Package 'enviGCMS'

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Type Package

Title GC/LC-MS Data Analysis for Environmental Science

Version 0.8.0

Description Gas/Liquid Chromatography-Mass Spectrometer(GC/LC-MS) Data Analysis for Environmental Science. This package covered topics such molecular isotope ratio, matrix effects and Short-Chain Chlorinated Paraffins analysis etc. in environmental analysis.

URL https://github.com/yufree/enviGCMS

BugReports https://github.com/yufree/enviGCMS/issues

License GPL-2

Encoding UTF-8

LazyData true

Suggests knitr, testthat, plotly, shiny, rmarkdown, DT, crosstalk

VignetteBuilder knitr

Depends R (>= 3.5)

Imports Rdisop, BiocParallel, grDevices, graphics, stats, utils, animation (>= 2.2.3), RColorBrewer, mixtools, data.table, igraph

RoxygenNote 7.3.2

NeedsCompilation no

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Repository CRAN

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Contents

---

batch *Get the MIR and related information from the files*

Description

Get the MIR and related information from the files

Usage

```
batch(file, mz1, mz2)
```

Arguments

file	data file, CDF or other format supportted by xcmsRaw
mz1	the lowest mass
mz2	the highest mass

Value

Molecular isotope ratio

Examples

```
## Not run:
mr <- batch(data,mz1 = 79, mz2 = 81)

## End(Not run)
```

---

cbmd *Combine two data with similar retention time while different mass range*

Description

Combine two data with similar retention time while different mass range

Usage

```
cbmd(data1, data2, mzstep = 0.1, rtstep = 0.01)
```

Arguments

data1	data file path of lower mass range
data2	data file path of higher mass range
mzstep	the m/z step for generating matrix data from raw mass spectral data
rtstep	the alignment accuracy of retention time, e.g. 0.01 means the retention times of combined data should be the same at the accuracy 0.01s. Higher rtstep would return less scans for combined data

Value

matrix with the row as scantime in second and column as m/z

Examples

```
## Not run:
# mz100_200 and mz201_300 were the path to the raw data
matrix <- getmd(mz100_200,mz201_300)

## End(Not run)
```

---

dotpanno *Perform MS/MS dot product annotation for mgf file*

Description

Perform MS/MS dot product annotation for mgf file

Usage

```
dotpanno(file, db = NULL, ppm = 10, prems = 1.1, binstep = 1, consinc = 0.6)
```

Arguments

file	mgf file generated from MS/MS data
db	database could be list object from ‘getMSP‘
ppm	mass accuracy, default 10
prems	precursor mass range, default 1.1 to include M+H or M-H
binstep	bin step for consin similarity
consinc	consin similarity cutoff for annotation. Default 0.6.

Value

list with MSMS annotation results

`findline` *find line of the regression model for GC-MS*

Description

find line of the regression model for GC-MS

Usage

```
findline(data, threshold = 2, temp = c(100, 320))
```

Arguments

`data`	imported data matrix of GC-MS
`threshold`	the threshold of the response (log based 10)
`temp`	the scale of the oven temperature (constant rate)

Value

list linear regression model for the matrix

Examples

```
## Not run:
data(matrix)
findline(matrix)

## End(Not run)
```

`findlipid` *Find lipid class of metabolites base on referenced Kendrick mass defect*

Description

Find lipid class of metabolites base on referenced Kendrick mass defect

Usage

```
findlipid(list, mode = "pos")
```

Arguments

`list`	list with data as peaks list, mz, rt and group information, retention time should be in seconds
`mode`	'pos' for positive mode, 'neg' for negative mode and 'none' for neutral mass, only support [M+H] and [M-H] for each mode

Value

list list with dataframe with the lipid referenced Kendrick mass defect(RKMD) and logical for class

References

Method for the Identification of Lipid Classes Based on Referenced Kendrick Mass Analysis. Lerno LA, German JB, Lebrilla CB. Anal Chem. 2010 May 15;82(10):4236–45.

Examples

```
data(list)
RKMD <- findlipid(list)
```

`findmet` *Screen metabolites by Mass Defect*

Description

Screen metabolites by Mass Defect

Usage

```
findmet(list, mass, mdr = 50)
```

Arguments

`list`	list with data as peaks list, mz, rt and group information, retention time should be in seconds
`mass`	mass to charge ratio of specific compounds
`mdr`	mass defect range, default 50mDa

Value

list with filtered metabolites mass to charge index of certain compound

findohc *Screen organohalogen compounds by retention time, mass defect analysis and isotope relationship modified by literature report. Also support compounds with [M] and [M+2] ratio cutoff.*

Description

Screen organohalogen compounds by retention time, mass defect analysis and isotope relationship modified by literature report. Also support compounds with [M] and [M+2] ratio cutoff.

Usage

```
findohc(
  list,
  sf = 78/77.91051,
  step = 0.001,
  stepsd1 = 0.003,
  stepsd2 = 0.005,
  mzc = 700,
  cutoffint = 1000,
  cutoffr = 0.4,
  clustercf = 10
)
```

Arguments

list	list with data as peaks list, mz, rt and group information, retention time should be in seconds
sf	scale factor, default 78/77.91051(Br)
step	mass defect step, default 0.001
stepsd1	mass defect uncertainty for lower mass, default 0.003
stepsd2	mass defect uncertainty for higher mass, default 0.005
mzc	threshold of lower mass and higher mass, default 700
cutoffint	the cutoff of intensity, default 1000
cutoffr	the cutoff of [M] and [M+2] ratio, default 0.4
clustercf	the cutoff of cluster analysis to separate two different ions groups for retention time, default 10

Value

list with filtered organohalogen compounds

References

Identification of Novel Brominated Compounds in Flame Retarded Plastics Containing TBBPA by Combining Isotope Pattern and Mass Defect Cluster Analysis Ana Ballesteros-Gómez, Joaquín Ballesteros, Xavier Ortiz, Willem Jonker, Rick Helmus, Karl J. Jobst, John R. Parsons, and Eric J. Reiner Environmental Science & Technology 2017 51 (3), 1518-1526 DOI: 10.1021/acs.est.6b03294

`findpfc` *Find PFCs based on mass defect analysis*

Description

Find PFCs based on mass defect analysis

Usage

```
findpfc(list)
```

Arguments

`list`	list with data as peaks list, mz, rt and group information, retention time should be in seconds

Value

list list with potential PFCs compounds index

References

Liu, Y.; D'Agostino, L. A.; Qu, G.; Jiang, G.; Martin, J. W. High-Resolution Mass Spectrometry (HRMS) Methods for Nontarget Discovery and Characterization of Poly- and per-Fluoroalkyl Substances (PFASs) in Environmental and Human Samples. TrAC Trends in Analytical Chemistry 2019, 121, 115420.

Examples

```
data(list)
pfc <- findpfc(list)
```

getalign *Align two peaks vectors by mass to charge ratio and/or retention time*

Description

Align two peaks vectors by mass to charge ratio and/or retention time

Usage

```
getalign(mz1, mz2, rt1 = NULL, rt2 = NULL, ppm = 10, deltart = 10)
```

Arguments

mz1	the mass to charge of reference peaks
mz2	the mass to charge of peaks to be aligned
rt1	retention time of reference peaks
rt2	retention time of peaks to be aligned
ppm	mass accuracy, default 10
deltart	retention time shift table, default 10 seconds

Value

data frame with aligned peaks table

Examples

```
mz1 <- c(221.1171, 227.1390, 229.1546, 233.1497, 271.0790 )
mz2 <- c(282.279, 281.113, 227.139, 227.139, 302.207)
rt1 <- c(590.8710, 251.3820, 102.9230, 85.8850, 313.8240)
rt2 <- c(787.08, 160.02, 251.76, 251.76, 220.26)
getalign(mz1,mz2,rt1,rt2)
```

getalign2 *Align mass to charge ratio and/or retention time to remove redundancy*

Description

Align mass to charge ratio and/or retention time to remove redundancy

Usage

```
getalign2(mz, rt, ppm = 5, deltart = 5)
```

Arguments

mz	the mass to charge of reference peaks
rt	retention time of reference peaks
ppm	mass accuracy, default 10
deltart	retention time shift table, default 10 seconds

Value

index for

Examples

```
mz <- c(221.1171, 221.1170, 229.1546, 233.1497, 271.0790 )
rt <- c(590.8710, 587.3820, 102.9230, 85.8850, 313.8240)
getalign2(mz,rt)
```

---

getbgremove *Get the peak list with blank samples' peaks removed*

Description

Get the peak list with blank samples' peaks removed

Usage

```
getbgremove(
  xset,
  method = "medret",
  intensity = "into",
  file = NULL,
  rsdcf = 30,
  inscf = 1000
)
```

Arguments

xset	the xcmsset object with blank and certain group samples' data
method	parameter for groupval function
intensity	parameter for groupval function
file	file name for further annotation, default NULL
rsdcf	rsd cutoff for peaks, default 30
inscf	intensity cutoff for peaks, default 1000

Value

diff report

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file("cdf", package = "faahKO")
xset <- getdata(cdfpath, pmethod = ' ')
getbgremove(xset)

## End(Not run)
```

`getbiotechrep` *Get the report for biological replicates.*

Description

Get the report for biological replicates.

Usage

```
getbiotechrep(
  xset,
  method = "medret",
  intensity = "into",
  file = NULL,
  rsdcf = 30,
  inscf = 1000
)
```

Arguments

`xset`	the xcmsset object which for all of your technique replicates for bio replicated sample in single group
`method`	parameter for groupval function
`intensity`	parameter for groupval function
`file`	file name for further annotation, default NULL
`rsdcf`	rsd cutoff for peaks, default 30
`inscf`	intensity cutoff for peaks, default 0

Value

dataframe with mean, standard deviation and RSD for those technique replicates & biological replicates combined with raw data

getcompare *Align multiple peaks list to one peak list*

Description

Align multiple peaks list to one peak list

Usage

```
getcompare(..., index = 1, ppm = 5, deltart = 5)
```

Arguments

...	peaks list, mzrt objects
index	numeric, the index of reference peaks.
ppm	pmd mass accuracy, default 5
deltart	retention time shift table, default 10 seconds

Value

list object with aligned mzrt objects

getcsv *Convert an list object to csv file.*

Description

Convert an list object to csv file.

Usage

```
getcsv(list, name, mzdigit = 4, rtdigit = 1, type = "o", target = FALSE, ...)
```

Arguments

list	list with data as peaks list, mz, rt and group information
name	result name for csv and/or eic file, default NULL
mzdigit	m/z digits of row names of data frame, default 4
rtdigit	retention time digits of row names of data frame, default 1
type	csv format for further analysis, m means Metaboanalyst, a means xMSannotator, p means Mummichog(NA values are imputed by 'getimputation', and F test is used here to generate stats and p value), o means full information csv (for 'pmd' package), default o. mapo could output all those format files.
target	logical, preserve original rowname of data or not for target data, default FALSE.
...	other parameters for 'write.table'

Value

NULL, csv file

References

Li, S.; Park, Y.; Duraisingham, S.; Strobel, F. H.; Khan, N.; Soltow, Q. A.; Jones, D. P.; Pulendran, B. PLOS Computational Biology 2013, 9 (7), e1003123. Xia, J., Sinelnikov, I.V., Han, B., Wishart, D.S., 2015. MetaboAnalyst 3.0—making metabolomics more meaningful. Nucl. Acids Res. 43, W251–W257.

Examples

```
## Not run:
data(list)
getcsv(list,name='demo')

## End(Not run)
```

`getdata` *Get xcmsset object in one step with optimized methods.*

Description

Get xcmsset object in one step with optimized methods.

Usage

```
getdata(
  path,
  index = FALSE,
  BPPARAM = BiocParallel::SnowParam(),
  pmethod = "hplcorbitrap",
  minfrac = 0.67,
  ...
)
```

Arguments

`path`	the path to your data
`index`	the index of the files
`BPPARAM`	used for BiocParallel package
`pmethod`	parameters used for different instrumentals such as 'hplcorbitrap', 'uplcorbitrap', 'hplcqtof', 'hplchqtof', 'uplcqtof', 'uplchqtof'. The parameters were from the reference
`minfrac`	minimum fraction of samples necessary in at least one of the sample groups for it to be a valid group, default 0.67
`...`	arguments for xcmsSet function

Details

the parameters are extracted from the papers. If you use name other than the name above, you will use the default setting of XCMS. Also I suggest IPO packages or apLCMS packages to get reasonable data for your own instrumental. If you want to summit the results to a paper, remember to include those parameters.

Value

a xcmsset object for that path or selected samples

References

Patti, G. J.; Tautenhahn, R.; Siuzdak, G. Nat. Protocols 2012, 7 (3), 508–516.

See Also

getdata2, getmzrt

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file('cdf', package = 'faahKO')
xset <- getdata(cdfpath, pmethod = ' ')

## End(Not run)
```

---

getdata2 *Get XCMSnExp object in one step from structured folder path for xcms 3.*

Description

Get XCMSnExp object in one step from structured folder path for xcms 3.

Usage

```
getdata2(
  path,
  index = FALSE,
  snames = NULL,
  sclass = NULL,
  phenoData = NULL,
  BPPARAM = BiocParallel::SnowParam(),
  mode = "onDisk",
  ppp,
  rtp,
  gpp,
```

```
  fpp
)
```

Arguments

path	the path to your data
index	the index of the files
snames	sample names. By default the file name without extension is used
sclass	sample classes.
phenoData	data.frame or NAnnotatedDataFrame defining the sample names and classes and other sample related properties. If not provided, the argument sclass or the sub-directories in which the samples are stored will be used to specify sample grouping.
BPPARAM	used for BiocParallel package
mode	'inMemory' or 'onDisk' see '?MSnbase::readMSData' for details, default 'onDisk'
ppp	parameters for peaks picking, e.g. xcms::CentWaveParam()
rtp	parameters for retention time correction, e.g. xcms::ObiwarpParam()
gpp	parameters for peaks grouping, e.g. xcms::PeakDensityParam()
fpp	parameters for peaks filling, e.g. xcms::FillChromPeaksParam(), PeakGroupsParam()

Details

This is a wrap function for metabolomics data process for xcms 3.

Value

a XCMSnExp object with processed data

See Also

getdata,getmzrt

---

getdoe *Generate the group level rsd and average intensity based on DoE,*

Description

Generate the group level rsd and average intensity based on DoE,

Usage

```
getdoe(
  list,
  inscf = 5,
  rsdcf = 100,
  rsdcft = 30,
  imputation = "l",
  tr = FALSE,
  BPPARAM = BiocParallel::bpparam()
)
```

Arguments

list	list with data as peaks list, mz, rt and group information
inscf	Log intensity cutoff for peaks across samples. If any peaks show a intensity higher than the cutoff in any samples, this peaks would not be filtered. default 5
rsdcf	the rsd cutoff of all peaks in all group
rsdcft	the rsd cutoff of all peaks in technical replicates
imputation	parameters for 'getimputation' function method
tr	logical. TRUE means dataset with technical replicates at the base level folder
BPPARAM	An optional BiocParallelParam instance determining the parallel back-end to be used during evaluation.

Value

list with group mean, standard deviation, and relative standard deviation for all peaks, and filtered peaks index

See Also

getimputation, getpower

Examples

```
data(list)
getdoe(list)
```

---

getdwtus *Density weighted intensity for one sample*

Description

Density weighted intensity for one sample

Usage

```
getdwtus(peak, n = 512, log = FALSE)
```

Arguments

peak	peaks intensity one sample
n	the number of equally spaced points at which the density is to be estimated, default 512
log	log transformation

Value

Density weighted intensity for one sample

Examples

```
data(list)
getdwtus(list$data[,1])
```

---

getfeaturesanova *Get the features from anova, with p value, q value, rsd and power restriction*

Description

Get the features from anova, with p value, q value, rsd and power restriction

Usage

```
getfeaturesanova(
  list,
  power = 0.8,
  pt = 0.05,
  qt = 0.05,
  n = 3,
  ng = 3,
  rsdcf = 100,
  inscf = 5,
  imputation = "l",
  index = NULL
)
```

Arguments

list	list with data as peaks list, mz, rt and group information (more than two groups)
power	defined power
pt	p value threshold
qt	q value threshold, BH adjust
n	sample numbers in one group
ng	group numbers
rsdcf	the rsd cutoff of all peaks in all group
inscf	Log intensity cutoff for peaks across samples. If any peaks show a intensity higher than the cutoff in any samples, this peaks would not be filtered. default 5
imputation	parameters for 'getimputation' function method
index	the index of peaks considered, default NULL

Value

dataframe with peaks fit the setting above

---

getfeaturest *Get the features from t test, with p value, q value, rsd and power restriction*

Description

Get the features from t test, with p value, q value, rsd and power restriction

Usage

```
getfeaturest(list, power = 0.8, pt = 0.05, qt = 0.05, n = 3, imputation = "l")
```

Arguments

list	list with data as peaks list, mz, rt and group information (two groups)
power	defined power
pt	p value threshold
qt	q value threshold, BH adjust
n	sample numbers in one group
imputation	parameters for 'getimputation' function method

Value

dataframe with peaks fit the setting above

getfilter *Filter the data based on row and column index*

Description

Filter the data based on row and column index

Usage

```
getfilter(list, rowindex = TRUE, colindex = TRUE, name = NULL, type = "o", ...)
```

Arguments

list	list with data as peaks list, mz, rt and group information
rowindex	logical, row index to keep
colindex	logical, column index to keep
name	file name for csv and/or eic file, default NULL
type	csv format for further analysis, m means Metaboanalyst, a means xMSannotator, p means Mummichog(NA values are imputed by 'getimputation', and F test is used here to generate stats and p value), o means full information csv (for 'pmd' package), default o. mapo could output all those format files.
...	other parameters for 'getcsv'

Value

list with remain peaks, and filtered peaks index

See Also

getimputation, getcsv

Examples

```
data(list)
li <- getdoe(list)
lif <- getfilter(li,rowindex = li$rsdindex)
```

getformula — *Get chemical formula for mass to charge ratio.*

Description

Get chemical formula for mass to charge ratio.

Usage

```
getformula(
  mz,
  charge = 0,
  window = 0.001,
 elements = list(C = c(1, 50), H = c(1, 50), N = c(0, 50), O = c(0, 50), P = c(0, 1), S
    = c(0, 1))
)
```

Arguments

mz	a vector with mass to charge ratio
charge	The charge value of the formula, default 0 for autodetect
window	The window accuracy in the same units as mass
elements	Elements list to take into account.

Value

list with chemical formula

getgrouprep — *Get the report for samples with biological and technique replicates in different groups*

Description

Get the report for samples with biological and technique replicates in different groups

Usage

```
getgrouprep(
  xset,
  file = NULL,
  method = "medret",
  intensity = "into",
  rsdcf = 30,
  inscf = 1000
)
```

Arguments

xset	the xcmsset object all of samples with technique replicates
file	file name for the peaklist to MetaboAnalyst
method	parameter for groupval function
intensity	parameter for groupval function
rsdcf	rsd cutoff for peaks, default 30
inscf	intensity cutoff for peaks, default 1000

Value

dataframe with mean, standard deviation and RSD for those technique replicates & biological replicates combined with raw data in different groups if file are defaults NULL.

---

getimputation *Impute the peaks list data*

Description

Impute the peaks list data

Usage

```
getimputation(list, method = "l")
```

Arguments

list	list with data as peaks list, mz, rt and group information
method	'r' means remove, 'l' means use half the minimum of the values across the peaks list, 'mean' means mean of the values across the samples, 'median' means median of the values across the samples, '0' means 0, '1' means 1. Default 'l'.

Value

list with imputed peaks

See Also

getdoe

Examples

```
data(list)
getimputation(list)
```

`GetIntegration` *GetIntegration was mainly used for get the integration of certain ion's chromatogram data and plot the data*

Description

GetIntegration was mainly used for get the integration of certain ion's chromatogram data and plot the data

Usage

```
GetIntegration(
  data,
  rt = c(8.3, 9),
  n = 5,
  m = 5,
  slope = c(2, 2),
  baseline = 10,
  noslope = TRUE,
  smoothit = TRUE,
  half = FALSE
)
```

Arguments

`data`	file should be a dataframe with the first column RT and second column intensity of the SIM ions.
`rt`	a rough RT range contained only one peak to get the area
`n`	points in the moving average smooth box, default value is 5
`m`	numbers of points for regression to get the slope
`slope`	the threshold value for start/stop peak as percentage of max slope
`baseline`	numbers of the points for the baseline of the signal
`noslope`	logical, if using a horizon line to get area or not
`smoothit`	logical, if using an average smooth box or not. If using, n will be used
`half`	logical, if using the left half peak to calculate the area

Value

integration data such as peak area, peak height, signal and the slope data.

Examples

```
## Not run:
list <- GetIntegration(data)

## End(Not run)
```

Getisotopologues *Get the selected isotopologues at certain MS data*

Description

Get the selected isotopologues at certain MS data

Usage

```
Getisotopologues(formula = "C6H11O6", charge = 1, width = 0.3)
```

Arguments

formula	the molecular formula.
charge	the charge of that molecular. 1 in EI mode as default
width	the width of the peak width on mass spectrum. 0.3 as default for low resolution mass spectrum.

Examples

```
## Not run:
# show isotopologues
Getisotopologues(formula = 'C6H11O6', charge = 1, width = 0.3)

## End(Not run)
```

getmass *Get the exact mass of the isotopologues from a chemical formula or reaction's isotope patterns with the highest abundances*

Description

Get the exact mass of the isotopologues from a chemical formula or reaction's isotope patterns with the highest abundances

Usage

```
getmass(data)
```

Arguments

data	a chemical formula or reaction e.g. 'Cl-H', 'C2H4'

Value

numerical vector

getmassdefect *Get mass defect with certain scaled factor*

Description

Get mass defect with certain scaled factor

Usage

```
getmassdefect(mass, sf)
```

Arguments

mass	vector of mass
sf	scaled factors

Value

dataframe with mass, scaled mass and scaled mass defect

See Also

plotkms

Examples

```
mass <- c(100.1022,245.2122,267.3144,400.1222,707.2294)
sf <- 0.9988
mf <- getmassdefect(mass,sf)
```

getmd *Import data and return the annotated matrix for GC/LC-MS by m/z range and retention time*

Description

Import data and return the annotated matrix for GC/LC-MS by m/z range and retention time

Usage

```
getmd(data, mzstep = 0.1, mzrange = FALSE, rtrange = FALSE)
```

Arguments

data	file type which xcmsRaw could handle
mzstep	the m/z step for generating matrix data from raw mass spectral data
mzrange	vector range of the m/z, default all
rtrange	vector range of the retention time, default all

Value

matrix with the row as increasing m/z second and column as increasing scantime

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file('cdf', package = 'faahKO')
cdffiles <- list.files(cdfpath, recursive = TRUE, full.names = TRUE)
matrix <- getmd(cdffiles[1])

## End(Not run)
```

---

getmdh *Get the high order unit based Mass Defect*

Description

Get the high order unit based Mass Defect

Usage

```
getmdh(mz, cus = c("CH2,H2"), method = "round")
```

Arguments

mz	numeric vector for exact mass
cus	chemical formula or reaction
method	you could use ‘round‘, ‘floor‘ or ‘ceiling‘

Value

high order Mass Defect with details

Examples

```
## Not run:
getmdh(getmass('C2H4')))

## End(Not run)
```

getmdr *Get the raw Mass Defect*

Description

Get the raw Mass Defect

Usage

```
getmdr(mz)
```

Arguments

mz	numeric vector for exact mass

Value

raw Mass Defect

Examples

```
getmdr(28.0313)
```

getmr *Get the mzrt profile and group information for batch correction and plot as a list directly from path with default setting*

Description

Get the mzrt profile and group information for batch correction and plot as a list directly from path with default setting

Usage

```
getmr(
  path,
  index = FALSE,
  BPPARAM = BiocParallel::SnowParam(),
  pmethod = "hplcorbitrap",
  minfrac = 0.67,
  ...
)
```

Arguments

path	the path to your data
index	the index of the files
BPPARAM	used for BiocParallel package
pmethod	parameters used for different instrumentals such as 'hplcorbitrap', 'uplcorbitrap', 'hplcqtof', 'hplchqtof', 'uplcqtof', 'uplchqtof'. The parameters were from the references
minfrac	minimum fraction of samples necessary in at least one of the sample groups for it to be a valid group, default 0.67
...	arguments for xcmsSet function

Value

list with rtmz profile and group infomation

See Also

getdata,getupload, getmzrt, getdoe

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file('cdf', package = 'faahKO')
list <- getmr(cdfpath, pmethod = ' ')

## End(Not run)
```

---

getms1anno *Annotation of MS1 data by compounds database by predefined paired mass distance*

Description

Annotation of MS1 data by compounds database by predefined paired mass distance

Usage

```
getms1anno(pmd, mz, ppm = 10, db = NULL)
```

Arguments

pmd	adducts formula or paired mass distance for ions
mz	unknown mass to charge ratios vector
ppm	mass accuracy
db	compounds database as dataframe. Two required columns are name and monoisotopic molecular weight with column names of name and mass

Value

list or data frame

`getMSP` *read in MSP file as list for ms/ms or ms(EI) annotation*

Description

read in MSP file as list for ms/ms or ms(EI) annotation

Usage

```
getMSP(file)
```

Arguments

`file`	the path to your MSP file

Value

list a list with MSP information for annotation

`getmzrt` *Get the mzrt profile and group information as a mzrt list and/or save them as csv or rds for further analysis.*

Description

Get the mzrt profile and group information as a mzrt list and/or save them as csv or rds for further analysis.

Usage

```
getmzrt(
  xset,
  name = NULL,
  mzdigit = 4,
  rtdigit = 1,
  method = "medret",
  value = "into",
  eic = FALSE,
  type = "o"
)
```

Arguments

xset	xcmsSet/XCMSnExp objects
name	file name for csv and/or eic file, default NULL
mzdigit	m/z digits of row names of data frame, default 4
rtdigit	retention time digits of row names of data frame, default 1
method	parameter for groupval or featureDefinitions function, default medret
value	parameter for groupval or featureDefinitions function, default into
eic	logical, save xcmsSet and xcmsEIC objects for further investigation with the same name of files, you will need raw files in the same directory as defined in xcmsSet to extract the EIC based on the binned data. You could use 'plot' to plot EIC for specific peaks. For example, 'plot(xcmsEIC,xcmsSet,groupidx = 'M123.4567T278.9')' could show the EIC for certain peaks with m/z 206 and retention time 2789. default F
type	csv format for further analysis, m means Metaboanalyst, a means xMSannotator, p means Mummichog(NA values are imputed by 'getimputation', and F test is used here to generate stats and p value), o means full information csv (for 'pmd' package), default o. mapo could output all those format files.

Value

mzrt object, a list with mzrt profile and group information

References

Smith, C.A., Want, E.J., O'Maille, G., Abagyan, R., Siuzdak, G., 2006. XCMS: Processing Mass Spectrometry Data for Metabolite Profiling Using Nonlinear Peak Alignment, Matching, and Identification. Anal. Chem. 78, 779–787.

See Also

getdata,getdata2, getdoe, getcsv, getfilter

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file('cdf', package = 'faahKO')
xset <- getdata(cdfpath, pmethod = ' ')
getmzrt(xset, name = 'demo', type = 'mapo')

## End(Not run)
```

getmzrt2 *Get the mzrt profile and group information for batch correction and plot as a list for xcms 3 object*

Description

Get the mzrt profile and group information for batch correction and plot as a list for xcms 3 object

Usage

```
getmzrt2(xset, name = NULL)
```

Arguments

xset	a XCMSnExp object with processed data
name	file name for csv file, default NULL

Value

list with rtmz profile and group information

See Also

getdata2,getupload2, getmzrt, getdoe,getmzrtcsv

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file('cdf', package = 'faahKO')
xset <- getdata2(cdfpath,
ppp = xcms::MatchedFilterParam(),
rtp = xcms::ObiwarpParam(),
gpp = xcms::PeakDensityParam())
getmzrt2(xset)

## End(Not run)
```

getmzrtcsv *Covert the peaks list csv file into list*

Description

Covert the peaks list csv file into list

Usage

```
getmzrtcsv(path)
```

Arguments

path	the path to your csv file

Value

list with rtmz profile and group information as the first row

See Also

getmzrt

getoverlappeak *Get the overlap peaks by mass and retention time range*

Description

Get the overlap peaks by mass and retention time range

Usage

```
getoverlappeak(list1, list2)
```

Arguments

list1	list with data as peaks list, mz, rt, mzrange, rtrange and group information to be overlapped
list2	list with data as peaks list, mz, rt, mzrange, rtrange and group information to overlap

Value

logical index for list 1's peaks

See Also

getimputation,getdoe

getpn — *Merge positive and negative mode data*

Description

Merge positive and negative mode data

Usage

```
getpn(pos, neg, ppm = 5, pmd = 2.02, digits = 2, cutoff = 0.9)
```

Arguments

pos	a list with mzrt profile collected from positive mode. The sample order should match the negative mode.
neg	a list with mzrt profile collected from negative mode.The sample order should match the positive mode.
ppm	pmd mass accuracy, default 5
pmd	numeric or numeric vector
digits	mass or mass to charge ratio accuracy for pmd, default 2
cutoff	correlation coefficients, default 0.9

Value

mzrt object with group information from pos mode

getpower — *Get the index with power restriction for certain study with BH adjusted p-value and certain power.*

Description

Get the index with power restriction for certain study with BH adjusted p-value and certain power.

Usage

```
getpower(list, pt = 0.05, qt = 0.05, powert = 0.8, imputation = "l")
```

Arguments

list	list with data as peaks list, mz, rt and group information
pt	p value threshold, default 0.05
qt	q value threshold, BH adjust, default 0.05
powert	power cutoff, default 0.8
imputation	parameters for ‘getimputation‘ function method

Value

list with current power and sample numbers for each peaks

See Also

getimputation, getdoe

Examples

```
data(list)
getpower(list)
```

---

getpqsi *Compute pooled QC linear index according to run order*

Description

Compute pooled QC linear index according to run order

Usage

```
getpqsi(data, order, n = 5)
```

Arguments

data	peaks intensity list with row as peaks and column as samples
order	run order of pooled QC samples
n	samples numbers used for linear regression

Value

vector for the peaks proportion with significant changes in linear regression after FDR control.

---

getQCraw *get the data of QC compound for a group of data*

Description

get the data of QC compound for a group of data

Usage

```
getQCraw(path, mzrange, rtrange, index = NULL)
```

Arguments

path	data path for your QC samples
mzrange	mass of the QC compound
rtrange	retention time of the QC compound
index	index of the files contained QC compounds, default is all of the compounds

Value

number vector, each number indicate the peak area of that mass and retention time range

---

getrangecsv *Get a mzrt list and/or save mz and rt range as csv file.*

Description

Get a mzrt list and/or save mz and rt range as csv file.

Usage

```
getrangecsv(list, name, ...)
```

Arguments

list	list with data as peaks list, mz, rt and group information
name	result name for csv and/or eic file, default NULL
...	other parameters for ‘write.table‘

Value

NULL, csv file

---

getretcor *Perform peaks list alignment and return features table*

Description

Perform peaks list alignment and return features table

Usage

```
getretcor(list, ts = 1, ppm = 10, deltart = 5, FUN)
```

Arguments

list	each element should be a data.frame with mz, rt and ins as m/z, retention time in seconds and intensity of certain peaks.
ts	template sample index in the list, default 1
ppm	mass accuracy, default 10
deltart	retention time shift table, default 5 seconds
FUN	function to deal with multiple aligned peaks from one sample

Value

mzrt object without group information

---

getrmd *Get the Relative Mass Defect*

Description

Get the Relative Mass Defect

Usage

```
getrmd(mz)
```

Arguments

mz	numeric vector for exact mass

Value

Relative Mass Defect

Examples

```
getrmd(28.0313)
```

getsim *output the similarity of two dataset*

Description

output the similarity of two dataset

Usage

```
getsim(xset1, xset2)
```

Arguments

xset1	the first dataset
xset2	the second dateset

Value

similarity on retention time and rsd

gettechrep *Get the report for technique replicates.*

Description

Get the report for technique replicates.

Usage

```
gettechrep(
  xset,
  method = "medret",
  intensity = "into",
  file = NULL,
  rsdcf = 30,
  inscf = 1000
)
```

Arguments

xset	the xcmsset object which for all of your technique replicates for one sample
method	parameter for groupval function
intensity	parameter for groupval function
file	file name for further annotation, default NULL
rsdcf	rsd cutoff for peaks, default 30
inscf	intensity cutoff for peaks, default 1000

Value

dataframe with mean, standard deviation and RSD for those technique replicates combined with raw data

---

`gettimegrouprep` *Get the time series or two factor DoE report for samples with biological and technique replicates in different groups*

Description

Get the time series or two factor DoE report for samples with biological and technique replicates in different groups

Usage

```
gettimegrouprep(
  xset,
  file = NULL,
  method = "medret",
  intensity = "into",
  rsdcf = 30,
  inscf = 1000
)
```

Arguments

`xset`	the xcmsset object all of samples with technique replicates in time series or two factor DoE
`file`	file name for the peaklist to MetaboAnalyst
`method`	parameter for groupval function
`intensity`	parameter for groupval function
`rsdcf`	rsd cutoff for peaks, default 30
`inscf`	intensity cutoff for peaks, default 1000

Value

dataframe with time series or two factor DoE mean, standard deviation and RSD for those technique replicates & biological replicates combined with raw data in different groups if file are defaults NULL.

getupload *Get the csv files from xcmsset/XCMSnExp/list object*

Description

Get the csv files from xcmsset/XCMSnExp/list object

Usage

```
getupload(
  xset,
  method = "medret",
  value = "into",
  name = "Peaklist",
  type = "m",
  mzdigit = 4,
  rtdigit = 1
)
```

Arguments

xset	the xcmsset/XCMSnExp/list object which you want to submitted to Metaboanalyst
method	parameter for groupval function
value	parameter for groupval function
name	file name
type	m means Metaboanalyst, a means xMSannotator, o means full information csv
mzdigit	m/z digits of row names of data frame
rtdigit	retention time digits of row names of data frame

Value

dataframe with data needed for Metaboanalyst/xMSannotator/pmd if your want to perform local analysis.

See Also

getdata, getmzrt

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file('cdf', package = 'faahKO')
xset <- getdata(cdfpath, pmethod = ' ')
getupload(xset)

## End(Not run)
```

getupload2 *Get the csv files to be submitted to Metaboanalyst*

Description

Get the csv files to be submitted to Metaboanalyst

Usage

```
getupload2(xset, value = "into", name = "Peaklist")
```

Arguments

xset	a XCMSnExp object with processed data which you want to submitted to Metaboanalyst
value	value for ‘xcms::featureValues‘
name	file name

Value

dataframe with data needed for Metaboanalyst if your want to perform local analysis.

See Also

getdata2,getupload, getmzrt2

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file('cdf', package = 'faahKO')
xset <- getdata2(cdfpath)
getupload2(xset)

## End(Not run)
```

getupload3 *Get the csv files to be submitted to Metaboanalyst*

Description

Get the csv files to be submitted to Metaboanalyst

Usage

```
getupload3(list, name = "Peaklist")
```

Arguments

list	list with data as peaks list, mz, rt and group information
name	file name

Value

dataframe with data needed for Metaboanalyst if your want to perform local analysis.

See Also

getmzrt, getmzrt2

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file('cdf', package = 'faahKO')
xset <- getdata2(cdfpath,
ppp = xcms::MatchedFilterParam(),
rtp = xcms::ObiwarpParam(),
gpp = xcms::PeakDensityParam())
xset <- enviGCMS::getmzrt2(xset)
getupload3(xset)

## End(Not run)
```

---

gifmr *plot scatter plot for rt-mz profile and output gif file for multiple groups*

Description

plot scatter plot for rt-mz profile and output gif file for multiple groups

Usage

```
gifmr(
  list,
  ms = c(100, 500),
  rsdcf = 30,
  inscf = 5,
  imputation = "i",
  name = "test",
  ...
)
```

Arguments

list	list with data as peaks list, mz, rt and group information
ms	the mass range to plot the data
rsdcf	the rsd cutoff of all peaks in all group
inscf	Log intensity cutoff for peaks across samples. If any peaks show a intensity higher than the cutoff in any samples, this peaks would not be filtered. default 5
imputation	parameters for 'getimputation' function method
name	file name for gif file, default test
...	parameters for 'plot' function

Value

gif file

Examples

```
## Not run:
data(list)
gifmr(list)

## End(Not run)
```

Integration *Just integrate data according to fixed rt and fixed noise area*

Description

Just integrate data according to fixed rt and fixed noise area

Usage

```
Integration(data, rt = c(8.3, 9), brt = c(8.3, 8.4), smoothit = TRUE)
```

Arguments

data	file should be a dataframe with the first column RT and second column intensity of the SIM ions.
rt	a rough RT range contained only one peak to get the area
brt	a rough RT range contained only one peak and enough noises to get the area
smoothit	logical, if using an average smooth box or not. If using, n will be used

Value

area integration data

Examples

```
## Not run:
area <- Integration(data)

## End(Not run)
```

`list` *Demo data*

Description

Demo data

Usage

```
data(list)
```

Format

A list object with data, mass to charge ratio, retention time and group information. The list is generated from faahKO package.

`ma` *filter data by average moving box*

Description

filter data by average moving box

Usage

```
ma(x, n)
```

Arguments

`x`	a vector
`n`	A number to identify the size of the moving box.

Value

The filtered data

Examples

```
ma(rnorm(1000),5)
```

matrix *Demo raw data matrix*

Description

Demo raw data matrix

Usage

```
data(matrix)
```

Format

A matrix object from raw mass spectrometry data. The list is generated from faahKO package.

Mode *define the Mode function*

Description

define the Mode function

Usage

```
Mode(x)
```

Arguments

x	vector

Value

Mode of the vector

plotanno *Show MS/MS pmd annotation result*

Description

Show MS/MS pmd annotation result

Usage

```
plotanno(anno, ...)
```

Arguments

anno	list from MSMS anno function
...	other parameter for plot function

plotcc *plot the calibration curve with error bar, r squared and equation.*

Description

plot the calibration curve with error bar, r squared and equation.

Usage

```
plotcc(x, y, upper, lower = upper, ...)
```

Arguments

x	concentration
y	response
upper	upper error bar
lower	lower error bar
...	parameters for ‘plot‘ function

Examples

```
## Not run:
plotcc(x,y,upper)

## End(Not run)
```

plotden *plot the density for multiple samples*

Description

plot the density for multiple samples

Usage

```
plotden(data, lv, index = NULL, name = NULL, lwd = 1, ...)
```

Arguments

data	data row as peaks and column as samples
lv	group information
index	index for selected peaks
name	name on the figure for samples
lwd	the line width for density plot, default 1
...	parameters for 'plot' function

Examples

```
data(list)
plotden(list$data, lv = as.character(list$group$sample_group),ylim = c(0,1))
```

plotdwtus *plot density weighted intensity for multiple samples*

Description

plot density weighted intensity for multiple samples

Usage

```
plotdwtus(list, n = 512, ...)
```

Arguments

list	list with data as peaks list, mz, rt and group information
n	the number of equally spaced points at which the density is to be estimated, default 512
...	parameters for 'plot' function

Value

Density weighted intensity for multiple samples

Examples

```
data(list)
plotdwtus(list)
```

---

plote *plot EIC and boxplot for all peaks and return diffreport*

Description

plot EIC and boxplot for all peaks and return diffreport

Usage

```
plote(xset, name = "test", test = "t", nonpara = "n", ...)
```

Arguments

xset	xcmsset object
name	filebase of the sub dir
test	't' means two-sample welch t-test, 't.equalvar' means two-sample welch t-test with equal variance, 'wilcoxon' means rank sum wilcoxon test, 'f' means F-test, 'pairt' means paired t test, 'blockf' means Two-way analysis of variance, default 't'
nonpara	'y' means using nonparametric ranked data, 'n' means original data
...	other parameters for 'diffreport'

Value

diffreport and pdf figure for EIC and boxplot

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file('cdf', package = 'faahKO')
xset <- getdata(cdfpath, pmethod = ' ')
plote(xset)

## End(Not run)
```

plotgroup *Plot the response group of GC-MS*

Description

Plot the response group of GC-MS

Usage

```
plotgroup(data, threshold = 2)
```

Arguments

data	imported data matrix of GC-MS
threshold	the threshold of the response (log based 10) to separate the group

Value

list linear regression model for the data matrix

Examples

```
## Not run:
data(matrix)
plotgroup(matrix)

## End(Not run)
```

plothist *plot the density of the GC-MS data with EM algorithm to separate the data into two log normal distribution.*

Description

plot the density of the GC-MS data with EM algorithm to separate the data into two log normal distribution.

Usage

```
plothist(data)
```

Arguments

data	imported data matrix of GC-MS

Examples

```
## Not run:
# generate a matrix from raw data with row as m/z and column as retention time
plothist(matrix)

## End(Not run)
```

`plothm` *Plot the heatmap of mzrt profiles*

Description

Plot the heatmap of mzrt profiles

Usage

```
plothm(data, lv, index = NULL)
```

Arguments

`data`	data row as peaks and column as samples
`lv`	group information
`index`	index for selected peaks

Examples

```
data(list)
plothm(list$data, lv = as.factor(list$group$sample_group))
```

`plotint` *plot the information of integration*

Description

plot the information of integration

Usage

```
plotint(list, name = NULL)
```

Arguments

`list`	list from getinteagtion
`name`	the title of the plot

Examples

```
## Not run:
list <- getinteagtion(rawdata)
plotint(list)

## End(Not run)
```

`plotintslope` *plot the slope information of integration*

Description

plot the slope information of integration

Usage

```
plotintslope(list, name = NULL)
```

Arguments

`list`	list from getintegration
`name`	the title of the plot

Examples

```
## Not run:
list <- getinteragtion(rawdata)
plotintslope(list)

## End(Not run)
```

`plotkms` *plot the kendrick mass defect diagram*

Description

plot the kendrick mass defect diagram

Usage

```
plotkms(data, cutoff = 1000)
```

Arguments

`data`	vector with the name m/z
`cutoff`	remove the low intensity

See Also

getmassdefect

Examples

```
## Not run:
mz <- c(10000,5000,20000,100,40000)
names(mz) <- c(100.1022,245.2122,267.3144,400.1222,707.2294)
plotkms(mz)

## End(Not run)
```

---

plotmr *plot the scatter plot for peaks list with threshold*

Description

plot the scatter plot for peaks list with threshold

Usage

```
plotmr(
  list,
  rt = NULL,
  ms = NULL,
  inscf = 5,
  rsdcf = 30,
  imputation = "l",
  ...
)
```

Arguments

list	list with data as peaks list, mz, rt and group information
rt	vector range of the retention time
ms	vector vector range of the m/z
inscf	Log intensity cutoff for peaks across samples. If any peaks show a intensity higher than the cutoff in any samples, this peaks would not be filtered. default 5
rsdcf	the rsd cutoff of all peaks in all group, default 30
imputation	parameters for ‘getimputation‘ function method
...	parameters for ‘plot‘ function

Value

data fit the cutoff

Examples

```
data(list)
plotmr(list)
```

`plotmrc` *plot the diff scatter plot for peaks list with threshold between two groups*

Description

plot the diff scatter plot for peaks list with threshold between two groups

Usage

```
plotmrc(list, ms = c(100, 800), inscf = 5, rsdcf = 30, imputation = "l", ...)
```

Arguments

`list`	list with data as peaks list, mz, rt and group information
`ms`	the mass range to plot the data
`inscf`	Log intensity cutoff for peaks across samples. If any peaks show a intensity higher than the cutoff in any samples, this peaks would not be filtered. default 5
`rsdcf`	the rsd cutoff of all peaks in all group
`imputation`	parameters for ‘getimputation‘ function method
`...`	parameters for ‘plot‘ function

Examples

```
data(list)
plotmrc(list)
```

`plotms` *plot GC/LC-MS data as a heatmap with TIC*

Description

plot GC/LC-MS data as a heatmap with TIC

Usage

```
plotms(data, log = FALSE)
```

Arguments

data	imported data matrix of GC-MS
log	transform the intensity into log based 10

Value

heatmap

Examples

```
## Not run:
png('test.png')
plotms(matrix)
dev.off()

## End(Not run)
```

---

plotmsrt *Plot EIC of certain m/z and return dataframe for integration*

Description

Plot EIC of certain m/z and return dataframe for integration

Usage

```
plotmsrt(data, ms, rt, n = FALSE)
```

Arguments

data	imported data matrix of GC-MS
ms	m/z to be extracted
rt	vector range of the retention time
n	logical smooth or not

Value

dataframe with with the first column RT and second column intensity of the SIM ions.

Examples

```
## Not run:
matrix <- getmd(rawdata)
plotmsrt(matrix,rt = c(500,1000),ms = 300)

## End(Not run)
```

plotmz *plot GC/LC-MS data as scatter plot*

Description

plot GC/LC-MS data as scatter plot

Usage

```
plotmz(data, inscf = 3.5, ...)
```

Arguments

data	imported data matrix of GC-MS
inscf	Log intensity cutoff for peaks, default 3.5
...	parameters for ‘plot‘ function

Value

scatter plot

Examples

```
## Not run:
data(matrix)
png('test.png')
plotmz(matrix)
dev.off()

## End(Not run)
```

plotpca *plot the PCA for multiple samples*

Description

plot the PCA for multiple samples

Usage

```
plotpca(
  data,
  lv = NULL,
  index = NULL,
  center = TRUE,
  scale = TRUE,
  xrange = NULL,
  yrange = NULL,
  pch = NULL,
  ...
)
```

Arguments

data	data row as peaks and column as samples
lv	group information
index	index for selected peaks
center	parameters for PCA
scale	parameters for scale
xrange	x axis range for return samples, default NULL
yrange	y axis range for return samples, default NULL
pch	default pch would be the first character of group information or samples name
...	other parameters for ‘plot‘ function

Value

if xrange and yrange are not NULL, return file name of all selected samples on 2D score plot

Examples

```
data(list)
plotpca(list$data, lv = as.character(list$group$sample_group))
```

---

plotpeak *plot intensity of peaks across samples or samples across peaks*

Description

plot intensity of peaks across samples or samples across peaks

Usage

```
plotpeak(data, lv = NULL, indexx = NULL, indexy = NULL, ...)
```

Arguments

data	matrix
lv	factor vector for the column
indexx	index for matrix row
indexy	index for matrix column
...	parameters for 'title' function

Value

parallel coordinates plot

Examples

```
data(list)
# selected peaks across samples
plotpeak(t(list$data), lv = as.factor(c(rep(1,5),rep(2,nrow(list$data)-5))),1:10,1:10)
# selected samples across peaks
plotpeak(list$data, lv = as.factor(list$group$sample_group),1:10,1:10)
```

---

plotridge *plot ridgeline density plot*

Description

plot ridgeline density plot

Usage

```
plotridge(data, lv = NULL, indexx = NULL, indexy = NULL, ...)
```

Arguments

data	matrix
lv	factor vector for the column
indexx	index for matrix row
indexy	index for matrix column
...	parameters for 'title' function

Value

ridgeline density plot

Examples

```
data(list)
plotridge(t(list$data),indexy=c(1:10),xlab = 'Intensity',ylab = 'peaks')
plotridge(log(list$data),as.factor(list$group$sample_group),xlab = 'Intensity',ylab = 'peaks')
```

plotridges *Relative Log Abundance Ridge (RLAR) plots for samples or peaks*

Description

Relative Log Abundance Ridge (RLAR) plots for samples or peaks

Usage

```
plotridges(data, lv, type = "g")
```

Arguments

data	data row as peaks and column as samples
lv	factor vector for the group information of samples
type	'g' means group median based, other means all samples median based.

Value

Relative Log Abundance Ridge(RLA) plots

Examples

```
data(list)
plotridges(list$data, as.factor(list$group$sample_group))
```

plotrla *Relative Log Abundance (RLA) plots*

Description

Relative Log Abundance (RLA) plots

Usage

```
plotrla(data, lv, type = "g", ...)
```

Arguments

data	data row as peaks and column as samples
lv	factor vector for the group information
type	'g' means group median based, other means all samples median based.
...	parameters for boxplot

Value

Relative Log Abundance (RLA) plots

Examples

```
data(list)
plotrla(list$data, as.factor(list$group$sample_group))
```

`plotrsd` *plot the rsd influences of data in different groups*

Description

plot the rsd influences of data in different groups

Usage

```
plotrsd(list, ms = c(100, 800), inscf = 5, rsdcf = 100, imputation = "l", ...)
```

Arguments

`list`	list with data as peaks list, mz, rt and group information
`ms`	the mass range to plot the data
`inscf`	Log intensity cutoff for peaks across samples. If any peaks show a intensity higher than the cutoff in any samples, this peaks would not be filtered. default 5
`rsdcf`	the rsd cutoff of all peaks in all group
`imputation`	parameters for 'getimputation' function method
`...`	other parameters for 'plot' function

Examples

```
data(list)
plotrsd(list)
```

plotrtms — *Plot mass spectrum of certain retention time and return mass spectrum vector (MSP file) for NIST search*

Description

Plot mass spectrum of certain retention time and return mass spectrum vector (MSP file) for NIST search

Usage

```
plotrtms(data, rt, ms, msp = FALSE)
```

Arguments

data	imported data matrix of GC-MS
rt	vector range of the retention time
ms	vector range of the m/z
msp	logical, return MSP files or not, default False

Value

plot, vector and MSP files for NIST search

Examples

```
## Not run:
plotrtms(matrix,rt = c(500,1000),ms = c(300,500))

## End(Not run)
```

plotrug — *plot 1-d density for multiple samples*

Description

plot 1-d density for multiple samples

Usage

```
plotrug(data, lv = NULL, indexx = NULL, indexy = NULL, ...)
```

Arguments

data	matrix
lv	factor vector for the column
indexx	index for matrix row
indexy	index for matrix column
...	parameters for ‘title‘ function

Examples

```
data(list)
plotrug(list$data)
plotrug(log(list$data), lv = as.factor(list$group$sample_group))
```

---

plotsms *Plot the intensity distribution of GC-MS*

Description

Plot the intensity distribution of GC-MS

Usage

```
plotsms(meanmatrix, rsdmatrix)
```

Arguments

meanmatrix	mean data matrix of GC-MS(n=5)
rsdmatrix	standard deviation matrix of GC-MS(n=5)

Examples

```
## Not run:
plotsms(meanmatrix,rsdmatrix)

## End(Not run)
```

plotsub *Plot the background of data*

Description

Plot the background of data

Usage

```
plotsub(data)
```

Arguments

data	imported data matrix of GC-MS

Examples

```
## Not run:
plotsub(matrix)

## End(Not run)
```

plott *plot GC-MS data as a heatmap for constant speed of temperature rising*

Description

plot GC-MS data as a heatmap for constant speed of temperature rising

Usage

```
plott(data, log = FALSE, temp = c(100, 320))
```

Arguments

data	imported data matrix of GC-MS
log	transform the intensity into log based 10
temp	temperature range for constant speed

Value

heatmap

Examples

```
## Not run:
plott(matrix)

## End(Not run)
```

`plottic` *Plot Total Ion Chromatogram (TIC)*

Description

Plot Total Ion Chromatogram (TIC)

Usage

```
plottic(data, n = FALSE)
```

Arguments

`data`	imported data matrix of GC-MS
`n`	logical smooth or not

Value

plot

Examples

```
## Not run:
plottic(matrix)

## End(Not run)
```

`qbatch` *Get the MIR from the file*

Description

Get the MIR from the file

Usage

```
qbatch(file, mz1, mz2, rt = c(8.65, 8.74), brt = c(8.74, 8.85))
```

Arguments

file	data file, CDF or other format supportted by xcmsRaw
mz1	the lowest mass
mz2	the highest mass
rt	a rough RT range contained only one peak to get the area
brt	a rough RT range contained only one peak and enough noises to get the area

Value

arearatio

Examples

```
## Not run:
arearatio <- qbatch(datafile)

## End(Not run)
```

---

runMDPlot *Shiny application for interactive mass defect plots analysis*

Description

Shiny application for interactive mass defect plots analysis

Usage

```
runMDPlot()
```

---

runsccp *Shiny application for Short-Chain Chlorinated Paraffins analysis*

Description

Shiny application for Short-Chain Chlorinated Paraffins analysis

Usage

```
runsccp()
```

sccp — *Short-Chain Chlorinated Paraffins(SCCPs) peaks information for quantitative analysis*

Description

A dataset containing the ions, formula, Cl

Usage

```
data(sccp)
```

Format

A data frame with 24 rows and 8 variables:

Cln Chlorine atom numbers

Cn Carbon atom numbers

formula molecular formula

Hn hydrogen atom numbers

ions [M-Cl]- ions

mz m/z for the isotopologues with highest intensity

intensity abundance of the isotopologues with highest intensity

Clp Chlorine contents

submd — *Get the differences of two GC/LC-MS data*

Description

Get the differences of two GC/LC-MS data

Usage

```
submd(data1, data2, mzstep = 0.1, rtstep = 0.01)
```

Arguments

data1	data file path of first data
data2	data file path of second data
mzstep	the m/z step for generating matrix data from raw mass spectral data
rtstep	the alignment accuracy of retention time, e.g. 0.01 means the retention times of combined data should be the same at the accuracy 0.01s. Higher rtstep would return less scans for combined data

Value

list four matrix with the row as scantime in second and column as m/z, the first matrix refer to data 1, the second matrix refer to data 2, the third matrix refer to data1 - data2 while the fourth refer to data2 - data1, minus values are imputed by 0

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file('cdf', package = 'faahKO')
cdffiles <- list.files(cdfpath, recursive = TRUE, full.names = TRUE)
matrix <- submd(cdffiles[1],cdffiles[7])

## End(Not run)
```

---

svabatch *Plot the influences of DoE and Batch effects on each peaks*

Description

Plot the influences of DoE and Batch effects on each peaks

Usage

```
svabatch(df, dfsv, dfanova)
```

Arguments

df	data output from ‘svacor‘ function
dfsv	data output from ‘svaplot‘ function for corrected data
dfanova	data output from ‘svaplot‘ function for raw data

Value

influences plot

See Also

svacor, svaplot, svapca

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file("cdf", package = "faahKO")
cdffiles <- list.files(cdfpath, recursive = TRUE, full.names = TRUE)
xset <- xcmsSet(cdffiles)
xset <- group(xset)
xset2 <- retcor(xset, family = "symmetric", plottype = "mdevden")
xset2 <- group(xset2, bw = 10)
xset3 <- fillPeaks(xset2)
df <- svacor(xset3)
dfsv <- svaplot(xset3)
dfanova <- svaplot(xset3, pqvalues = "anova")
svabatch(df,dfsv,dfanova)

## End(Not run)
```

`svacor` *Surrogate variable analysis(SVA) to correct the unknown batch effects*

Description

Surrogate variable analysis(SVA) to correct the unknown batch effects

Usage

```
svacor(xset, lv = NULL, method = "medret", intensity = "into")
```

Arguments

`xset`	xcmsset object
`lv`	group information
`method`	parameter for groupval function
`intensity`	parameter for groupval function

Details

this is used for reviesed version of SVA to correct the unknown batch effects

Value

list object with various components such raw data, corrected data, signal part, random errors part, batch part, p-values, q-values, mass, rt, Posterior Probabilities of Surrogate variables and Posterior Probabilities of Mod. If no surrogate variable found, corresponding part would miss.

See Also

`svapca`, `svaplot`, `svabatch`

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file("cdf", package = "faahKO")
cdffiles <- list.files(cdfpath, recursive = TRUE, full.names = TRUE)
xset <- xcmsSet(cdffiles)
xset <- group(xset)
xset2 <- retcor(xset, family = "symmetric", plottype = "mdevden")
xset2 <- group(xset2, bw = 10)
xset3 <- fillPeaks(xset2)
df <- svacor(xset3)

## End(Not run)
```

---

svadata *Filter the data with p value and q value*

Description

Filter the data with p value and q value

Usage

```
svadata(list, pqvalues = "sv", pt = 0.05, qt = 0.05)
```

Arguments

list	results from svacor function
pqvalues	method for ANOVA or SVA
pt	threshold for p value, default is 0.05
qt	threshold for q value, default is 0.05

Value

data, corrected data, mz and retention for filerted data

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file("cdf", package = "faahKO")
cdffiles <- list.files(cdfpath, recursive = TRUE, full.names = TRUE)
xset <- xcmsSet(cdffiles)
xset <- group(xset)
xset2 <- retcor(xset, family = "symmetric", plottype = "mdevden")
xset2 <- group(xset2, bw = 10)
xset3 <- fillPeaks(xset2)
df <- svacor(xset3)
```

```
svadata(df)

## End(Not run)
```

---

svapca *Principal component analysis(PCA) for SVA corrected data and raw data*

Description

Principal component analysis(PCA) for SVA corrected data and raw data

Usage

```
svapca(list, center = TRUE, scale = TRUE, lv = NULL)
```

Arguments

list	results from svacor function
center	parameters for PCA
scale	parameters for scale
lv	group information

Value

plot

See Also

svacor, svaplot, svabatch

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file("cdf", package = "faahKO")
cdffiles <- list.files(cdfpath, recursive = TRUE, full.names = TRUE)
xset <- xcmsSet(cdffiles)
xset <- group(xset)
xset2 <- retcor(xset, family = "symmetric", plottype = "mdevden")
xset2 <- group(xset2, bw = 10)
xset3 <- fillPeaks(xset2)
df <- svacor(xset3)
svapca(df)

## End(Not run)
```

svaplot *Filter the data with p value and q value and show them*

Description

Filter the data with p value and q value and show them

Usage

```
svaplot(list, pqvalues = "sv", pt = 0.05, qt = 0.05, lv = NULL, index = NULL)
```

Arguments

list	results from svacor function
pqvalues	method for ANOVA or SVA
pt	threshold for p value, default is 0.05
qt	threshold for q value, default is 0.05
lv	group information
index	index for selected peaks

Value

heatmap for the data

See Also

svacor, svapca, svabatch

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file("cdf", package = "faahKO")
cdffiles <- list.files(cdfpath, recursive = TRUE, full.names = TRUE)
xset <- xcmsSet(cdffiles)
xset <- group(xset)
xset2 <- retcor(xset, family = "symmetric", plottype = "mdevden")
xset2 <- group(xset2, bw = 10)
xset3 <- fillPeaks(xset2)
df <- svacor(xset3)
svaplot(df)

## End(Not run)
```

svaupload *Get the corrected data after SVA for metabolanalyst*

Description

Get the corrected data after SVA for metabolanalyst

Usage

```
svaupload(xset, lv = NULL)
```

Arguments

xset	xcmsset object
lv	group information

Value

csv files for both raw and corrected data for metaboanalyst if SVA could be applied

Examples

```
## Not run:
library(faahKO)
cdfpath <- system.file("cdf", package = "faahKO")
cdffiles <- list.files(cdfpath, recursive = TRUE, full.names = TRUE)
xset <- xcmsSet(cdffiles)
xset <- group(xset)
xset2 <- retcor(xset, family = "symmetric", plottype = "mdevden")
xset2 <- group(xset2, bw = 10)
xset3 <- fillPeaks(xset2)
svaupload(xset3)

## End(Not run)
```

TBBPA *Demo data for TBBPA metabolism in Pumpkin*

Description

Demo data for TBBPA metabolism in Pumpkin

Usage

```
data(TBBPA)
```

Format

A list object with data, mass to charge ratio, retention time and group information. Three pumpkin seeding root samples' peaks list is extracted by xcms online.

References

Hou, X., Yu, M., Liu, A., Wang, X., Li, Y., Liu, J., Schnoor, J.L., Jiang, G., 2019. Glycosylation of Tetrabromobisphenol A in Pumpkin. Environ. Sci. Technol. https://doi.org/10.1021/acs.est.9b02122

`writeMSP` *Write MSP file for NIST search*

Description

Write MSP file for NIST search

Usage

```
writeMSP(list, name = "unknown", sep = FALSE)
```

Arguments

`list`	a list with spectra information
`name`	name of the compounds
`sep`	numeric or logical the numbers of spectra in each file and FALSE to include all of the spectra in one msp file

Value

none a MSP file will be created.

Examples

```
## Not run:
ins <- c(10000,20000,10000,30000,5000)
mz <- c(101,143,189,221,234)
writeMSP(list(list(spectra = cbind.data.frame(mz,ins))), name = 'test')

## End(Not run)
```

xrankanno *Perform MS/MS X rank annotation for mgf file*

Description

Perform MS/MS X rank annotation for mgf file

Usage

```
xrankanno(file, db = NULL, ppm = 10, prems = 1.1, intc = 0.1, quantile = 0.75)
```

Arguments

file	mgf file generated from MS/MS data
db	database could be list object from 'getms2pmd'
ppm	mass accuracy, default 10
prems	precursor mass range, default 1.1 to include M+H or M-H
intc	intensity cutoff for peaks. Default 0.1
quantile	X rank quantiles cutoff for annotation. Default 0.75.

Value

list with MSMS annotation results

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