Package 'seqc'

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Type Package

Title RNA-seq data generated from SEQC (MAQC-III) study

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Description The SEQC/MAQC-III Consortium has produced benchmark RNA-seq data for the assessment of RNA sequencing technologies and data analysis methods (Nat Biotechnol, 2014). Billions of sequence reads have been generated from ten different sequencing sites. This package contains the summarized read count data for ~2000 sequencing libraries. It also includes all the exon-exon junctions discovered from the study. TaqMan RT-PCR data for ~1000 genes and ERCC spike-in sequence data are included in this package as well.

URL http://bioconductor.org/packages/release/data/experiment/html/seqc.html

License GPL-3

LazyData yes

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Depends R (>= 2.10)

Imports utils, Biobase

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`SEQC-package` *RNA-seq data employed in the Sequence Quality Control (SEQC) Project*

Description

This package contains 69 data frames in total, in which there are 22 read counting tables, 46 exon-exon junction tables and a gene intensity table. All these tables were generated from the RNA-Seq libraries of human brain RNA and universal human reference RNA samples employed in the SEQC/MAQC study (Nat Biotech, 2014), except that the gene intensity table was derived by using the TaqMan RT-PCR technology on the same samples. Three platforms (Illumina, Roche 454 and SOLiD) were examined in the project at twelve different sites (the Illumina platform at AGR, BGI, CNL, COH, MAY and NVS, the Roche 454 platform at MGP, NYU and SQW, the SOLiD platform at LIV, NWU, PSU and SQW), and the libraries were mapped by using Subread-1.3.0. The reads were then assigned to the annotated genes by using featureCounts.

Please read the vignette document before using this package by using R command "vignette('seqc')".

Details

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Type:	Package
Version:	1.0
Date:	2014-08-28
License:	The GNU General Public License

The 22 read counting tables provide the numbers of single-end reads or paired-end fragments assigned to human genes for each library. Two annotation sets were used in read/fragment assignment: the RefSeq annotations and the AceView annotations, both from NCBI. In each read counting table, the first four columns record the entrez IDs, the symbols and the summed exon lengths of the genes, plus a column of Boolean values indicating if the gene is an ERCC spike-in sequence, and the following columns each corresponds to a RNA-seq library. These tables are named as (Platform)_(Annotation)_gene_(Site).

The 46 exon-exon junction tables are named as (Platform)_junction_(Site)_(Sample). The four columns in each table are the chromosome names, the two ends of the junction and the number of

supporting reads to the junctions. It is noticed that a read may supporting zero, one or multiple exon-exon junctions depending on the number of exon-exon junctions in it.

The TaqMan RT-PCR results on the SEQC samples are also provided in the package. The data object is named as "taqman".

Author(s)

Yang Liao and Wei Shi

References

Liao Y, Smyth GK and Shi W. The Subread aligner: fast, accurate and scalable read mapping by seed-and-vote. Nucleic Acids Research, 41(10):e108, 2013

Liao Y, Smyth GK and Shi W. featureCounts: an efficient general purpose program for assigning sequence reads to genomic features. Bioinformatics, 30(7):923-30, 2014

Su Z, Labaj PP, Li S, Thierry-Mieg J, Thierry-Mieg D, Shi W, Wang C, Schroth GP, Setterquist RA, Thompson JF, et al. (SEQC/MAQC-III Consortium). A comprehensive assessment of RNA-seq accuracy, reproducibility and information content by the Sequence Quality Control consortium. Nature Biotechnology, Published online 24 August 2014

See Also

Rsubread, voom

Examples

```
ls(2)
ILM_aceview_gene_AGR[1:10,1:10]
taqman[1:10, 1:10]
```

SEQC-features *Read count tables from the SEQC project*

Description

This package contains 22 read counting tables (data frames). All these tables were generated from the RNA-Seq libraries from the SEQC project. Three platforms (Illumina, Roche 454 and SOLiD) were examined in the project at twelve different sites, and the libraries were mapped by using Subread. The reads (in the single-end libraries) or fragments (in the paired-end libraries) were then assigned to the annotated genes by using the featureCounts program on the single-end mode or the paired-end mode accordingly.

All the platforms and sequencing sites are listed in Table 1 in the vignette document of this package. This table also describes if each library is either single-end or paired-end. Please read the vignette document before using this package by using R command "vignette('seqc')".

Usage

```
ILM_aceview_gene_AGR
ILM_aceview_gene_BGI
ILM_aceview_gene_CNL
ILM_aceview_gene_COH
ILM_aceview_gene_MAY
ILM_aceview_gene_NVS
LIF_aceview_gene_LIV
LIF_aceview_gene_NWU
LIF_aceview_gene_PSU
LIF_aceview_gene_SQW
ROC_aceview_gene_MGP
ROC_aceview_gene_NYU
ROC_aceview_gene_SQW
ILM_refseq_gene_AGR
ILM_refseq_gene_BGI
ILM_refseq_gene_CNL
ILM_refseq_gene_COH
ILM_refseq_gene_MAY
ILM_refseq_gene_NVS
LIF_refseq_gene_LIV
LIF_refseq_gene_NWU
LIF_refseq_gene_PSU
LIF_refseq_gene_SQW
ROC_refseq_gene_MGP
ROC_refseq_gene_NYU
ROC_refseq_gene_SQW
```

Details

The 22 read counting tables are data frames providing the numbers of reads or fragments overlapping with the exon regions of each of the known human genes in the annotations. Two annotation sets were used in this package: the RefSeq annotations and the AceView annotations, both from the NCBI. The 22 data frames are named as to its origin; the naming scheme is (Platform)_(Annotation)_gene_(Site). For example, "LIF_refseq_gene_NMU" contains the read counts from all samples sequenced at NMU by using the SOLiD systems; the mapping results were then assigned to the RefSeq annotations.

Each of the data frames has many columns. The first three columns give the entrez ids, symbols and lengths of the genes, followed by a column of Boolean values indicating if each gene is actually an ERCC RNA Spike-In. After the fourth column are the columns for the read/fragment counts in the libraries; the column names are concatenated from three or four parts: (Sample)_(Replicate)_(Lane)_(FlowCell) for the tables generated by the Illumina platform or the SOLiD systems, or (Sample)_(Replicate)_(Region) for the tables generated by the Roche 454 platform. For example, column "ILM_aceview_gene_AGR$B_3_L02_FlowCellA" is a column of fragment counts on the third replicate of sample B, sequenced at AGR by using the Illumina HiSeq 2000 device (the second lane and flow cell A); the fragments were then assigned to the AceView annotations.

Author(s)

Yang Liao, Wei Shi and Gordon K Smyth

References

Liao Y, Smyth GK and Shi W. The Subread aligner: fast, accurate and scalable read mapping by seed-and-vote. Nucleic Acids Research, 41(10):e108, 2013

Liao Y, Smyth GK and Shi W. featureCounts: an efficient general purpose program for assigning sequence reads to genomic features. Bioinformatics, 30(7):923-30, 2014

Su Z, Labaj PP, Li S, Thierry-Mieg J, Thierry-Mieg D, Shi W, Wang C, Schroth GP, Setterquist RA, Thompson JF, et al. (SEQC/MAQC-III Consortium). A comprehensive assessment of RNA-seq accuracy, reproducibility and information content by the Sequence Quality Control consortium. Nature Biotechnology, Published online 24 August 2014

See Also

Rsubread, voom

Examples

```
ls(2)
colnames(ILM_aceview_gene_AGR)
ILM_aceview_gene_AGR[1:10,1:10]
```

SEQC-junction-tables *Junction tables from the SEQC project*

Description

This package contains 46 exon-exon junction tables (data frames). All these tables were generated from the RNA-Seq libraries for the SEQC project. Three platforms were examined in the project at twelve different sites, and the libraries were mapped by using Subread-1.3.0. The exon-exon junctions were further detected from the mapping results by the Subjunc program. After the exon-exon junctions were detected from each library, we combined the junction lists from the same "sample and sequencing site" combinations by adding up the supporting read numbers to the same junctions (i.e., junctions connecting the same exon-pairs); every junction is reported only once in each table.

Please read the vignette document before using this package by using R command "vignette('seqc')".

Usage

```
ILM_junction_AGR_A
ILM_junction_AGR_B
ILM_junction_AGR_C
ILM_junction_AGR_D
ILM_junction_BGI_A
```

```
ILM_junction_BGI_B
ILM_junction_BGI_C
ILM_junction_BGI_D
ILM_junction_CNL_A
ILM_junction_CNL_B
ILM_junction_CNL_C
ILM_junction_CNL_D
ILM_junction_COH_A
ILM_junction_COH_B
ILM_junction_COH_C
ILM_junction_COH_D
ILM_junction_MAY_A
ILM_junction_MAY_B
ILM_junction_MAY_C
ILM_junction_MAY_D
ILM_junction_NVS_A
ILM_junction_NVS_B
ILM_junction_NVS_C
ILM_junction_NVS_D
LIF_junction_LIV_A
LIF_junction_LIV_B
LIF_junction_LIV_C
LIF_junction_LIV_D
LIF_junction_NWU_A
LIF_junction_NWU_B
LIF_junction_NWU_C
LIF_junction_NWU_D
LIF_junction_PSU_A
LIF_junction_PSU_B
LIF_junction_PSU_C
LIF_junction_PSU_D
LIF_junction_SQW_A
LIF_junction_SQW_B
LIF_junction_SQW_C
LIF_junction_SQW_D
ROC_junction_MGP_A
ROC_junction_MGP_B
ROC_junction_NYU_A
ROC_junction_NYU_B
ROC_junction_SQW_A
ROC_junction_SQW_B
```

Details

The 46 exon-exon junction tables are data frames named as (Platform)_junction_(Site)_(Sample). For example, data frame "ILM_junction_BGI_C" contains all junctions detected from the RNA-seq libraries of sample C sequenced at BGI by using the Illumina HiSeq 2000 device.

Each of the 46 data frames has four columns: the chromosome names, the two sides of the junctions

and the number of supporting reads to the junctions. More precisely, the two sides of a junction are defined as the chromosomal locations (coordinates starting from one) of the last base in the exon before this junction, and the first base in the exon after this junction. It is also noted that a read may supporting zero, one or multiple exon-exon junctions depending on the number of exon-exon junctions in it.

Author(s)

Yang Liao, Wei Shi and Gordon K Smyth

References

Liao Y, Smyth GK and Shi W. The Subread aligner: fast, accurate and scalable read mapping by seed-and-vote. Nucleic Acids Research, 41(10):e108, 2013

Su Z, Labaj PP, Li S, Thierry-Mieg J, Thierry-Mieg D, Shi W, Wang C, Schroth GP, Setterquist RA, Thompson JF, et al. (SEQC/MAQC-III Consortium). A comprehensive assessment of RNA-seq accuracy, reproducibility and information content by the Sequence Quality Control consortium. Nature Biotechnology, Published online 24 August 2014

See Also

Rsubread, voom

Examples

```
ls(2)
LIF_junction_NWU_B[1:10,]
```

---

seqc.eSet *Create an ExpressionSet of counts for a given subset of the samples provided by the seqc data package*

Description

Create an ExpressionSet object.

Usage

```
seqc.eSet(feature=c('gene', 'junction', 'taqman'),annotation=c('refseq', 'aceview'),
platform=NULL,center=NULL)
```

Arguments

feature	the type of features you want to build an ExpressionSet.
annotation	If feature == 'gene', then this determines which set of gene features you want.
platform	Subset the data based on the platform it was sequenced on. Possible values include “ILM", “ROC" and “LIF".

center	Subset the data based on the center that sequenced the libraries. Possible values include “AGR”, “BGI”, “CNL”, “COH”, “MAY”, and “NVS” for Illumina platform, “LIV”, “NWU”, “PSU” and “SQW” for LifeTech SOLiD platform and “MGP”, “NYU”, “SQW” for Roche 454 platform.

Details

Currently this only works for `feature == 'gene'`.

Value

An ExpressionSet with the counts from the samples that satisfy the critera set by the function parameters.

Author(s)

Steve Lianoglou

`seqc.samples` *Return a character vector of the available SEQC samples*

Description

Get sample names.

Usage

```
seqc.samples(feature=NULL,annotation=NULL,platform=NULL,center=NULL)
```

Arguments

feature	Should be either ’gene’ or ’junction’.
annotation	Should be either ’refseq’ or ’aceview’.
platform	Subset the data based on the platform it was sequenced on. Possible values include “ILM", “ROC" and “LIF".
center	Subset the data based on the center that sequenced the libraries. Possible values include “AGR”, “BGI”, “CNL”, “COH”, “MAY”, and “NVS” for Illumina platform, “LIV”, “NWU”, “PSU” and “SQW” for LifeTech SOLiD platform and “MGP”, “NYU”, “SQW” for Roche 454 platform.

Value

A character vector of the sample names/objects in the package:seqc namespace.

Author(s)

Steve Lianoglou

TaqMan-RTPCR *TaqMan RT-PCR results from the SEQC project*

Description

The 'taqman' object is a data frame object that contains raw TaqMan RT-PCR expression data of 1044 genes in four SEQC samples including 'A', 'B','C' and 'D'. Each of the four samples has four replicates. Therefore this object includes expression data for sixteen libraries.

Columns of the 'tagman' object includes Entrez gene identifiers, gene symbols, expression values of genes and detection call for the Presence/Absence of genes.

The TaqMan data were downloaded from GEO database (GSE5350).

Please read the vignette document before using this package by using R command "vignette('seqc')".

Usage

```
taqman
```

Author(s)

Yang Liao, Wei Shi and Gordon K Smyth

References

Su Z, Labaj PP, Li S, Thierry-Mieg J, Thierry-Mieg D, Shi W, Wang C, Schroth GP, Setterquist RA, Thompson JF, et al. (SEQC/MAQC-III Consortium). A comprehensive assessment of RNA-seq accuracy, reproducibility and information content by the Sequence Quality Control consortium. Nature Biotechnology, 32(9):903-14, 2014

See Also

Rsubread, voom

Examples

```
ls(2)
rownames(taqman)
taqman[1:10, 1:10]
```

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