Package ‘Omixer’

October 14, 2021

Type Package

Title Randomize Samples for -omics Profiling

Version 1.2.4

Description Omixer - an R package for multivariate and reproducible randomization with lab-friendly sample layouts. Omixer ensures optimal sample distribution across batches with well-documented methods, and can output lab-friendly sample sheets for the wet lab if needed.

License MIT + file LICENSE

Encoding UTF-8

LazyData true

Imports dplyr, ggplot2, forcats, tibble, gridExtra, magrittr, readr, tidyselect, grid, stats, stringr, RColorBrewer

Depends R (>= 4.0)

RoxygenNote 7.1.1

Suggests knitr, rmarkdown, BiocStyle, magick, testthat

VignetteBuilder knitr

biocViews DataRepresentation, ExperimentalDesign, QualityControl, Software, Visualization

BugReports <l.j.sinke@lumc.nl>

git_url https://git.bioconductor.org/packages/Omixer

git_branch RELEASE_3_13

git_last_commit 341f989

git_last_commit_date 2021-10-06

Date/Publication 2021-10-14

Author Lucy Sinke [cre, aut]

Maintainer Lucy Sinke <l.j.sinke@lumc.nl>

R topics documented:

`Omixer` *Multivariate Randomization*

Description

Omixer provides functions to perform optimal randomization of sample lists prior to omic profiling. This minimizes the correlation between biological factors and technical covariates, whilst ensuring there is insufficient evidence for any of these associations.

Details

Following this multivariate randomization, Omixer can also be used to smoothly bridge the gap between dry and wet labs, by creating visually intuitive sample sheets.

With clear documentation and the possibility to reproduce any output sample list, Omixer sets the standard for transparency and reproducibility in this often vague methodological step.

Author(s)

Lucy Sinke <`l.j.sinke@lumc.nl`>

`omixerCorr` *Correlation Tests*

Description

This function uses appropriate tests of correlation between two variables and stores the estimate and p-value in a list.

Usage

```
omixerCorr(x, y)
```

Arguments

`x`	Randomization variable (e.g. age)
`y`	Technical covariate (e.g. plate number)

Details

For two categorical variables, the Cramer's V estimate is stored alongside chi-square p-value. For all other combinations of variables, Pearson's correlation coefficient and p-value are stored.

Please note: variables will be converted to numeric class within this function.

Value

List of correlation estimate and p-value

Examples

```
library(tibble)
library(forcats)
library(stringr)

sampleList <- tibble(sampleId=str_pad(1:48, 4, pad="0"),
sex=as_factor(sample(c("m", "f"), 48, replace=TRUE)),
age=round(rnorm(48, mean=30, sd=8), 0),
smoke=as_factor(sample(c("yes", "ex", "never"), 48, replace=TRUE)),
date=sample(seq(as.Date('2008/01/01'), as.Date('2016/01/01'),
    by="day"), 48))

omixerCorr(sampleList$age, sampleList$sex)
```

omixerRand *Multivariate Randomization*

Description

As the main function of the Omixer package, this function outputs a randomized sample list that minimizes correlations between biological factors and technical covariates.

Usage

```
omixerRand(
  df,
  sampleId = "sampleId",
  block = "block",
  iterNum = 1000,
  wells,
  div = "none",
  positional = FALSE,
  plateNum = 1,
  layout,
  mask = 0,
  techVars,
  randVars
)
```

Arguments

`df`	Sample list
`sampleId`	String specifying sample ID variable
`block`	Paired sample identifier
`iterNum`	Number of layouts to generate
`wells`	Number of wells on a plate
`div`	Plate subdivisions
`positional`	Logical indicator of positional batch effects
`plateNum`	Number of plates
`layout`	Custom plate layout as data frame
`mask`	Wells to be left empty
`techVars`	Technical covariates
`randVars`	Randomization variables

Value

Selected randomized sample list as a data frame

Randomization environment of optimal list generation

Examples

```
library(tibble)
library(forcats)
library(stringr)

sampleList <- tibble(sampleId=str_pad(1:48, 4, pad="0"),
sex=as_factor(sample(c("m", "f"), 48, replace=TRUE)),
age=round(rnorm(48, mean=30, sd=8), 0),
smoke=as_factor(sample(c("yes", "ex", "never"), 48, replace=TRUE)),
date=sample(seq(as.Date('2008/01/01'), as.Date('2016/01/01'),
               by="day"), 48))

randVars <- c("sex", "age", "smoke", "date")

omixerLayout <- omixerRand(sampleList, sampleId="sampleId",
block="block", iterNum=10, wells=48, div="row",
plateNum=1, randVars=randVars)
```

omixerSheet *Sample Sheet Generation*

Description

This function will generate visually intuitive plate layouts for the wet lab, with the option to colour code different types of samples (e.g. for studies investigating multiple tissues).

Usage

```
omixerSheet(
  omixerLayout = omixerLayout,
  group,
  group.text.size = 3.5,
  sample.text.size = 4
)
```

Arguments

`omixerLayout`	Randomized sample list
`group`	Colour-coding indicator
`group.text.size`	Change size of group text (default: 3.5)
`sample.text.size`	Change size of sample text (default: 4)

Value

PDF of sample layout in working directory

Examples

```
library(tibble)
library(forcats)
library(stringr)

sampleList <- tibble(sampleId=str_pad(1:48, 4, pad="0"),
sex=as_factor(sample(c("m", "f"), 48, replace=TRUE)),
age=round(rnorm(48, mean=30, sd=8), 0),
smoke=as_factor(sample(c("yes", "ex", "never"), 48, replace=TRUE)),
date=sample(seq(as.Date('2008/01/01'), as.Date('2016/01/01'),
             by="day"), 48))

randVars <- c("sex", "age", "smoke", "date")

omixerLayout <- omixerRand(sampleList, sampleId="sampleId",
block="block", iterNum=10, wells=48, div="row",
plateNum=1, randVars=randVars)
```

```
omixerSheet(omixerLayout)
```

omixerSpecific *Sample List Regeneration*

Description

Regenerate an Omixer-produced randomized sample list quickly, after setting up the random environement from omixerRand

Usage

```
omixerSpecific(
  df,
  sampleId = "sampleId",
  block = "block",
  wells,
  div = "none",
  positional = FALSE,
  plateNum = 1,
  layout,
  mask = 0,
  techVars,
  randVars
)
```

Arguments

df	Sample list
sampleId	String specifying sample ID variable
block	Paired sample identifier
wells	Number of wells on a plate
div	Plate subdivisions
positional	Logical indicator of positional batch effects
plateNum	Number of plates
layout	Custom plate layout as data frame
mask	Wells to be left empty
techVars	Technical covariates
randVars	Randomization variables

Value

Chosen layout as a data frame

Examples

```
library(tibble)
library(forcats)
library(stringr)

sampleList <- tibble(sampleId=str_pad(1:48, 4, pad="0"),
sex=as_factor(sample(c("m", "f"), 48, replace=TRUE)),
age=round(rnorm(48, mean=30, sd=8), 0),
smoke=as_factor(sample(c("yes", "ex", "never"), 48, replace=TRUE)),
date=sample(seq(as.Date('2008/01/01'), as.Date('2016/01/01'),
               by="day"), 48))

randVars <- c("sex", "age", "smoke", "date")

omixerLayout <- omixerSpecific(sampleList, sampleId="sampleId",
block="block", wells=48, div="row",
plateNum=1, randVars=randVars)
```

Index