

# Package ‘IntramiRExploreR’

June 4, 2023

**Title** Predicting Targets for Drosophila Intragenic miRNAs

**Version** 1.22.0

**Author** Surajit Bhattacharya and Daniel Cox

**Maintainer** Surajit Bhattacharya <sbhattach2@childrensnational.org>

**Description** Intra-miR-ExploreR, an integrative miRNA target prediction bioinformatics tool, identifies targets combining expression and biophysical interactions of a given microRNA (miR). Using the tool, we have identified targets for 92 intragenic miRs in *D. melanogaster*, using available microarray expression data, from Affymetrix 1 and Affymetrix2 microarray array platforms, providing a global perspective of intragenic miR targets in *Drosophila*. Predicted targets are grouped according to biological functions using the DAVID Gene Ontology tool and are ranked based on a biologically relevant scoring system, enabling the user to identify functionally relevant targets for a given miR.

**Depends** R (>= 3.4)

**Imports** igraph (>= 1.0.1), FGNet (>= 3.0.7), knitr (>= 1.12.3), stats, utils, grDevices, graphics

**Suggests** gProfileR, topGO, org.Dm.eg.db, rmarkdown, testthat

**VignetteBuilder** knitr

**License** GPL-2

**biocViews** Software, Microarray, GeneTarget, StatisticalMethod, GeneExpression, GenePrediction

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.2

**URL** <https://github.com/VilainLab/IntramiRExploreR>

**BugReports** <https://github.com/VilainLab/IntramiRExploreR>

**git\_url** <https://git.bioconductor.org/packages/IntramiRExploreR>

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**R topics documented:**

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|                      |                                                                             |
|----------------------|-----------------------------------------------------------------------------|
| Affy1_Distance_Final | <i>Targets for the microRNA analyzed from Affy1 plaform using Distance.</i> |
|----------------------|-----------------------------------------------------------------------------|

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**Description**

A precomputed dataset containing the targets, scores and other attributes of 83 intragenic microRNAs using Distance Correlation for plaform Affymetrix 1.

**Usage**

Affy1\_Distance\_Final

**Format**

- A data frame with 53399 rows and 8 variables:
- miRNA** miRNA name, miRNA symbol
  - GeneSymbol** Gene name, in Gene Symbol
  - FBGN** Gene name, in FlybaseID
  - CGID** Gene name, in CGID
  - Score** Computed Score, in float
  - GeneFunction** Gene Functions, from Flybase
  - experiments** Experiments, from ArrayExpress
  - TargetDatabases** Target Database Name, from TargetDatabases

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|                     |                                                                            |
|---------------------|----------------------------------------------------------------------------|
| Affy1_Pearson_Final | <i>Targets for the microRNA analyzed from Affy1 plaform using Pearson.</i> |
|---------------------|----------------------------------------------------------------------------|

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**Description**

A precomputed dataset containing the targets, scores and other attributes of 83 intragenic microRNAs using Pearson Correlation for plaform Affymetrix 1.

**Usage**

Affy1\_Pearson\_Final

**Format**

A data frame with 41845 rows and 8 variables:

**miRNA** miRNA name, miRNA symbol

**GeneSymbol** Gene name, in Gene Symbol

**FBGN** Gene name, in FlybaseID

**CGID** Gene name, in CGID

**Score** Computed Score, in float

**GeneFunction** Gene Functions, from Flybase

**experiments** Experiments, from ArrayExpress

**TargetDatabases** Target Database Name, from TargetDatabases

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|                      |                                                                             |
|----------------------|-----------------------------------------------------------------------------|
| Affy2_Distance_Final | <i>Targets for the microRNA analyzed from Affy2 plaform using Distance.</i> |
|----------------------|-----------------------------------------------------------------------------|

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**Description**

A precomputed dataset containing the targets, scores and other attributes of 83 intragenic microRNAs using Distance Correlation for plaform Affymetrix 1.

**Usage**

Affy2\_Distance\_Final

**Format**

A data frame with 73374 rows and 8 variables:

**miRNA** miRNA name, miRNA symbol

**GeneSymbol** Gene name, in Gene Symbol

**FBGN** Gene name, in FlybaseID

**CGID** Gene name, in CGID

**Score** Computed Score, in float

**GeneFunction** Gene Functions, from Flybase

**experiments** Experiments, from ArrayExpress

**TargetDatabases** Target Database Name, from TargetDatabases

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|                     |                                                                             |
|---------------------|-----------------------------------------------------------------------------|
| Affy2_Pearson_Final | <i>Targets for the microRNA analyzed from Affy2 platform using Pearson.</i> |
|---------------------|-----------------------------------------------------------------------------|

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**Description**

A precomputed dataset containing the targets, scores and other attributes of 83 intragenic microRNAs using Pearson Correlation for platform Affymetrix 1.

**Usage**

Affy2\_Pearson\_Final

**Format**

A data frame with 52913 rows and 8 variables:

**miRNA** miRNA name, miRNA symbol

**GeneSymbol** Gene name, in Gene Symbol

**FBGN** Gene name, in FlybaseID

**CGID** Gene name, in CGID

**Score** Computed Score, in float

**GeneFunction** Gene Functions, from Flybase

**experiments** Experiments, from ArrayExpress

**TargetDatabases** Target Database Name, from TargetDatabases

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|                  |                                                        |
|------------------|--------------------------------------------------------|
| extract_HostGene | <i>Extract Host Gene for a given Intragenic miRNA.</i> |
|------------------|--------------------------------------------------------|

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**Description**

Extract Host Gene for a given Intragenic miRNA.

**Usage**

```
extract_HostGene(miRNA)
```

**Arguments**

|       |                                     |
|-------|-------------------------------------|
| miRNA | A String containing the miRNA name. |
|-------|-------------------------------------|

**Value**

genf, a character string or vector containing Host gene for the Intragenic miRNA.

**Examples**

```
miRNA="dme-miR-12"  
extract_HostGene(miRNA)
```

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|                        |                                                        |
|------------------------|--------------------------------------------------------|
| extract_intragenic_miR | <i>Extract Intragenic miRNA for a given Host gene.</i> |
|------------------------|--------------------------------------------------------|

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**Description**

Extract Intragenic miRNA for a given Host gene.

**Usage**

```
extract_intragenic_miR(gene)
```

**Arguments**

|      |                         |
|------|-------------------------|
| gene | character. Gene Symbol. |
|------|-------------------------|

**Value**

miRf, a character string or vector containing Intragenic miRNA for the Host Gene.

**Examples**

```
gene="Gmap"  
extract_intragenic_miR(gene)
```

---

|            |                                                    |
|------------|----------------------------------------------------|
| genes_Stat | <i>Extracting miRNAs that target a query gene.</i> |
|------------|----------------------------------------------------|

---

## Description

Extracting miRNAs that target a query gene.

## Usage

```
genes_Stat(
  gene,
  geneIDType = c("GeneSymbol", "FBGN", "CGID"),
  method = c("Pearson", "Distance", "Both", "BothIntersect"),
  Platform = c("Affy1", "Affy2"),
  Text = FALSE,
  outpath = tempdir()
)
```

## Arguments

|            |                                                                              |
|------------|------------------------------------------------------------------------------|
| gene       | character. gene Identifier.                                                  |
| geneIDType | character. GeneIDType choices are 'GeneSymbol', 'FBGN', 'CGID'               |
| method     | character. Choices are 'Pearson', 'Distance', 'Both' and 'BothIntersected'   |
| Platform   | character. Choices are 'Affy1', 'Affy2'.                                     |
| Text       | logical . To choose between storing the data as text file. Default is FALSE. |
| outpath    | character. The path where the data is stored if TEXT=TRUE. Default is        |

## Value

Outputs the miRNA information, Target Prediction Score, miRNA miRNA function and Target Database that predicts the interaction in a dataframe. Depending upon the output choice data is stored in the path specified. Default option prints output to the console.

## Examples

```
gene="Syb"
genes_Stat(gene, geneIDType="GeneSymbol", method=c("Pearson"),
           Platform=c("Affy1"), Text=FALSE)
```

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|                    |                                                                           |
|--------------------|---------------------------------------------------------------------------|
| Gene_Visualisation | <i>Visualises the targetGene:miRNA network using Cytoscape and igraph</i> |
|--------------------|---------------------------------------------------------------------------|

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## Description

Visualises the targetGene:miRNA network using Cytoscape and igraph .

## Usage

```
Gene_Visualisation(
  mRNA,
  mRNA_type = c("GeneSymbol", "FBGN", "CGID"),
  method = c("Pearson", "Distance", "Both"),
  platform = c("Affy1", "Affy2"),
  visualisation = c("igraph", "Cytoscape", "text", "console"),
  path = tempdir(),
  layout = c("kamadakawai", "reingold.tilford", "fruchterman.reingold", "interactive")
)
```

## Arguments

|               |                                                                                                                    |
|---------------|--------------------------------------------------------------------------------------------------------------------|
| mRNA          | character. gene Identifier.                                                                                        |
| mRNA_type     | character. mRNA id type. The choices are 'GeneSymbol','FBID' and 'CGID'.                                           |
| method        | character. Statistical Methods. Choices are 'Pearson','Distance','Both'                                            |
| platform      | character. Affymetrix Platforms. Choices are 'Affy1','Affy2'.                                                      |
| visualisation | character. Visualisation type. Choices are 'igraph','Cytoscape','text' and "console"                               |
| path          | character. Path where data.frame is saved when visualisation is text. Default is tempdir().                        |
| layout        | character. Network choices. Choices are 'kamadakawai','reingold.tilford','fruchterman.reingold' and 'interactive'. |

## Value

Depending upon the output choice network image or dataframe containing miRNAs that target the query gene are output.

## Examples

```
mRNA='Syb'
Gene_Visualisation(mRNA,mRNA_type=c('GeneSymbol'),method=c('Pearson'),
  platform=c('Affy1'), visualisation = "console")
```

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|            |                                        |
|------------|----------------------------------------|
| GetGOS_ALL | <i>Gene ontology for Target Genes.</i> |
|------------|----------------------------------------|

---

## Description

Gene ontology for Target Genes.

## Usage

```
GetGOS_ALL(
  gene,
  GO = c("topGO"),
  term = c("GOTERM_BP_ALL", "GOTERM_MF_ALL", "GOTERM_CC_ALL"),
  geneIdType = "ALIAS",
  path = tempdir(),
  ontology = c("GO_BP", "GO_MF", "GO_CC"),
  filename
)
```

## Arguments

|            |                                                                                                   |
|------------|---------------------------------------------------------------------------------------------------|
| gene       | List A String or vector containing the Gene names.                                                |
| GO         | A String depicting the chosen GO tool. Choice is "topGO"                                          |
| term       | A String depicting the chosen term. Choices are "GOTERM_BP_ALL","GOTERM_MF_ALL", "GOTERM_CC_ALL". |
| geneIdType | Type of gene Id given as input. Default "ALIAS"                                                   |
| path       | String. The path where the data is stored if TEXT=TRUE.                                           |
| ontology   | Ontology selection for topGO. Choices are "GO_BP","GO_MF","GO_CC".                                |
| filename   | Name of the file to store Gene Ontology.                                                          |

## Value

Depending upon the output choice data is stored in the path specified. Default option prints output to the console.

## Examples

```
## Not run:
miR="dme-miR-12"
a<-Visualisation(miR,mRNA_type=c("GeneSymbol"),method=c("Both"),
  platform=c("Affy1"),thresh=100)
genes<-a$Target_GeneSymbol
GetGOS_ALL(genes,GO=c("topGO"),term=c("GO_BP"),path=tempdir(),
  filename="test")

## End(Not run)
```

---

|                  |                                                                                    |
|------------------|------------------------------------------------------------------------------------|
| IntramiRExploreR | <i>IntramiRExploreR: Prediction of targets for Intragenic miRNA in Drosophila.</i> |
|------------------|------------------------------------------------------------------------------------|

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### Description

Prediction of targets for Drosophila Intragenic microRNAs and Integrated approach using Gene Ontology and Networking tools.

### Examples

```
## Not run:
gene='Gmap'
extract_intragenic_miR(gene)

## End(Not run)
```

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|                      |                                                                       |
|----------------------|-----------------------------------------------------------------------|
| miRNA_ID_to_Function | <i>Contains the miRNA function information from Flybase database.</i> |
|----------------------|-----------------------------------------------------------------------|

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### Description

A dataset containing the function for the intragenic miRNA.

### Usage

```
miRNA_ID_to_Function
```

### Format

A data frame with 66 rows and 4 variables:

**miRNA** miRNA name, miRNA symbol

**FBGN** target gene name, gene symbol

**miRNAFunction** miRNA function, from Flybase

### Source

<http://flybase.org/>

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|                  |                                                       |
|------------------|-------------------------------------------------------|
| miRNA_summary_DB | <i>Contains the summary for the intragenic miRNA.</i> |
|------------------|-------------------------------------------------------|

---

### Description

A dataset containing the summary for the intragenic miRNA.

### Usage

```
miRNA_summary_DB
```

### Format

A data frame with 257 rows and 6 variables:

**miRNA** miRNA name, miRNA symbol

**Intragenic** Responsee, in boolean

**Intergenic** Responsee, in boolean

**Gene** miRNA name, miRNA symbol

**Type.of.HostGene.mRNA.lncRNA.** Type of Hostgene

**Notes** Comments about the miRNA

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|                 |                                                    |
|-----------------|----------------------------------------------------|
| miRTargets_Stat | <i>Extracting miRNAs that target a query gene.</i> |
|-----------------|----------------------------------------------------|

---

### Description

Extracting miRNAs that target a query gene.

### Usage

```
miRTargets_Stat(
  miR,
  method = c("Pearson", "Distance", "Both", "BothIntersect"),
  Platform = c("Affy1", "Affy2"),
  outpath = tempdir(),
  Text = FALSE
)
```

**Arguments**

|            |                                                                                  |
|------------|----------------------------------------------------------------------------------|
| miR        | character. miRNA symbol.                                                         |
| method     | character. Choices are "Pearson", "Distance", "Both" and "BothIntersected"       |
| Platform   | character. Choices are "Affy1", "Affy2".                                         |
| outputpath | character. The path where the data is stored if TEXT=TRUE. Default is tempdir(). |
| Text       | logical . To choose between storing the data as text file. Default is FALSE.     |

**Value**

Outputs the target information, Target Prediction Score, miRNA target function and Target Database that predicts the interaction in a dataframe. Depending upon the output choice data is stored in the path specified. Default option prints output to the console.

**Examples**

```
miRNA="dme-miR-12"
miRTargets_Stat (miRNA,method=c ("Pearson"),Platform=c ("Affy1"),Text=FALSE)
```

---

|               |                                                                           |
|---------------|---------------------------------------------------------------------------|
| Visualisation | <i>Visualises the targetGene:miRNA network using Cytoscape and igraph</i> |
|---------------|---------------------------------------------------------------------------|

---

**Description**

Visualises the targetGene:miRNA network using Cytoscape and igraph .

**Usage**

```
Visualisation(
  miRNA,
  mRNA_type = c("GeneSymbol", "FBID", "CGID"),
  method = c("Pearson", "Distance", "Both"),
  platform = c("Affy1", "Affy2"),
  thresh = 50,
  visualisation = c("igraph", "Cytoscape", "Text", "console"),
  path = tempdir(),
  layout = c("kamadakawai", "reingold.tilford", "fruchterman.reingold", "interactive")
)
```

**Arguments**

|           |                                                                          |
|-----------|--------------------------------------------------------------------------|
| miRNA     | character. miRNA Identifier.                                             |
| mRNA_type | character. mRNA id type. The choices are 'GeneSymbol','FBID' and 'CGID'. |
| method    | character. Statistical Methods. Choices are 'Pearson','Distance','Both'  |

|               |                                                                                                                    |
|---------------|--------------------------------------------------------------------------------------------------------------------|
| platform      | character. Affymetrix Platforms. Choices are 'Affy1','Affy2'.                                                      |
| thresh        | integer. Threshold depicting number of rows to show.                                                               |
| visualisation | character. Visualisation type. Choices are 'igraph','Cytoscape','text' and 'console'.                              |
| path          | character. Path where data.frame is saved when visualisation is text. Default is tempdir().                        |
| layout        | character. Network choices. Choices are 'kamadakawai','reingold.tilford','fruchterman.reingold' and 'interactive'. |

**Value**

Depending upon the output choice network image or dataframe containing miRNAs that target the query gene are output.

**Examples**

```
miRNA='dme-miR-12'  
Visualisation(miRNA,mRNA_type=c('GeneSymbol'),method=c('Pearson'),  
platform=c('Affy1'),visualisation=c('igraph'),layout=c('kamadakawai'),  
path=tempdir())
```

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