Package 'timecoursedata'

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Title A data package for timecourse RNA-seq and microarray gene expression data sets

Version 1.22.0

Description This data package contains timecourse gene expression data sets. The first dataset, from Shoemaker et al, consists of microarray samples from lung tissue of mice exposed to different influenzy strains from 14 timepoints. The two other datasets are leaf and root samples from sorghum crops exposed to pre- and post-flowering drought stress and a control condition, sampled across the plants lifetime.

Depends R (>= 4.0), SummarizedExperiment

Suggests testthat (>= 1.0.0), knitr, rmarkdown, markdown, covr, BiocStyle

VignetteBuilder knitr

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Encoding UTF-8

LazyData false

RoxygenNote 7.1.1

biocViews ExpressionData, MicroarrayData, RNASeqData

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Contents

load_shoemaker2015 2
load_varoquaux2019 2
shoemaker2015 3
varoquaux2019leaf 4

Index **7**

`load_shoemaker2015` *Loading the shoemaker2015 dataset as SummarizedExperiment*

Description

See data(shoemaker2015) for a full description of the dataset and the metadata.

Usage

```
load_shoemaker2015()
```

Value

a `SummerizedExperiment` of the Shoemaker 2015 data

Examples

```
mice_timecourse_data = load_shoemaker2015()
head(mice_timecourse_data)
```

`load_varoquaux2019` *Loading the varoquaux2019 leaf or root dataset as SummarizedExperiment*

Description

See data(varoquaux2019leaf) or data(varoquaux2019root) for a full description of the dataset and the metadata.

Usage

```
load_varoquaux2019(sample_type = "leaf")
```

Arguments

`sample_type`	"leaf", "root", optional, default: leaf Sets which sample to load.

Value

a SummerizedExperiment of the leaf or root samples of Varoquaux et al.

Examples

```
sorghum_timecourse_data = load_varoquaux2019(sample_type="leaf")
head(sorghum_timecourse_data)
```

---

shoemaker2015 *Time course transcriptomic from mouse lung tissues infected with influenza*

Description

Time-course microarray data from "An Ultrasensitive Mechanism Regulates Influenza Virus-Induced Inflammation".

Usage

```
data(shoemaker2015)
```

Format

A list with two related datasets: a gene expression data set (element data) and corresponding meta data (element meta). The column names of data correspond to the rownames of meta, linking the samples together in the two datasets. See examples for accessing these two data.frames.

Details

This is data from a micro-array time-course experiment, exposing mice to three different strains of influenza, and collecting lung tissue during 14 time-points after infection (0, 3, 6, 9, 12, 18, 24, 30, 36, 48, 60 hours, then 3, 5, and 7 days later) [8]. The three strains of influenza used in the study are (1) a low pathogenicity seasonal H1N1 influenza virus (A/Kawasaki/UTK4/2009 [H1N1]), a mildly pathogenic virus from the 2009 pandemic season (A/California/04/2009 [H1N1]), and a highly pathogenic H5N1 avian influenza virus (A/Vietnam/1203/2004 [H5N1]. Mice were injected with 105 PFU of each virus. An additional 42 mice were injected with a lower dose of the Vietnam avian influenza virus (103 PFU).

data is a data frame with 39544 rows corresponding to genes and 209 corresponding to samples. The rownames give the RefSeq name of the gene.

meta is a data frame with 209 rows corresponding to samples and 3 named columns (the first column is just an index from 0-208):

Group The treatment group of the sample. "C"=Control, "K"=Kawasaki strain, "M"=California strain, "VH"=Vietnam strain, "VL"=Vietnam at lower dosage (103 PFU).

Replicate Identifies the replicate – each combination of treatment and timepoint was replicated three times (except for VH at timepoint 3, which has only 2 replicates).

Timepoint Identifies the time passed (in days) since infection of the sample

References

Shoemaker et al. (2015) PLOS Pathog. (PubMed)

Examples

```
data(shoemaker2015)
data = attr(shoemaker2015, "data")
meta = attr(shoemaker2015, "meta")
```

`varoquaux2019leaf` *Time course transcriptomic data from leaf and root tissues exposed to drought stress*

Description

Time-course RNA-seq leaf and root data from "Transcriptomic analysis of field-droughted sorghum from seedling to maturity reveals biotic and metabolic responses"

Usage

```
data(varoquaux2019leaf)
data(varoquaux2019root)
```

Format

A list with two related datasets: a gene expression data set (element `data`) and corresponding meta data (element `meta`). The column names of `data` correspond to the rownames of `meta`, linking the samples together in the two datasets. See examples for accessing these two data.frames.

Details

This are two datasets from a mRNA-Seq time-course experiment, measuring gene expression across time in the plant sorghum. One dataset corresponds to the leaf of the plant (`varoquaux2019leaf`), the other to the root from the same sets of plants (`varoquaux2019leaf`). Each sample sequenced is actually a pool of at least 10 plants. Note that leaf and root samples were processed and sequenced as two separate batches. Any comparison between the two datasets should be traded with care.

`data` is a data frame with 34,211 rows corresponding to sorghum genes with (Phytozome v3.0 gene ids). Root has 198 columns and leaf has 197 columns, corresponding to samples. The root and leaf samples are from the same plants, and have ids in the form of "0622162L05" or "0622162R05", with "L" corresponding to the leaf and "R" corresponding to the root sample. Some samples were removed for quality control reasons, resulting in slightly different numbers of samples between the leaf and root.

The data provided is the raw data. Note that leafs and roots were sequenced as two different batches.

`meta` is a data frame with rows corresponding to samples and and columns with meta data. These columns are the same across leaf and root, allowing for easy reuse of code across the datasets:

Barcode Barcode of the sample, same as row name

libraryName Internal Barcode given to the sample by the sequencing facility (JGI)

Block Plot from which the sample was taken

Week Numeric value corresponding to the week sample was taken

Replicate Each condition combination was replicated three times, but not all replicates were sequenced. Each replicate came from a different plot. The replicate id tracks this plot for each condition. However, replicate 1 in one condition is a completely different plot from replicate 1 in another condition, though the replicates were physically close to each other in the field.

Genotype Genotype (i.e. variety) of the sample, one of BT642 or RT430

Condition The drought condition, one of "Control" (regular watering), "Postflowering" (drought applied post flowering of the plant), or "Preflowering" (drought applied pre-flowering of the plant, and then watering resumed after flowering)

Sample.type Either "Leaves" or "Root", only relevant if merging the two datasets

Day The day sample collected, in form of "Day14" (corresponding to Week 2)

Row Row plant was sampled from within the block

isFloweringWeek logical, indicating whether the week sampled corresponding to the plant flowering

Date.Harvested The date sample was collected

Collection.Time The time of day plant was collected

No.plants.pooled The number of plants pooled for the sample

FloweringJulianDate The Julian date of flowering for the block the sample was collected from

FloweringDate The date of flowering for the block the sample was collected from

FloweringWeek The week of flowering for the block the sample was collected from

FloweringDay The day of flowering for the block the sample was collected from

Unreplicated Identifies timepoints with no replicates

CompleteSampleTreatment Full set of factors (Genotype x Treatment x Week)

The following variables are features measured at the end of planting when the remaining plants from the plot were harvested:

LbsGrainHarvestPerPlot

TonsOfGrain.ac

PctGrainMoisture

TonsOfGrain.acAt13PctMoisture

X1000SeedWt_g

ApproximateEndOfSeasonStandCount_aveOfGrainRows

TotalFreshForageWtPerPlot_kg

TotalFreshForageWtPerPlot_lbs

TonsOfForage.ac

PctMoistureForage

TonsOfForage.acAt65PctMoisture

ApproximateEndOfSeasonStandCount_aveOfForageRows

DryBiomass

FreshBiomass

AveHeight

The following variables are features regarding the quality of the mapping of the sequences from the sample:

rawReads

filteredReads

sequencerType

runType

totalFragments

mappedFragments

assignedFragments

unassignedAmbiguous

unassignedNoFeatures

unassignedSecondaryHits

ratioStrandedness

MappedRatio

AssignedRatio

Plate

Location

References

Varoquaux et al, 2019 (PNAS)

Examples

```
data(varoquaux2019leaf)
dataLeaf = attr(varoquaux2019leaf, "data")
metaLeaf = attr(varoquaux2019leaf, "meta")
data(varoquaux2019root)
dataRoot = attr(varoquaux2019root, "data")
metaRoot = attr(varoquaux2019root, "meta")
```

Index

∗ **datasets**
shoemaker2015, 3
varoquaux2019leaf, 4

load_shoemaker2015, 2
load_varoquaux2019, 2

shoemaker2015, 3

varoquaux2019leaf, 4
varoquaux2019root *(*varoquaux2019leaf*)*, 4