

Data for DExMA package

Juan Antonio Villatoro-García^{1,2} and Pedro Carmona-Sáez*

¹Department of Statistics and Operational Research. University of Granada

²Bioinformatics Unit. GENYO, Centre for Genomics and Oncological Research

*pedro.carmona@genyo.es

May 20, 2021

packageVersionDExMAdata 1.0.0

Contents

1	Package contents.	2
2	Sources	6
3	Session info	6

1 Package contents

```
> library(DExMAdata)
> data(IDsDExMA)
> data(SynonymsDExMA)
> data(availableIDs)
> data(availableOrganism)
> data(DExMAExampleData)
```

Firstly, **DExMAExampleData** contains the objects required to perform the **DExMA** package examples:

- **listMatrixEX**: a list of four expression matrices. The first two matrices contain 200 genes annotated in entrez and the other two contains 175 genes annotated in Official Gene Symbol.

```
> class(listMatrixEX)
[1] "list"
> head(listMatrixEX$Study1)
      Sample1 Sample2 Sample3 Sample4
100859927 5.439524 6.253319 2.926444 4.4304023
8086      5.769823 5.971453 1.831349 4.0466288
8212      7.558708 5.957130 2.365252 3.4352889
65985     6.070508 7.368602 2.971158 3.7151784
729522    6.129288 5.774229 3.670696 3.9171749
13        7.715065 7.516471 1.349453 0.3390772
```

- **listPhenodatas**: a list of four phenodatas corresponding to the four expression matrices of the `listMatrixEX` object

```
> class(listPhenodatas)
[1] "list"
> head(listPhenodatas$Study1)
      condition gender  organism race
Sample1  Diseased Female Homo Sapiens  AA
Sample2  Diseased Female Homo Sapiens  AA
Sample3   Healthy Female Homo Sapiens  AA
Sample4   Healthy Female Homo Sapiens   H
```

- **listExpressionSets**: a list of four ExpressionSets objects. It contains the same information as `listMatrixEX` and `listPhenodatas` objects.

```
> class(listExpressionSets)
[1] "list"
> listExpressionSets$Study1
ExpressionSet (storageMode: lockedEnvironment)
assayData: 200 features, 4 samples
element names: exprs
```

DExMAdata package

```
protocolData: none
phenoData
  rowNames: Sample1 Sample2 Sample3 Sample4
  varLabels: condition gender organism race
  varMetadata: labelDescription
featureData: none
experimentData: use 'experimentData(object)'
Annotation:
```

- **ExpressionSetStudy5**: an ExpressionSet object similar to the ExpressionSets objects of *listExpression*

```
> class(ExpressionSetStudy5)

[1] "ExpressionSet"
attr(,"package")
[1] "Biobase"

> ExpressionSetStudy5

ExpressionSet (storageMode: lockedEnvironment)
assayData: 200 features, 6 samples
  element names: exprs
protocolData: none
phenoData
  rowNames: newSample1 newSample2 ... newSample6 (6 total)
  varLabels: condition gender organism race
  varMetadata: labelDescription
featureData: none
experimentData: use 'experimentData(object)'
Annotation:
```

- **maObjectDif**: the meta-analysis object (*ObjectMA*) created from the listMatrixEX adn phenodatas objects information. An *ObjectMA* is the object type used in the DExMA package. This type of object is better explained in the DExMA package.

```
> str(maObjectDif)

List of 4
 $ Study1:List of 2
  ..$ mExpres  : num [1:200, 1:4] 5.44 5.77 7.56 6.07 6.13 ...
  .. ..- attr(*, "dimnames")=List of 2
  .. .. ..$ : chr [1:200] "100859927" "8086" "8212" "65985" ...
  .. .. ..$ : chr [1:4] "Sample1" "Sample2" "Sample3" "Sample4"
  ..$ condition: num [1:4] 1 1 0 0
 $ Study2:List of 2
  ..$ mExpres  : num [1:200, 1:6] 4.37 5.94 5.29 5.69 5.73 ...
  .. ..- attr(*, "dimnames")=List of 2
  .. .. ..$ : chr [1:200] "100859927" "8086" "8212" "65985" ...
  .. .. ..$ : chr [1:6] "Sample5" "Sample6" "Sample7" "Sample8" ...
  ..$ condition: num [1:6] 1 1 1 0 0 0
 $ Study3:List of 2
  ..$ mExpres  : num [1:175, 1:4] 4.5 7.24 6.04 4.96 6.15 ...
  .. ..- attr(*, "dimnames")=List of 2
```

DExMAdata package

```
.. .. .$ : chr [1:175] "AAA4" "AAAS" "AABT" "AACS" ...
.. .. .$ : chr [1:4] "Sample11" "Sample12" "Sample13" "Sample14"
..$ condition: num [1:4] 1 1 0 0
$ Study4:List of 2
..$ mExpres : num [1:175, 1:6] 5.37 5.04 6.84 6.94 6 ...
.. ..- attr(*, "dimnames")=List of 2
.. .. .$ : chr [1:175] "AAA4" "ADRACALIN" "AABT" "ACSF1" ...
.. .. .$ : chr [1:6] "Sample15" "Sample16" "Sample17" "Sample18" ...
..$ condition: num [1:6] 1 1 1 0 0 0
```

- **maObjetc**: an *ObjectMA* after setting all the studies of *maObjectDif* in Official Gene Symbol annotation.

```
> str(maObject)
List of 4
$ Study1:List of 2
..$ mExpres : num [1:144, 1:4] 5.44 5.77 7.56 6.07 6.13 ...
.. ..- attr(*, "dimnames")=List of 2
.. .. .$ : chr [1:144] "AAA4" "AAAS" "AABT" "AACS" ...
.. .. .$ : chr [1:4] "Sample1" "Sample2" "Sample3" "Sample4"
..$ condition: num [1:4] 1 1 0 0
$ Study2:List of 2
..$ mExpres : num [1:144, 1:6] 4.37 5.94 5.29 5.69 5.73 ...
.. ..- attr(*, "dimnames")=List of 2
.. .. .$ : chr [1:144] "AAA4" "AAAS" "AABT" "AACS" ...
.. .. .$ : chr [1:6] "Sample5" "Sample6" "Sample7" "Sample8" ...
..$ condition: num [1:6] 1 1 1 0 0 0
$ Study3:List of 2
..$ mExpres : num [1:175, 1:4] 6.37 6.28 4.59 4.6 4.59 ...
.. ..- attr(*, "dimnames")=List of 2
.. .. .$ : chr [1:175] "AARS1" "AATF" "ABCC2" "ABCD1P4" ...
.. .. .$ : chr [1:4] "Sample11" "Sample12" "Sample13" "Sample14"
..$ condition: num [1:4] 1 1 0 0
$ Study4:List of 2
..$ mExpres : num [1:175, 1:6] 5.79 5.59 4.61 4.6 4.63 ...
.. ..- attr(*, "dimnames")=List of 2
.. .. .$ : chr [1:175] "AARS1" "AATF" "ABCC2" "ABCD1P4" ...
.. .. .$ : chr [1:6] "Sample15" "Sample16" "Sample17" "Sample18" ...
..$ condition: num [1:6] 1 1 1 0 0 0
```

On the other hand, **IDsDExMA** and **SynonymsDExMA** are the necessary objects to be able to apply the *allSameID()* function of the package *DExMA*.

IDsDExMA is a dataframe that contains the equivalences between the different types of IDs. It also contains a column with the organism to which the annotation refers.

```
> class(IDsDExMA)
[1] "data.frame"
> length(IDsDExMA)
[1] 4
```

DExMAdata package

```
> names(IDsDExMA)
[1] "GeneSymbol" "Entrez"      "Ensembl"    "Organism"
> head(IDsDExMA$Entrez)
[1] "53288" "27777" "27778" "71661" "76253" "78297"
> head(IDsDExMA$GeneSymbol)
NULL
> class(SynonymsDExMA)
[1] "data.frame"
> head(SynonymsDExMA)
  Name GeneSymbol Organism
1   Alm         Pzp Mus musculus
2 AI893533       Pzp Mus musculus
4   MAM         Pzp Mus musculus
5   Pzp         Pzp Mus musculus
9  Nat-2       Aanat Mus musculus
10 AA-NAT       Aanat Mus musculus
```

SynonymsDExMA is a data.frame of 3 columns that contains other possible names that a gene can have in a organism and its equivalent annotation in Official Gene Symbol.

```
> class(SynonymsDExMA)
[1] "data.frame"
> head(SynonymsDExMA)
  Name GeneSymbol Organism
1   Alm         Pzp Mus musculus
2 AI893533       Pzp Mus musculus
4   MAM         Pzp Mus musculus
5   Pzp         Pzp Mus musculus
9  Nat-2       Aanat Mus musculus
10 AA-NAT       Aanat Mus musculus
```

availableIDs is a character vector that contains the different IDs that are available to use in *allSameID* function. It is recommended to look this object before making use of *allSameID* function.

```
> availableIDs
[1] "Entrez"      "Ensembl"    "GeneSymbol"
```

availableOrganism is a character vector that contains the different organism that are available to use in *allSameID* function. Like **availableIDs** object, it is recommended to look this object before making use of *allSameID* function.

```
> availableOrganism
[1] "Bos taurus"          "Caenorhabditis elegans"
[3] "Canis familiaris"   "Danio rerio"
```

DExMAdata package

```
[5] "Drosophila melanogaster" "Gallus gallus"  
[7] "Homo sapiens"          "Mus musculus"  
[9] "Rattus norvegicus"     "Arabidopsis thaliana"  
[11] "Saccharomyces cerevisiae" "Escherichia coli"
```

2 Sources

`listMatrixEX`, `lisPhenodatas`, `listExpressionSets` and `ExpressionSetStudy5` example objects are synthetic.

The `maObjectDif` example object have been created after applying `createObjectMA()` function from **DExMA** package to `listMatrixEX` and `listPhenodatas` objects.

The `maObject` example object have been obtained after applying `allSameID()` function from **DExMA** package to `maObjectDif`

IDsDExMA and **SynonymsDExMA** objects have been constructed using the information available in NCBI GEO [1] and in the NCBI's gene database [2]

3 Session info

```
R version 4.1.0 (2021-05-18)  
Platform: x86_64-pc-linux-gnu (64-bit)  
Running under: Ubuntu 20.04.2 LTS  
  
Matrix products: default  
BLAS: /home/biocbuild/bbs-3.13-bioc/R/lib/libRblas.so  
LAPACK: /home/biocbuild/bbs-3.13-bioc/R/lib/libRlapack.so  
  
locale:  
[1] LC_CTYPE=en_US.UTF-8      LC_NUMERIC=C  
[3] LC_TIME=en_US.UTF-8      LC_COLLATE=C  
[5] LC_MONETARY=en_US.UTF-8  LC_MESSAGES=en_US.UTF-8  
[7] LC_PAPER=en_US.UTF-8     LC_NAME=C  
[9] LC_ADDRESS=C             LC_TELEPHONE=C  
[11] LC_MEASUREMENT=en_US.UTF-8 LC_IDENTIFICATION=C  
  
attached base packages:  
[1] stats      graphics  grDevices  utils      datasets  methods   base  
  
other attached packages:  
[1] DExMAdata_1.0.0  
  
loaded via a namespace (and not attached):  
[1] BiocManager_1.30.15 compiler_4.1.0      BiocStyle_2.20.0  
[4] parallel_4.1.0     htmltools_0.5.1.1  tools_4.1.0  
[7] yaml_2.2.1         Biobase_2.52.0     rmarkdown_2.8  
[10] knitr_1.33         BiocGenerics_0.38.0 digest_0.6.27  
[13] xfun_0.23          rlang_0.4.11      evaluate_0.14
```

References

- [1] Barret T., Wilhite S., Ledoux P. and et al. *NCBI GEO: archive for functional genomics data sets—update Nucleic Acids Research*, 991-995, 2013 <https://doi.org/10.1093/nar/gks1193>
- [2] *Database resources of the National Center for Biotechnology information Nucleic Acids Research*, volume 47, Pages D23–D28, 2019 <https://doi.org/10.1093/nar/gky1069>