modelParams<-, S4Model, List_or_list_or_NULL-method, 42
- models<-, 44
- models<-, S4Model, List_or_list_or_NULL-method, 45
- trainData<-, S4Model-method, 83
- validationData<-, S4Model, List_or_list_or_NULL-method, 99
- .ClinicalModel (ClinicalModel-class), 15
- .CohortList (CohortList-class), 16
- .ConsensusMetaclusteringModel (ConsensusMetaclusteringModel-class), 20
- .CoxModel (CoxModel-class), 21
- .GeneFuModel (GeneFuModel-class), 33
- .ModelComparison (ModelComparison-class), 40
- .NCSModel (NCSModel-class), 46
- .PCOSP (PCOSP-class), 52
- .RGAModel (RGAModel-class), 70
- .RLSModel (RLSModel-class), 70
- .S4Model (S4Model-class), 72
- .SurvivalExperiment (SurvivalExperiment-class), 79
- .SurvivalModel (SurvivalModel-class), 80
- .findAllCohortPairs, 6
- .randomSampleIndex, 7

assignColDataColumn, 7

assignSubtypes, 8

assignSubtypes, CohortList, list-method, 9

assignSubtypes, SurvivalExperiment, data.frame-method, 10

barPlotModelComparison, 11

barPlotModelComparison, ClinicalModel, PCOSP_or_RLS_or_RGA-method, 12

BiocGenerics::mad, 66

BiocParallel::bplapply, 62, 92, 94, 96

binomial, 13

caret::preProcess, 49, 50, 63

cbn, 13

ClinicalModel, 14

ClinicalModel-class, 15

CohortList, 15

CohortList-class, 16

cohortSubtypeDFs, 16

compareModels, 16

compareModels, ModelComparison, SurvivalModel-method, 17

compareModels, SurvivalModel, SurvivalModel-method, 18

ConMetaclustModel (ConsensusMetaclusteringModel), 19

ConsensusClusterPlus::ConsensusClusterPlus, 20

ConsensusMetaclusteringModel, 19

ConsensusMetaclusteringModel-class, 20

CoxModel, 20

CoxModel-class, 21

CSPC_MAE, 21

densityPlotModelComparison, 22

densityPlotModelComparison, PCOSP_or_RLS_or_RGA, PCOSP_or_RLS_or_RGA-method, 22

dplyr::dense_rank, 66

dropNotCensored, 23

dropNotCensored, CohortList-method, 24

dropNotCensored, SurvivalExperiment-method, 24

existingClassifierData, 25

- findCommonGenes, 26
- findCommonGenes, CohortList-method, 26
- findCommonGenes, MultiAssayExperiment-method, 27
- findCommonSamples, 27
- findCommonSamples, CohortList-method, 28
- forestPlot, 29
- forestPlot, ModelComparison-method, 29
- forestPlot, PCOSP_or_ClinicalModel-method, 31

- geneFu::sig.score, 58
- GeneFuModel, 32
- GeneFuModel-class, 33
- getModelSeed, 33
- getModelSeed, SurvivalModel-method, 34
- getTopFeatures, 34
- getTopFeatures, MultiAssayExperiment-method, 35
- getTopFeatures, PCOSP-method, 36
- getTopFeatures, SummarizedExperiment-method, 36

- haiderSigScores, 37
- hasColDataColumns, 37

- matrixStats::weightedMedian, 66
- merge, SurvivalExperiment, SurvivalExperiment-method, 38
- ModelComparison, 39
- ModelComparison-class, 40
- modelParams, 40
- modelParams, S4Model-method, 41
- modelParams<-, 41
- modelParams<-, S4Model, List_or_list_or_NULL-method, 42
- models, 42
- models, S4Model-method, 43
- models, SurvivalModel-method, 44
- models<-, 44
- models<-, S4Model, List_or_list_or_NULL-method, 45
- models<-, SurvivalModel, SimpleList-method, 45

- NCSModel (NetworkCommunitySearchModel), 46
- NCSModel-class, 46
- NetworkCommunitySearchModel, 46
- normalize, data.frame_or_matrix-method, 47
- normalize, DFrame-method, 47
- normalize, MultiAssayExperiment-method, 48
- normalize, SummarizedExperiment-method, 49
- normalsMAE, 50
- optimalKMinimizeAmbiguity, 50

- PCOSP, 51
- PCOSP-class, 52
- PCOSP_or_ClinicalModel-class, 52
- PCOSP_or_RLS_or_RGA-class, 52
- piano::runGSAhyper, 71
- plotNetworkGraph, 53
- plotNetworkGraph, NCSModel-method, 53
- plotROC, 54
- plotROC, PCOSP-method, 54
- plotSurvivalCurves, 55
- plotSurvivalCurves, CoxModel-method, 55
- predictClasses, 56
- predictClasses, CohortList, ClinicalModel-method, 57
- predictClasses, CohortList, GeneFuModel-method, 58
- predictClasses, CohortList, PCOSP_or_RLS_or_RGA-method, 58
- predictClasses, ConsensusMetaclusteringModel, ANY-method, 59
- predictClasses, NCSModel, ANY-method, 60
- predictClasses, SurvivalExperiment, ClinicalModel-method, 60
- predictClasses, SurvivalExperiment, GeneFuModel-method, 61
- predictClasses, SurvivalExperiment, PCOSP_or_RLS_or_RGA-method, 62
- preprocessCaret, 49, 50, 63

- RandomGeneAssignmentModel, 64
- RandomLabelShufflingModel, 64
- rankFeatures, 65
- rankFeatures, MultiAssayExperiment-method, 66
- rankFeatures, SummarizedExperiment-method, 67
- removeColDataFactorColumns, 68

- removeFactorColumns, 68
- renameColDataColumns, 69
- renameColumns, 69
- RGAModel (RandomGeneAssignmentModel), 64
- RGAModel-class, 70
- RLSModel (RandomLabelShufflingModel), 64
- RLSModel-class, 70
- runGSEA, 70
- runGSEA, PCOSP, data.frame-method, 71

- S4Model-class, 72
- sampleClinicalModel, 72
- sampleCohortList, 73
- sampleICGCmicro, 73
- samplePCOSPmodel, 74
- samplePCOSPpredList, 74
- samplePCSI survExp, 75
- sampleRGAModel, 75
- sampleRLSmodel, 76
- sampleTrainedPCOSPmodel, 76
- sampleValPCOSPmodel, 77
- show, S4Model-method, 77
- stats::glm, 84
- stats::predict, 57, 61, 63
- stats::predict.glm, 57, 61
- subset, CohortList-method, 78
- SurvivalExperiment, 78
- SurvivalExperiment-class, 79
- SurvivalModel, 80
- SurvivalModel-class, 80
- switchBox::SWAP.KTSP.Classify, 62, 92, 94, 96

- trainData, 81
- trainData, S4Model-method, 82
- trainData<-, 82
- trainData<-, S4Model-method, 83
- trainModel, 83
- trainModel, ClinicalModel-method, 84
- trainModel, ConsensusMetaclusteringModel-method, 85
- trainModel, CoxModel-method, 86
- trainModel, GeneFuModel-method, 86
- trainModel, NCSModel-method, 87
- trainModel, PCOSP-method, 87
- trainModel, RGAModel-method, 88
- trainModel, RLSModel-method, 89

- validateModel, 90
- validateModel, ClinicalModel, CohortList-method, 91
- validateModel, ClinicalModel, SurvivalExperiment-method, 92
- validateModel, ConsensusMetaclusteringModel, ConsensusMetaclusteringModel-method, 93
- validateModel, GeneFuModel, CohortList-method, 94
- validateModel, GeneFuModel, SurvivalExperiment-method, 95
- validateModel, PCOSP_or_RLS_or_RGA, CohortList-method, 95
- validateModel, PCOSP_or_RLS_or_RGA, SurvivalExperiment-method, 96
- validationData, 97
- validationData, S4Model-method, 98
- validationData, SurvivalModel-method, 98
- validationData<-, 99
- validationData<-, S4Model, List_or_list_or_NULL-method, 99
- validationData<-, SurvivalModel, CohortList-method, 100
- validationStats, 100
- validationStats, S4Model-method, 101
- validationStats, SurvivalModel-method, 102
- validationStats<-, 102
- validationStats<-, S4Model, DFrame_or_data.frame_data.table-method, 103
- validationStats<-, SurvivalModel, data.frame-method, 103