

# Package ‘OncoScore’

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**Title** A tool to identify potentially oncogenic genes

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**Depends** R (>= 4.1.0),

**Imports** biomaRt, grDevices, graphics, utils, methods,

**Suggests** BiocGenerics, BiocStyle, knitr, testthat,

**Description** OncoScore is a tool to measure the association of genes to cancer based on citation frequencies in biomedical literature. The score is evaluated from PubMed literature by dynamically updatable web queries.

**Encoding** UTF-8

**License** file LICENSE

**URL** <https://github.com/danro9685/OncoScore>

**BugReports** <https://github.com/danro9685/OncoScore>

**biocViews** BiomedicalInformatics

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---

combine.query.results *combine.query.results*

---

### Description

Merge a set of genes in a unique one in order to account for possible aliases

### Usage

```
combine.query.results(query, genes, new.name)
```

### Arguments

|          |  |
|----------|--|
| query    | The result of perform.query, perform.query.timeseries or perform.query.from.region |
| genes    | A list of genes to be merged   |
| new.name | A string containing the new name to be used for the new genes                      |

### Value

The frequencies of the genes in the cancer related documents and in all the documents retrieved on PubMed

**Examples**

```
data(query)
combine.query.results(query, c('IDH1', 'IDH2'), 'new_gene')
```

---

```
combine.single.matrix combine.single.matrix
```

---

**Description**

Perform merge procedure on a matrix

**Usage**

```
combine.single.matrix(query, genes, new.name)
```

**Arguments**

|          |  |
|----------|--|
| query    | The result of perform.query, perform.query.timeseries or perform.query.from.region |
| genes    | A list of genes to be merged   |
| new.name | A string containing the new name to be used for the new genes                      |

**Value**

a merged matrix

---

```
compute.frequencies.scores
compute.frequencies.scores
```

---

**Description**

compute the logarithmic scores based on the frequencies of the genes

**Usage**

```
compute.frequencies.scores(data, filter.threshold = 1, analysis.mode = "Log2")
```

**Arguments**

|                  |   |
|------------------|---|
| data             | input data as result of the function perform.query                        |
| filter.threshold | threshold to filter for a minimum number of citations for the genes       |
| analysis.mode    | logarithmic scores to be computed, i.e., log10, log2, natural log or log5 |

**Value**

the computed scores

---

compute.oncoscore      *compute.oncoscore*

---

## Description

compute the OncoScore for a list of genes

## Usage

```
compute.oncoscore(  
  data,  
  filter.threshold = 0,  
  analysis.mode = "Log2",  
  cutoff.threshold = 21.09,  
  file = NULL,  
  filter.invalid = TRUE  
)
```

## Arguments

`data`            input data as result of the function `perform.query`

`filter.threshold`    threshold to filter for a minimum number of citations for the genes

`analysis.mode`    logarithmic scores to be computed, i.e., log10, log2, natural log or log5

`cutoff.threshold`    threshold to be used to asses the oncogenes

`file`            should I save the results to text files?

`filter.invalid`    auto-remove genes with invalid count

## Value

the computed OncoScores and the clusters for the genes

## Examples

```
data(query)  
compute.oncoscore(query)
```

---

```
compute.oncoscore.from.region  
compute.oncoscore.from.region
```

---

## Description

Perform OncoScore analysis on a given chromosomal region

## Usage

```
compute.oncoscore.from.region(  
  chromosome,  
  start = NA,  
  end = NA,  
  gene.num.limit = 100,  
  filter.threshold = NA,  
  analysis.mode = "Log2",  
  cutoff.threshold = 21.09,  
  file = NULL  
)
```

## Arguments

|                  |  |
|------------------|--|
| chromosome       | chromosome to be retrieved   |
| start            | initial position to be used  |
| end              | final position to be used  |
| gene.num.limit   | A limit to the genes to be considered in the analysis; this is done to limit the number of queries to PubMed |
| filter.threshold | threshold to filter for a minimum number of citations for the genes  |
| analysis.mode    | logarithmic scores to be computed, i.e., log10, log2, natural log or log5                                    |
| cutoff.threshold | threshold to be used to assess the oncogenes   |
| file             | should I save the results to text files?   |

## Value

the computed scores

## Examples

```
chromosome = 15  
start = 200000  
end = 300000
```

---

```
compute.oncoscore.timeseries  
    compute.oncoscore.timeseries
```

---

### Description

perform the OncoScore time series analysis for a list of genes and data times

### Usage

```
compute.oncoscore.timeseries(  
  data,  
  filter.threshold = 0,  
  analysis.mode = "Log2",  
  cutoff.threshold = 21.09,  
  file = NULL  
)
```

### Arguments

|                  |   |
|------------------|---|
| data             | input data as result of the function perform.query.timeseries             |
| filter.threshold | threshold to filter for a minimum number of citations for the genes       |
| analysis.mode    | logarithmic scores to be computed, i.e., log10, log2, natural log or log5 |
| cutoff.threshold | threshold to be used to asses the oncogenes                               |
| file             | should I save the results to text files?                                  |

### Value

the performed OncoScores time series analysis

### Examples

```
data(query.timepoints)  
compute.oncoscore.timeseries(query.timepoints)
```

---

|                    |                           |
|--------------------|---------------------------|
| estimate.oncogenes | <i>estimate.oncogenes</i> |
|--------------------|---------------------------|

---

**Description**

estimate the oncoscore for the genes

**Usage**

```
estimate.oncogenes(data, cutoff.threshold = 21.09)
```

**Arguments**

|                  |   |
|------------------|---|
| data             | input data as result of the function compute.frequencies.scores |
| cutoff.threshold | threshold to be used to asses the oncogenes                     |

**Value**

the computed scores and oncogenes

---

|       |                        |
|-------|------------------------|
| genes | <i>A list of genes</i> |
|-------|------------------------|

---

**Description**

This dataset contains a list of genes to be used in the analysis as an example

**Usage**

```
genes
```

**Format**

```
txt
```

**Value**

list of 5 elements

**Source**

example data

---

`get.genes.from.biomart`

*get.genes.from.biomart*

---

**Description**

Get a gene list from biomart

**Usage**

```
get.genes.from.biomart(chromosome, start = NA, end = NA)
```

**Arguments**

|            |                             |
|------------|-----------------------------|
| chromosome | chromosome to be retrieved  |
| start      | initial position to be used |
| end        | final position to be used   |

**Value**

A list of genes

**Examples**

```
chromosome = 15  
start = 200000  
end = 300000
```

---

`get.list.from.xml`

*get.list.from.xml*

---

**Description**

process the result of the query

**Usage**

```
get.list.from.xml(webget)
```

**Arguments**

|        |                                     |
|--------|-------------------------------------|
| webget | The result from the query to PubMed |
|--------|-------------------------------------|

**Value**

Processed result obtained from the query to PubMed



---

```
get.pubmed.driver.analysis
      get.pubmed.driver.analysis
```

---

**Description**

query PubMed for a list of genes

**Usage**

```
get.pubmed.driver.analysis(keywords, gene)
```

**Arguments**

|          |  |
|----------|--|
| keywords | The set of keywords to be used for the query to PubMed |
| gene     | The name of a gene to be used for the query to PubMed  |

**Value**

The frequency for the current gene retrieved with the query on the provided set of keywords

---

```
perform.query      perform.query
```

---

**Description**

perform the query to PubMed

**Usage**

```
perform.query(list.of.genes, gene.num.limit = 100, custom.search = NA)
```

**Arguments**

|                |  |
|----------------|--|
| list.of.genes  | The list of genes to be used in the queries to PubMed  |
| gene.num.limit | A limit to the genes to be considered in the analysis; this is done to limit the number of queries to PubMed |
| custom.search  | A custom set of keywords to be used when querying PubMed   |

**Value**

The frequencies of the genes in the cancer related documents and in all the documents retrieved on PubMed

**Examples**

```
data(genes)
```

---

```
perform.query.from.region  
    perform.query.from.region
```

---

**Description**

Perform the query to PubMed on a given chromosomal region

**Usage**

```
perform.query.from.region(  
  chromosome,  
  start = NA,  
  end = NA,  
  gene.num.limit = 100  
)
```

**Arguments**

|                |  |
|----------------|--|
| chromosome     | chromosome to be retrieved   |
| start          | initial position to be used  |
| end            | final position to be used  |
| gene.num.limit | A limit to the genes to be considered in the analysis; this is done to limit the number of queries to PubMed |

**Value**

The frequencies of the genes in the cancer related documents and in all the documents retrieved on PubMed

**Examples**

```
chromosome = 15  
start = 200000  
end = 300000
```

---

```
perform.query.timeseries  
    perform.query.timeseries
```

---

## Description

perform the query to PubMed for the time series analysis

## Usage

```
perform.query.timeseries(  
  list.of.genes,  
  list.of.datatimes,  
  gene.num.limit = 100,  
  timepoints.limit = 10,  
  custom.search = NA  
)
```

## Arguments

`list.of.genes` The list of genes to be used in the queries to PubMed

`list.of.datatimes`  
The list of time points to be used in the queries to PubMed

`gene.num.limit` A limit to the genes to be considered in the analysis; this is done to limit the number of queries to PubMed

`timepoints.limit`  
A limit to the time points to be considered in the analysis; this is done to limit the number of queries to PubMed

`custom.search` A custom set of keywords to be used when querying PubMed

## Value

The frequencies of the genes in the cancer related documents and in all the documents retrieved on PubMed at the specified time points

## Examples

```
data(genes)  
data(timepoints)
```

plot.oncoscore      *plot.oncoscore*

---

### Description

plot the OncoScore for a list of genes

### Usage

```
## S3 method for class 'oncoscore'  
plot(  
  x,  
  gene.number = 5,  
  main = "OncoScore",  
  xlab = "score",  
  ylab = "genes",  
  file = NA,  
  ...  
)
```

### Arguments

|             |  |
|-------------|--|
| x           | input data as result of the function compute.OncoScore |
| gene.number | number of genes to print                               |
| main        | the title  |
| xlab        | description of x asix (defaul score)                   |
| ylab        | description of y asix (defaul genes)                   |
| file        | where to save the plot                                 |
| ...         | additional parameter to pass to the barplot function   |

### Value

A plot

### Examples

```
data(query)  
result = compute.oncoscore(query)  
plot.oncoscore(result)
```

---

```
plot.oncoscore.timeseries  
plot.oncoscore.timeseries
```

---

## Description

plot the OncoScore for a list of genes

## Usage

```
## S3 method for class 'oncoscore.timeseries'  
plot(  
  x,  
  gene.number = 5,  
  incremental = FALSE,  
  relative = FALSE,  
  main = "OncoScore",  
  xlab = "timepoints",  
  ylab = "score",  
  legend.pos = "top",  
  file = NA,  
  ...  
)
```

## Arguments

|             |  |
|-------------|--|
| x           | input data as result of the function compute.OncoScore |
| gene.number | number of genes to print                               |
| incremental | display the OncoScore increment                        |
| relative    | display the incrementa as relative value               |
| main        | the title  |
| xlab        | description of x asix (defaul score)                   |
| ylab        | description of y asix (defaul genes)                   |
| legend.pos  | Position of the legend                                 |
| file        | where to save the plot                                 |
| ...         | additional parameter to pass to the lines function     |

## Value

A plot

**Examples**

```
data(query.timepoints)
result = compute.oncoscore.timeseries(query.timepoints)
plot.oncoscore.timeseries(result)
```

---

|       |   |
|-------|---|
| query | <i>The result of perform.web.query on genes</i> |
|-------|---|

---

**Description**

This dataset contains the result of perform.web.query on genes

**Usage**

```
query
```

**Format**

```
rdata
```

**Value**

```
matrix 5 x 2
```

**Source**

```
example data
```

---

|                  |  |
|------------------|--|
| query.timepoints | <i>The result of perform.time.series.query on genes and timepoints</i> |
|------------------|--|

---

**Description**

This dataset contains the result of perform.time.series.query on genes and timepoints

**Usage**

```
query.timepoints
```

**Format**

```
rdata
```

**Value**

```
list of 5 matrix 5 x 2
```

**Source**

example data

---

|            |                             |
|------------|-----------------------------|
| timepoints | <i>A list of timepoints</i> |
|------------|-----------------------------|

---

**Description**

This dataset contains a list of time points to be used in the analysis as an example

**Usage**

timepoints

**Format**

txt

**Value**

list of 5 elements

**Source**

example data

---

|          |                 |
|----------|-----------------|
| try.scan | <i>try.scan</i> |
|----------|-----------------|

---

**Description**

try to query the given URL

**Usage**

try.scan(getURL)

**Arguments**

|        |               |
|--------|---------------|
| getURL | The given URL |
|--------|---------------|

**Value**

Result obtained from PubMed

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