

Package ‘yeastExpData’

March 23, 2023

Title Yeast Experimental Data

Version 0.45.0

Author R. Gentleman

Description A collection of different sets of experimental data from yeast.

biocViews ExperimentData, Genome, Saccharomyces_cerevisiae_Data

Maintainer R. Gentleman <rgentlem@fhcrc.org>

License GPL

Depends R (>= 2.4), graph (>= 1.9.26)

Suggests Biobase, GO.db, RBGL, org.Sc.sgd.db

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

git_branch devel

git_last_commit 3efb5bd

git_last_commit_date 2022-11-01

Date/Publication 2023-03-23

R topics documented:

ccycled	2
fcabundance	3
gfp	4
litG	6
nPdist	7
proteinProperties	8
Index	10

ccyclered *~~ data name/kind ... ~~*

Description

The data are 2885 yeast genes, common to a number of different experiments. The original data were reported by Cho et al. and were processed to

Usage

```
data(ccyclered)
```

Format

A data frame with 2885 observations on the following 11 variables.

Cluster The cluster number the gene was assigned to.

Distance The distance from the cluster center?

Y.name The name of the gene, using standard yeast nomenclature.

SGDID The Stanford yeast genome database identifier for the gene.

GENE The common name for the gene.

Chromosome The chromosome the gene is located on.

Start The start of the gene, in bases, most likely from the 3' end.

End The end of the gene.

Introns The number of introns.

Exons The location of the exons.

Description A description of the gene.

Details

Cho, et al. discuss the k means clustering of 2885 *Saccharomyces* genes into 30 clusters with measurements taken over two synchronized cell cycles.

Source

http://arep.med.harvard.edu/network_discovery

References

Cho, et al. (1998) A genome-wide transcriptional analysis of the mitotic cell cycle. *Molecular Cell*, 2, 65-73.

Tavazoie, et al. (1999) Systematic determination of genetic network architecture. *Nature Genetics*, 22, 281-285.

Examples

```
data(ccyclered)
```

fcabundance	<i>Yeast protein abundance</i>
-------------	--------------------------------

Description

Abundance of yeast proteins measured using flow cytometry and GFP tagging

Usage

```
data(fcabundance)
```

Format

A data frame with 4159 observations on the following 6 variables.

yORF a factor denoting yeast Open Reading Frames with levels YAL001C, YAL002W, YAL005C, etc

gene_name a factor denoting corresponding gene names, with levels 37164, AAC1, AAC3, etc

YEPD.mean a numeric vector, giving average abundance in rich (YEPD) media

YEPD.error a numeric vector, giving corresponding (standard?) error

SD.mean a numeric vector, giving average abundance in minimal (SD) media

SD.error a numeric vector, giving corresponding error

Source

<http://www.nature.com/nature/journal/v441/n7095/extref/nature04785-s03.xls>

References

"Single-cell proteomic analysis of *S. cerevisiae* reveals the architecture of biological noise" (15 June 2006). John R. S. Newman, Sina Ghaemmaghami, Jan Ihmels, David K. Breslow, Matthew Noble, Joseph L. DeRisi and Jonathan S. Weissman *Nature* 441, 840-846

Examples

```
data(fcabundance)
plot(YEPD.mean ~ SD.mean, fcabundance, log = "xy")
plot(SD.error ~ SD.mean, fcabundance, log = "x")
```

gfp

*Yeast GFP Fusion Data***Description**

This data frame contains data concerning the localization and abundance of various yeast proteins.

Usage

```
data(gfp)
```

Format

A data frame with 6234 observations on the following 33 variables.

`orfid` a numeric vector of identifiers

`yORF` a factor representing yeast ORF names, with levels YAL001C, YAL002W, etc. These are also the row names of the data frame.

`gene_name` a factor representing corresponding yeast gene names, with levels AAC1, AAC3, etc.

`GFP_tagged` a factor with levels not tagged and tagged, indicating whether or not the ORF was GFP tagged

`GFP_visualized` a factor with levels not visualized and visualized, indicating whether or not GFP fluorescence was visualized

`TAP_visualized` a factor with levels TAP visualized and not TAP visualized, indicating success of TAP tag

`abundance` a numeric vector, giving estimated abundance in units of molecules per cell

`error` a numeric vector of estimated errors in abundance for a subset of proteins, in the same units as abundance (see details below)

`localization_summary` a factor with levels , ER, ER to Golgi, ER, ambiguous, ER, ambiguous, bud, etc. Summarizes the information contained in the subsequent columns.

The following columns indicate whether or not the protein was localized in the specific region of the cell. A protein can be localized in more than one region.

`ambiguous` a logical vector

`mitochondrion` a logical vector

`vacuole` a logical vector

`spindle_pole` a logical vector

`cell_periphery` a logical vector

`punctate_composite` a logical vector

`vacuolar_membrane` a logical vector

`ER` a logical vector

`nuclear_periphery` a logical vector

endosome a logical vector
bud_neck a logical vector
microtubule a logical vector
Golgi a logical vector
late_Golgi a logical vector
peroxisome a logical vector
actin a logical vector
nucleolus a logical vector
cytoplasm a logical vector
ER_to_Golgi a logical vector
early_Golgi a logical vector
lipid_particle a logical vector
nucleus a logical vector
bud a logical vector

Explanation for missing abundance values are given by

missingAbundance a factor with levels low signal, not visualized and technical problem

Details

The information on abundance is available in three columns. abundance gives (where available) absolute protein abundances determined by quantitative Western blot analysis of TAP-tagged strains. Abundances that have a non-NA error value were done in triplicate with serial dilutions of purified TAP-tagged standards included in each gel, which substantially reduces the measurement error. In addition, for these strains, the tagged genes were confirmed to rescue the loss of function phenotype of the corresponding deletion strain. For rows where abundance is missing (NA), the missingAbundance column gives the reason. Possible reasons are:

"not visualized" Either the tagging was unsuccessful or no signal was detected.

"low signal" The tagging was successful, but the signal was not sufficiently high above background to permit accurate quantitation (about 50 molecules/cell).

"technical problem" The protein was detectable but could not be quantitated because it did not migrate as a single band or comigrated with the internal standards in the gel.

Replicate analysis for a subset of tagged strains found a linear correlation coefficient of $R = 0.94$, with the pairs of proteins having a median variation of a factor of 2.0. This error analysis does not account for potential alterations in the endogenous levels of the proteins caused by the the fused tag, which may be particularly disruptive for small proteins.

Source

The data were obtained from <http://yeastgfp.ucsf.edu/>, which contains a lot more information as well as raw image data. This data frame was specifically generated from <http://yeastgfp.ucsf.edu/allOrfData.txt>

References

For the Localization data: Huh, et al., Nature 425, 686-691 (2003) – http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=14562095&dopt=Abstract

For the Protein abundance data: Ghaemmaghami, et al., Nature 425, 737-741 (2003) – http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=14562106&dopt=Abstract

Examples

```
data(gfp)
keep <- names(which(table(gfp$localization_summary) > 50))

if (require(lattice)) {
  bwplot(reorder(localization_summary, abundance, median, na.rm = TRUE) ~ log2(abundance), gfp,
         varwidth = TRUE,
         subset = localization_summary %in% keep)
} else {

  opar <- par(las = 2, mar = par("mar") + c(3.5, 0, 0, 0))
  gfp._sub <- subset(gfp, localization_summary %in% keep)
  gfp._sub$localization_summary <- gfp._sub$localization_summary[, drop = TRUE]
  boxplot(log2(abundance) ~ reorder(localization_summary, abundance, median, na.rm = TRUE),
          data = gfp._sub, varwidth = TRUE)
  rm(gfp._sub)
  par(opar)

}
```

litG

Literature and Y2H interaction graphs

Description

These two data objects represent protein/gene interactions as reported in Ge et al.

Usage

```
data(litG)
data(y2hG)
```

Format

The data are stored as instances of the graphNEL class. Each has 2885 nodes, named using yeast standard names. Interactions either represent literature curated interactions, or Y2H interactions.

Details

The data were reported and used in Correlation between transcriptome and interactome mapping data from *Saccharomyces cerevisiae*, Nature Genetics, 2001, H. Ge and Z. Liu and G. M. Church and M. Vidal.

See the package vignette for more details.

Examples

```
data(litG)
data(y2hG)
```

nPdist	<i>Counts from a node permutation experiment.</i>
--------	---

Description

In comparing the yeast cell cycle data to the protein-protein interaction data a node permutation distribution is suggested. The output here are the counts of the number of common edges for 500 permutations.

Usage

```
data(nPdist)
```

Format

Five hundred counts of nodes in the intersection of two graphs.

Details

The seed was 123 and we called the function `nodePerm` with `litG` and `cg1` as arguments. See the vignette in this package for the explicit computations.

Examples

```
data(nPdist)
```

proteinProperties *Properties of Yeast proteins*

Description

A data frame which details 33 properties of proteins in the Yeast Genome

Usage

```
data(proteinProperties)
```

Format

A data frame with 6718 observations on the following 33 variables.

yORF a factor representing yeast ORF names, with levels Q0010, Q0017, etc.

SGDID a factor representing SGD IDs

molwt a numeric vector giving Molecular Weight in Daltons

pi a numeric vector denoting the theoretical isoelectric point(pI), the pH at which the protein carries no net charge

cai a numeric vector denoting Codon Adaptation Index

length a numeric vector denoting length of the protein (number of amino acids)

nterm a factor representing N Term Sequence with levels MAAACIC MAAAPWY, etc.

cterm a factor representing N Term Sequence with levels AAAAML L AAADKKT, etc.

codonBias a numeric vector denoting Codon Bias

The next set of columns, designated by amino acids, is the number of times that particular residue appears in the protein sequence. For example, if the ALA column is 2, then the protein contains 2 alanines. These columns (should) add up to the length column.

ALA a numeric vector

ARG a numeric vector

ASN a numeric vector

ASP a numeric vector

CYS a numeric vector

GLN a numeric vector

GLU a numeric vector

GLY a numeric vector

HIS a numeric vector

ILE a numeric vector

LEU a numeric vector

LYS a numeric vector

MET a numeric vector
 PHE a numeric vector
 PRO a numeric vector
 SER a numeric vector
 THR a numeric vector
 TRP a numeric vector
 TYR a numeric vector
 VAL a numeric vector

The remaining columns are:

fop FOP score, a numeric vector, denoting Frequency of Optimal Codons

gravy Gravy score, a numeric vector denoting Hydrophobicity of Protein

aromaticity Aromaticity score, a numeric vector denoting Frequency of aromatic amino acids:
 Phe, Tyr, Trp

type Feature type, a factor with levels ORF|Dubious ORF|Uncharacterized ORF|Verified ORF|Verified|silenced_gene
 pseudogene transposable_element_gene

Details

This data frame is downloaded directly from SGD. It contains 33 characteristics for 6714 open reading frames (ORFs). From the SGD README:

“Contains basic protein information about each ORF in SGD. This file does not include information on deleted or merged ORFs. Note, however, that it includes ORFs of all other classifications (Verified, Uncharacterized, and Dubious).”

For more details see http://www.yeastgenome.org/help/protein_page.html.

Source

ftp://genome-ftp.stanford.edu/pub/yeast/protein_info/protein_properties.tab. This file is updated weekly (Saturday). The version used here was downloaded on 2009-12-03.

Examples

```
data(proteinProperties)
pairs(proteinProperties[, c("molwt", "pi", "cai", "gravy", "aromaticity")],
      pch = ".", col = as.numeric(proteinProperties$type))
```

Index

* datasets

ccyclered, [2](#)

fcabundance, [3](#)

gfp, [4](#)

litG, [6](#)

nPdist, [7](#)

proteinProperties, [8](#)

ccyclered, [2](#)

fcabundance, [3](#)

gfp, [4](#)

litG, [6](#)

nPdist, [7](#)

proteinProperties, [8](#)

y2hG (litG), [6](#)