

ITALICS

April 19, 2009

analyseCGH *GLAD analysis*

Description

Glad Analysis of the genomic profile

Usage

```
analyseCGH(data, amplicon, deletion, deltaN, forceGL, param, nbsigma, ...)
```

Arguments

data	A data frame containing SNP's intensity, chromosome and position on the genome. data must have a Chr, X and LogRatio columns
amplicon	see the amplicon parameter in the daglad function
deletion	see the deletion parameter in the daglad function
deltaN	see the deltaN parameter in the daglad function
forceGL	see the forceGL parameter in the daglad function
param	see the param parameter in the daglad function
nbsigma	see the nbsigma parameter in the daglad function
...	Other daglad parameters.

Value

An object of class `profileCGH`.
Other daglad parameters.

Note

People interested in tools dealing with array CGH analysis and DNA copy number analysis can visit our web-page <http://bioinfo.curie.fr>.

Author(s)

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Source

Institut Curie, <italics@curie.fr>.

See Also

[getModel](#)

ITALICS

Affymetrix SNP chip normalization

Description

Normalize and analyse Affymetrix SNP array 100K and 500K set (see the vignette)

Usage

```
ITALICS(quartetInfo, snpInfo, confidence=0.95, iteration=2,
        formule="Smoothing+QuartetEffect+FL+I (FL^2)+I (FL^3)+GC+I (GC^2)+I (GC^3)", prc
        amplicon=2.1, deletion=-3.5, deltaN=0.15, forceGL=c(-0.2,0.2), param=c(d=2),
```

Arguments

<code>quartetInfo</code>	a data frame containing all the raw quartet intensities plus there GC content, fragment length, and Quartet effect
<code>snpInfo</code>	a data frame containing SNPs position along the genome and raw copy number
<code>confidence</code>	The confidence interval. After the last bias estimation step, quartets outside this confidence interval are flagged. The lower confidence is, the more quartets will be flagged. See also the parameter <code>prc</code> .
<code>iteration</code>	The number of iteration you d'like to do
<code>formule</code>	A symbolic description of the term of the model. The default value of <code>formule</code> means that we want correct the observed <code>quartetLogRatio</code> using the estimated copy number (Smoothing), the Quartet Effect, the quartet Fragment Length (FL) and the quartet GC content.
<code>prc</code>	<code>prc</code> is a frequence (between 0 and 1). After the final iteration of ITALICS, badly predicted probes are flagged (see also the parameter <code>confidence</code>). Only SNPs having more than <code>prc</code> of their probes non-flagged are kept for the final GLAD analysis. The higher <code>prc</code> is, the more SNPs are removed before the final GLAD analysis.
<code>amplicon</code>	see the <code>amplicon</code> parameter in the <code>daglad</code> function
<code>deletion</code>	see the <code>deletion</code> parameter in the <code>daglad</code> function
<code>deltaN</code>	see the <code>deltaN</code> parameter in the <code>daglad</code> function
<code>forceGL</code>	see the <code>forceGL</code> parameter in the <code>daglad</code> function
<code>param</code>	see the <code>param</code> parameter in the <code>daglad</code> function
<code>nbsigma</code>	see the <code>nbsigma</code> parameter in the <code>daglad</code> function
<code>...</code>	Other <code>daglad</code> parameters.

Details

The function `ITALICS` implements the methodology which is described in the article : `ITALICS`: an algorithm for normalization and DNA copy number calling for Affymetrix SNP arrays (Rigaill et al., *Bioinformatics Advance Access* published on February 5, 2008).

The principle of the `ITALICS` algorithm: `ITALICS`, is a normalization method that estimates both the biological and the non-relevant effects in an alternate and iterative way to accurately remove the non-relevant effects.

`ITALICS` deals with known systematic sources of variation such as the GC-content of the quartets, the PCR amplified fragment length and the GC-content of the PCR amplified fragment . It also takes into account the quartet effect which corresponds to the fact that some quartets systematically have a small intensity while others tend to have a high intensity. `ITALICS` is also able to correct spatial artifacts which sometimes arise on Affymetrix SNP arrays 100K and 500K set.

Value

Return an object of class `profileCGH`
Other daglad parameters.

Note

People interested in tools dealing with array CGH analysis and DNA copy number analysis can visit our web-page <http://bioinfo.curie.fr>.

Author(s)

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Source

Institut Curie, italics@curie.fr.

Examples

```
## Not run:
## step to get the path of the HF0844_Hind.CEL file
ITALICSDataPATH <- attr(as.environment(match("package:ITALICSData", search())), "path")
filename <- paste(ITALICSDataPATH, "/data/HF0844_Hind.CEL", sep="")
quartetEffectFile <- paste(ITALICSDataPATH, "/data/Hind.QuartetEffect.csv", sep="")

## load quartet effect
quartetEffect <- read.table(quartetEffectFile, sep=";", header=TRUE)

## load annotation using the pd.mapping50k.xba24 or pd.mapping50k.hind240 or pd.mapping2
headdetails <- readCelHeader(filename[1])
pkgname <- cleanPlatformName(headdetails[["chiptype"]])
snpInfo <- getSnpInfo(pkgname)
quartet <- getQuartet(pkgname, snpInfo)

## read cel files and format data
tmpExprs <- readCelIntensities(filename, indices=quartet$fid)
quartet$quartetInfo$quartetLogRatio <- readQuartetCopyNb(tmpExprs)
quartet$quartetInfo <- addInfo(quartet, quartetEffect)
snpInfo <- fromQuartetToSnp(cIntensity="quartetLogRatio", quartetInfo=quartet$quartetInfo)
```

```
## ITALICS normalization
profilSNPHind <- ITALICS(quartet$quartetInfo, snpInfo,
  formule="Smoothing+QuartetEffect+FL+I (FL^2)+I (FL^3)+GC+I (GC^2)+I (GC^3) ")

## plot the profile
plotProfile(profilSNPHind, Smoothing="Smoothing", Bkp=TRUE)
## End(Not run)
```

trainITALICS	<i>ITALICS training</i>
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Description

Estimation of the quartet effect based on several normal sample chips

Usage

```
trainITALICS (dir, amplicon=2.1, deletion=-3.5, deltaN=0.15, forceGL=c(-0.2,0.2
```

Arguments

dir	The directory containing the normal sample chips. All these chips should be of the same type hind, xba, nsp or sty. Only .CEL files be considered
amplicon	see the amplicon parameter in the daglad function
deletion	see the deletion parameter in the daglad function
deltaN	see the deltaN parameter in the daglad function
forceGL	see the forceGL parameter in the daglad function
param	see the param parameter in the daglad function
nbsigma	see the nbsigma parameter in the daglad function
...	Other daglad parameters.

Details

The ITALICS function take into account a quartet effect which is computed on a reference data set of normal women samples. The ITALICSData provide quartetEffect for the Xba, Hind, Sty and Nsp chip computed on our own reference data set.

We recommend that you use your own reference data set to compute the quartet Effect by using the trainITALICS function. ITALICS reference data should contain only woman normal samples. Furthermore we recommend that you check that none of these chip have obvious spatial artifact. To so read the cel files using the read.affybatch (form the affy package). Then use the image function on the obtain affybatch object.

Value

a data.frame with two column fsetid and quartetEffect
Other daglad parameters.

Note

People interested in tools dealing with array CGH analysis and DNA copy number analysis can visit our web-page <http://bioinfo.curie.fr>.

Author(s)

Guillem Rigaille, <italics@curie.fr>.

Source

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getConfDat

Elimination of badly predicted probes

Description

This function eliminate badly predicted probes using a regression table and an estimated model given by the function `getModel` or `getBestBICModelLight`. Then it computes the corrected intensity.

Usage

```
getConfDat(confidence, quartetInfo, model)
```

Arguments

`confidence` The confidence interval : 0.95
`quartetInfo` A Regression table containing the variables in the model
`model` The class `lm` object given by the function `getModel`

Value

A data frame with the corrected intensity. Only goodly predicted probes are taken.
The class `lm` object given by the function `getModel`

Note

People interested in tools dealing with array CGH analysis and DNA copy number analysis can visit our web-page <http://bioinfo.curie.fr>.

Author(s)

Guillem Rigaille, <italics@curie.fr>.

Source

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getCorrection *Correction*

Description

This function computes the corrected intensity.

Usage

```
getCorrection(effet, model, regTab)
```

Arguments

effet	The name of the biological effect
model	The class lm object given by the getModel function
regTab	The regression table used to estimate the linear model, and containing the variables in the model

Note

People interested in tools dealing with array CGH analysis and DNA copy number analysis can visit our web-page <http://bioinfo.curie.fr>.

Author(s)

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Source

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getEffet *Effet*

Description

This function retrieves the estimated biological effect

Usage

```
getEffet(effet, model, regTab)
```

Arguments

effet	The name of the biological effect
model	The class lm object given by the getModel function
regTab	The regression table used to estimate the linear model, and containing the variables in the model

Note

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Author(s)

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getModel

Regression Model

Description

Computes the linear regression model and and return an object of class lm.

Usage

```
getModel(formule, response, regTab)
```

Arguments

formule	A symbolic description of the term of the model. It is a string
response	The parameter you want to explain (the response) : the SNP "LogRatio". Y is a string
regTab	A Regression table containing the variables in the model

Note

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Author(s)

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getResidu

Correction

Description

This function retrieves the residual values

Usage

```
getResidu(model)
```

Arguments

model The class lm object given by the getModel function

Note

People interested in tools dealing with array CGH analysis and DNA copy number analysis can visit our web-page <http://bioinfo.curie.fr>.

Author(s)

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Source

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addInfo

add info to quartet annotation

Description

This function merge information obtain from the getQuartet function and a given table

Usage

```
addInfo(quartet, dat)
```

Arguments

quartet list obtain through the getQuartet Function
dat a data.frame with additionnal information it must contain a fsetid and fid column

Value

a data.frame similar to the quartetInfo item of quartet plus additionnal column

Note

People interested in tools dealing with array CGH analysis and DNA copy number analysis can visit our web-page <http://bioinfo.curie.fr>.

Author(s)

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Source

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fromQuartetToSnp *Compute the copy number of each SNP from its quartets intensities*

Description

This function removes the LogRatio column of the snpInfo data.frame. Then compute the copy number of each SNP having its quartet intensities. And return the snpInfo data.frame with the newly computed LogRatio.

Usage

```
fromQuartetToSnp(quartetInfo, snpInfo, cIntensity="quartetLogRatio", nLog=1)
```

Arguments

quartetInfo	A table containing the quartet intensities and other quartet information. It must have a column called : fsetid.
snpInfo	A table containing snp information.
cIntensity	A vector containing the names of the quartet information to be aggregate. For example quartetLogRatio.
nLog	The position of the field which will be named LogRatio in the snpInfo data.frame. For example if cIntensity = c("a", "b") and you want b to be considered as the LogRatio you should set nLog=2

Value

return the data.frame snpInfo with additionnal columns.

The position of the field which will be named LogRatio in the snpInfo data.frame. For example if cIntensity = c("a", "b") and you want b to be considered as the LogRatio you should set nLog=2

Note

People interested in tools dealing with array CGH analysis and DNA copy number analysis can visit our web-page <http://bioinfo.curie.fr>.

Author(s)

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fromSnpToQuartet *Function to get from snp to quartet*

Description

This function put the smoothing value of each SNP in front of its corresponding quartet in the quartetInfo data.frame.

Usage

```
fromSnpToQuartet(quartetInfo, profilSNP)
```

Arguments

`quartetInfo` a data frame containing all the quartet values plus there GC content, fragment length and GC content and Quartet effect

`profilSNP` a data frame, corresponding to the profileValues argument of a profilCGH object (see GLAD)

Value

return the data.frame quartetInfo with an additionnal column: "Smoothing" corresponding to the estimated smoothing value.

Note

People interested in tools dealing with array CGH analysis and DNA copy number analysis can visit our web-page <http://bioinfo.curie.fr>.

Author(s)

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getQuartet	<i>Function to retrieve the information of each quartet</i>
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Description

This function retrieve information of each quartet. This function use the pd.mapping50k.xba240, pd.mapping50k.hind240, pd.mapping250k.sty and pd.mapping250k.nsp package.

Usage

```
getQuartet(pkgname, snpInfo)
```

Arguments

pkgname	the chip type pd.mapping50k.xba240, pd.mapping50k.hind240, pd.mapping250k.sty or pd.mapping250k.nsp
snpInfo	a data frame containing SNPs position along the genome

Value

return a list with two fields. fid : containing the position of each quartet o
a data frame containing SNPs position along the genome

Note

People interested in tools dealing with array CGH analysis and DNA copy number analysis can visit our web-page <http://bioinfo.curie.fr>.

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Source

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getSnpInfo	<i>Function to retrieve the chromosome and the position of each SNP on a given Affymetrix SNP array</i>
------------	---

Description

This function retrieve the chromosome and position in bp of each SNP of a given Affymetrix SNP array. This function use the pd.mapping50k.xba240, pd.mapping50k.hind240, pd.mapping250k.sty and pd.mapping250k.nsp package.

Usage

```
getSnpInfo(pkgname)
```

Arguments

pkgname the chip type pd.mapping50k.xba240, pd.mapping50k.hind240, pd.mapping250k.sty
or pd.mapping250k.nsp

Value

Return a data.frame with five columns : fsetid, dbsnp_rs_id, Chr, X and fragmen
the chip type pd.mapping50k.xba240, pd.mapping50k.hind240, pd.mapping250k.sty
or pd.mapping250k.nsp

Note

People interested in tools dealing with array CGH analysis and DNA copy number analysis can visit
our web-page <http://bioinfo.curie.fr>.

Author(s)

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Source

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readQuartetCopyNb *Read PM probes of selected quartets and compute the quartet intensity*

Description

This function read the cel files and return the raw-value of each quartet = mean of allele A and B

Usage

```
readQuartetCopyNb(tmpExprs)
```

Arguments

tmpExprs A vector of the perfect match intensity of allele A and B of the quartets. This
vector should be sorted in a specific order. See the example given in the help of
the ITALICS function.

Value

return a vector with the raw-value of each quartet
A vector of the perfect match intensity of allele A and B of the quartets. This
vector should be sorted in a specific order. See the example given in the help of
the ITALICS function.

Note

People interested in tools dealing with array CGH analysis and DNA copy number analysis can visit
our web-page <http://bioinfo.curie.fr>.

Author(s)

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Source

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Index

addInfo, 8
analyseCGH, 1

fromQuartetToSnp, 9
fromSnpToQuartet, 10

getConfDat, 5
getCorrection, 6
getEffet, 6
getModel, 2, 7
getQuartet, 11
getResidu, 8
getSnpInfo, 11

ITALICS, 2
Italics (*ITALICS*), 2
italics (*ITALICS*), 2

readQuartetCopyNb, 12

trainITALICS, 4
trainItalics (*trainITALICS*), 4
trainitalics (*trainITALICS*), 4