Package ‘dorothea’

May 2, 2024

Type  Package
Title  Collection Of Human And Mouse TF Regulons
Version  1.16.0
Description  DoRothEA is a gene regulatory network containing signed transcription factor (TF) - target gene interactions. DoRothEA regulons, the collection of a TF and its transcriptional targets, were curated and collected from different types of evidence for both human and mouse. A confidence level was assigned to each TF-target interaction based on the number of supporting evidence.

URL  https://saezlab.github.io/dorothea/,
      https://github.com/saezlab/dorothea

BugReports  https://github.com/saezlab/dorothea/issues

Depends  R (>= 4.0)
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dorothea-package  dorothea: Collection Of Human And Mouse TF Regulons

Description

This package contains human and mouse TF regulons.

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**df2regulon**

See Also

Useful links:

- https://saezlab.github.io/dorothea/
- https://github.com/saezlab/dorothea
- Report bugs at https://github.com/saezlab/dorothea/issues

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**df2regulon**  
*Construction of dorothea regulons for viper analysis*

**Description**

This function converts DoRothEA’s regulons that are stored in a table to the format required by the *viper* function.

**Usage**

```r
df2regulon(df)
```

**Arguments**

- `df`  
  A regulon table from dorothea package.

**Value**

Regulons in the *viper* format.

**Examples**

```r
# accessing (human) dorothea regulons
# for mouse regulons: data(dorothea_mm, package = "dorothea")
data(dorothea_hs, package = "dorothea")
# convert to the format required by *viper*
 viper_regulons = df2regulon(dorothea_hs)
```
**dorothea_hs_pancancer**

---

**Description**

A table reporting signed human TF-target interactions. This database covers in total 1395 TFs targeting 20,244 genes with 486,676 unique interactions. In addition, each TF is accompanied with an empirical confidence level that was derived from the number of supporting evidences for this TF/interaction. The range is from A (high quality) to E (low quality).

**Format**

A table of human TF-target interactions:

- **tf**: TF identifier as HGNC symbols
- **confidence**: Summary confidence score classifying regulons based on their quality
- **target**: target identifier as HGNC symbols
- **mor**: mode of regulation indicating the effect of a TF on the target

**Source**

[https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6673718/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6673718/)

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**dorothea_hs_pancancer Human DoRothEA (pancancer)**

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**Description**

A table reporting signed human TF-target interactions for cancer application. The difference to "dorothea_hs" is that TGCA gene expression data was used instead of GTEx to infer the networks with ARACNE. This database covers in total 1344 TFs targeting 20,582 genes with 213,230 unique interactions. In addition, each TF is accompanied with an empirical confidence level that was derived from the number of supporting evidences for this TF/interaction. The range is from A (high quality) to E (low quality).

**Format**

A table of human TF-target interactions:

- **tf**: TF identifier as HGNC symbols
- **confidence**: Summary confidence score classifying regulons based on their quality
- **target**: target identifier as HGNC symbols
- **mor**: mode of regulation indicating the effect of a TF on the target

**Source**

[https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6673718/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6673718/)
**dorothea_mm**

<table>
<thead>
<tr>
<th>dorothea_mm</th>
<th>Mouse DoRothEA</th>
</tr>
</thead>
</table>

**Description**

A table reporting signed human TF-target interactions. This database covers in total 1179 TFs targeting 17,410 genes with 410,455 unique interactions. In addition, each TF is accompanied with an empirical confidence level that was derived from the number of supporting evidences for this TF/interaction. The range is from A (high quality) to E (low quality).

**Format**

A table of mouse TF-target interactions:

- **tf**: TF identifier as MGI symbols
- **confidence**: summary confidence score classifying regulons based on their quality
- **target**: target identifier as MGI symbols
- **mor**: mode of regulation indicating the effect of a TF on the target

**Source**


---

**dorothea_mm_pancancer**

<table>
<thead>
<tr>
<th>dorothea_mm_pancancer</th>
<th>Mouse DoRothEA (pancancer)</th>
</tr>
</thead>
</table>

**Description**

A table reporting signed human TF-target interactions. The difference to "dorothea_mm" is that TGCA gene expression data was used instead of GTEx to infer the networks with ARACNE. This database covers in total 1096 TFs targeting 17,695 genes with 187,955 unique interactions. In addition, each TF is accompanied with an empirical confidence level that was derived from the number of supporting evidences for this TF/interaction. The range is from A (high quality) to E (low quality).

**Format**

A table of mouse TF-target interactions:

- **tf**: TF identifier as MGI symbols
- **confidence**: summary confidence score classifying regulons based on their quality
- **target**: target identifier as MGI symbols
- **mor**: mode of regulation indicating the effect of a TF on the target

**Source**

### entire_database

Entire database with associated meta data

**Description**

This table lists all human TF-target interactions that were derived from the four lines of evidences. Each interaction is assigned a confidence score based on the number of supporting evidences. The table provides also all required information to trace back the origin of the interaction.

**Source**

[https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6673718/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6673718/)

### run_viper

VIPER wrapper

**Description**

This function is a convenient wrapper for the `run_viper` function using DoRothEA regulons.

**Usage**

```r
run_viper(input, regulons, options = list(), tidy = FALSE, assay_key = "RNA")
```

**Arguments**

- **input**: An object containing a gene expression matrix with genes (HGNC/MGI symbols) in rows and samples in columns. The object can be a simple matrix/data frame or more complex objects such as `ExpressionSet`, `Seurat` or `SingleCellExperiment` objects.
- **regulons**: DoRothEA regulons in table format.
- **options**: A list of named options to pass to `viper` such as `minsize` or `method`. These options should not include, `eset` or `regulon`.
- **tidy**: Logical, whether computed TF activities scores should be returned in a tidy format.
- **assay_key**: Only applies if the input is a `Seurat` object. It selects the name of the assay from where to extract the normalized expression data.

**Value**

A matrix of normalized enrichment scores for each TF across all samples. Of note, if you provide Bioconductor objects as input the function will return this object with added TF activities at appropriate slots. E.g. Seurat object with a new assay called dorothea. For all other inputs the function will return a matrix. If `tidy` is `TRUE` the normalized enrichment scores are returned in a tidy format (not supported for Bioconductor objects).
Examples

# use example gene expression matrix from bcellViper package
library(bcellViper)
data(bcellViper, package = "bcellViper")
# accessing (human) dorothea regulons
# for mouse regulons: data(dorothea_mm, package = "dorothea")
data(dorothea_hs, package = "dorothea")
# run viper
tf_activities <- run_viper(dset, dorothea_hs,
  options = list(method = "scale", minsize = 4,
    eset.filter = FALSE, cores = 1,
    verbose = FALSE))

%>%

Pipe operator

Description

See magrittr::%>% for details.

Usage

lhs %>% rhs

Value

lhs

Examples

c(1:10) %>% mean()
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