

Package ‘SVMDO’

January 10, 2025

Title Identification of Tumor-Discriminating mRNA Signatures via Support Vector Machines Supported by Disease Ontology

Version 1.6.0

Date 2024-08-30

Depends R(>= 4.4), shiny (>= 1.7.4)

Imports shinyFiles (>= 0.9.3), shinytitle (>= 0.1.0), golem (>= 0.3.5), nortest (>= 1.0-4), e1071 (>= 1.7-12), BSDA (>= 1.2.1), data.table (>= 1.14.6), sjmisc (>= 2.8.9), klaR (>= 1.7-1), caTools (>= 1.18.2), caret (>= 6.0-93), survival (>= 3.4-0), DT (>= 0.33.0), DOSE (>= 3.24.2), AnnotationDbi (>= 1.60.0), org.Hs.eg.db (>= 3.16.0), dplyr (>= 1.0.10), SummarizedExperiment (>= 1.28.0), grDevices, graphics, stats, utils

Description It is an easy-to-use GUI using disease information for detecting tumor/normal sample discriminating gene sets from differentially expressed genes. Our approach is based on an iterative algorithm filtering genes with disease ontology enrichment analysis and wilk and wilks lambda criterion connected to SVM classification model construction. Along with gene set extraction, SVMDO also provides individual prognostic marker detection. The algorithm is designed for FPKM and RPKM normalized RNA-Seq transcriptome datasets.

RoxygenNote 7.3.2

biocViews GeneSetEnrichment, DifferentialExpression, GUI, Classification, RNASeq, Transcriptomics, Survival

NeedsCompilation no

License GPL-3

Encoding UTF-8

Roxygen list(markdown = TRUE)

Suggests BiocStyle, knitr, rmarkdown, testthat (>= 3.1.6)

VignetteBuilder knitr

Config/testthat/edition 3

BugReports <https://github.com/robogeno/SVMDO/issues>

git_url <https://git.bioconductor.org/packages/SVMDO>

git_branch RELEASE_3_20

git_last_commit 1f89469

git_last_commit_date 2024-10-29

Repository Bioconductor 3.20

Date/Publication 2025-01-09

Author Mustafa Erhan Ozer [aut, cre] (<<https://orcid.org/0000-0002-1572-8008>>),
Pemra Ozbek Sarica [aut],
Kazim Yalcin Arga [aut]

Maintainer Mustafa Erhan Ozer <erhanozer19@marun.edu.tr>

Contents

| | |
|--|----|
| classification_server | 3 |
| classification_ui | 3 |
| clinic_data_input_server | 4 |
| clinic_data_input_ui | 4 |
| deg_server | 5 |
| deg_ui | 5 |
| disc_gene_download_ui | 6 |
| disc_gene_dw_server | 6 |
| do_based_gene_filtration_server | 7 |
| do_based_gene_filtration_ui | 7 |
| expression_dataset_input_server | 8 |
| gene_directory_selection_server | 8 |
| gene_directory_selection_ui | 9 |
| gene_list_name_server | 9 |
| gene_list_name_ui | 10 |
| gene_list_table_visualization_ui | 10 |
| globals | 10 |
| gui_obj_removal_server | 11 |
| gui_obj_removal_ui | 11 |
| innerServer_exp_ui | 12 |
| package_req_list | 12 |
| plot_list_server | 12 |
| plot_list_ui | 13 |
| plot_push_server | 13 |
| plot_push_ui | 14 |
| plot_show_server | 14 |
| plot_show_ui | 15 |
| runGUI | 15 |
| survival_analysis_server | 16 |
| survival_analysis_ui | 16 |
| surv_plot_dw_server | 17 |
| surv_plot_dw_ui | 17 |
| table_server | 18 |
| table_ui | 18 |
| test_data_selection_server | 19 |
| test_data_selection_ui | 19 |
| top_val_based_deg_filtration | 20 |
| top_val_based_deg_filtration_ui | 20 |
| top_val_server | 21 |

| | |
|------------------------------|-----------|
| <i>classification_server</i> | 3 |
| <i>top_val_ui</i> | 21 |
| Index | 22 |

classification_server SVMDO

Description

SVMDO

Usage

`innerServer_7(input, output, session)`

Arguments

| | |
|----------------------|----------------|
| <code>input</code> | server input |
| <code>output</code> | server output |
| <code>session</code> | server session |

Value

Server section of wilks lambda filtration and SVM classification of disease filtered differentially expressed gene set

classification_ui SVMDO

Description

SVMDO

Usage

`innerUI_classification(id)`

Arguments

| | |
|-----------------|------------------|
| <code>id</code> | connection input |
|-----------------|------------------|

Value

UI section of wilks lambda filtration and SVM classification of disease filtered differentially expressed gene set

clinic_data_input_server
SVMDO

Description

SVMDO

Usage

innerServer_clinic(input, output, session)

Arguments

| | |
|---------|----------------|
| input | server input |
| output | server output |
| session | server session |

Value

Server section of loading clinical data

clinic_data_input_ui *SVMDO*

Description

SVMDO

Usage

innerUI_clinic_data(id)

Arguments

| | |
|----|------------------|
| id | connection input |
|----|------------------|

Value

UI section of loading clinical data

| | |
|------------|--------------|
| deg_server | <i>SVMDO</i> |
|------------|--------------|

Description

SVMDO

Usage

```
innerServer_3(input, output, session, rawData, rval)
```

Arguments

| | |
|---------|--|
| input | server input |
| output | server output |
| session | server session |
| rawData | expression dataset provided from innerServer_exp_server |
| rval | Selected radio button information provided from innerServer_rad_server |

Value

Server section of differential gene expression analysis

| | |
|--------|--------------|
| deg_ui | <i>SVMDO</i> |
|--------|--------------|

Description

SVMDO

Usage

```
innerUI_deg_analysis(id)
```

Arguments

| | |
|----|------------------|
| id | connection input |
|----|------------------|

Value

UI section of differential gene expression analysis

disc_gene_download_ui *SVMDO*

Description

SVMDO

Usage

disc_gene_download_ui(id)

Arguments

id connection input

Value

UI section of discriminative gene set download button

disc_gene_dw_server *SVMDO*

Description

SVMDO

Usage

disc_gene_dw_server(input, output, session, gene_list_val)

Arguments

input server input
output server output
session server session
gene_list_val discriminative gene set list variable

Value

Server section of discriminative gene set download button

do_based_gene_filtration_server
SVMDO

Description

SVMDO

Usage

innerServer_6(input, output, session)

Arguments

| | |
|---------|----------------|
| input | server input |
| output | server output |
| session | server session |

Value

Server section of disease ontology based filtration of differentially expressed genes

do_based_gene_filtration_ui
SVMDO

Description

SVMDO

Usage

innerUI_disease_ont_class(id)

Arguments

| | |
|----|------------------|
| id | connection input |
|----|------------------|

Value

UI section of disease ontology based filtration of differentially expressed genes

expression_dataset_input_server
SVMDO

Description

SVMDO

Usage

```
innerServer_exp(input, output, session)
```

Arguments

| | |
|---------|----------------|
| input | server input |
| output | server output |
| session | server session |

Value

Server section of providing expression dataset

gene_directory_selection_server
SVMDO

Description

SVMDO

Usage

```
innerServer(input, output, session)
```

Arguments

| | |
|---------|----------------|
| input | server input |
| output | server output |
| session | server session |

Value

Server section of entering output/working for gene list directory

gene_directory_selection_ui
SVMDO

Description

SVMDO

Usage

innerUI_path(id)

Arguments

id connection input

Value

UI section of entering output/working for gene list directory

gene_list_name_server SVMDO

Description

SVMDO

Usage

innerServer_10(input, output, session)

Arguments

input server input
output server output
session server session

Value

Server section of entering final gene list name

gene_list_name_ui *SVMDO*

Description

SVMDO

Usage

innerUI_gene_names(id)

Arguments

id connection input

Value

UI section of entering top gene value

gene_list_table_visualization_ui
SVMDO

Description

SVMDO

Usage

deg_data_table_ui(id)

Arguments

id connection input

Value

Providing table form of discriminative gene sets in GUI

globals *SVMDO*

Description

SVMDO

Value

Including script files and global variables of GUI required to be initiated at the runApp file execution

gui_obj_removal_server
SVMDO

Description

SVMDO

Usage

innerServer_9(input, output, session)

Arguments

| | |
|---------|----------------|
| input | server input |
| output | server output |
| session | server session |

Value

Server section of workspace clearance

gui_obj_removal_ui SVMDO

Description

SVMDO

Usage

innerUI_clear_env(id)

Arguments

| | |
|----|------------------|
| id | connection input |
|----|------------------|

Value

UI section of workspace clearance

innerServer_exp_ui *SVMDO*

Description

SVMDO

Usage

innerUI_exp_data(id)

Arguments

id connection input

Value

UI section of providing expression dataset into GUI

package_req_list *SVMDO*

Description

SVMDO

Value

List of packages involved in SVMDO

plot_list_server *SVMDO*

Description

SVMDO

Usage

plot_list_server(input, output, session)

Arguments

input server input
output server output
session server session

Value

Server section of preparing plot list to be visualized in GUI page

| | |
|--------------|--------------|
| plot_list_ui | <i>SVMDO</i> |
|--------------|--------------|

Description

SVMDO

Usage`innerUI_collect_plot_data(id)`**Arguments**

| | |
|----|-------------------|
| id | connection output |
|----|-------------------|

Value

UI section of preparing plot list to be visualized in GUI page

| | |
|------------------|--------------|
| plot_push_server | <i>SVMDO</i> |
|------------------|--------------|

Description

SVMDO

Usage`plot_push_server(input, output, session)`**Arguments**

| | |
|---------|----------------|
| input | server input |
| output | server output |
| session | server session |

Value

Server section of providing information about total number of survival plots for visualization

| | |
|--------------|--------------|
| plot_push_ui | <i>SVMDO</i> |
|--------------|--------------|

Description

SVMDO

Usage

innerUI_plot_inject(id)

Arguments

| | |
|----|------------------|
| id | connection input |
|----|------------------|

Value

UI section of providing information about total number of survival plots for visualization

| | |
|------------------|--------------|
| plot_show_server | <i>SVMDO</i> |
|------------------|--------------|

Description

SVMDO

Usage

plot_show_server(input, output, session, max_data)

Arguments

| | |
|----------|---|
| input | server input |
| output | server output |
| session | server session |
| max_data | Information of total number of survival plots prepared with discriminative gene set |

Value

Server section of providing information about total number of survival plots for visualization

| | |
|--------------|--------------|
| plot_show_ui | <i>SVMDO</i> |
|--------------|--------------|

Description

SVMDO

Usage

innerUI_plot_show(id)

Arguments

id connection input

Value

UI section of providing information about total number of survival plots for visualization

| | |
|--------|--------------|
| runGUI | <i>SVMDO</i> |
|--------|--------------|

Description

SVMDO

Usage

linebreaks(n)

Arguments

n linebreak function variable

Value

Returning GUI window screen

Examples

```
#SVMDO::runGUI() Calling GUI without activating library
#runGUI() Calling GUI after activating library
# Disease Ontology Enrichment of a differentially expressed gene (entrez id):
a_1<-DOSE::enrichD0(2981,ont="HDO")
```

```
survival_analysis_server
    SVMDO
```

Description

SVMDO

Usage

```
innerServer_8(input, output, session, rawData_2, rval)
```

Arguments

| | |
|-----------|--|
| input | server input |
| output | server output |
| session | server session |
| rawData_2 | Clinical data provided from clinic_data_input_server |
| rval | Selected radio button information provided from innerServer_rad_server |

Value

Server section of survival analysis of final discriminative gene set

```
survival_analysis_ui  SVMDO
```

Description

SVMDO

Usage

```
innerUI_surv(id)
```

Arguments

| | |
|----|------------------|
| id | connection input |
|----|------------------|

Value

UI section of survival analysis of final discriminative gene set

surv_plot_dw_server *SVMDO*

Description

SVMDO

Usage

```
surv_plot_dw_server(input, output, session)
```

Arguments

| | |
|---------|----------------|
| input | server input |
| output | server output |
| session | server session |

Value

Server section of downloading survival plots of discriminative gene set

surv_plot_dw_ui *SVMDO*

Description

SVMDO

Usage

```
surv_plots_download_ui(id)
```

Arguments

| | |
|----|------------------|
| id | connection input |
|----|------------------|

Value

UI section of downloading survival plots of discriminative gene set

| | |
|--------------|--------------|
| table_server | <i>SVMDO</i> |
|--------------|--------------|

Description

SVMDO

Usage

```
table_server(input, output, session)
```

Arguments

| | |
|---------|----------------|
| input | server input |
| output | server output |
| session | server session |

Value

Server section of providing discriminative gene set for preparing table

| | |
|----------|--------------|
| table_ui | <i>SVMDO</i> |
|----------|--------------|

Description

SVMDO

Usage

```
innerUI_table_show(id)
```

Arguments

| | |
|----|------------------|
| id | connection input |
|----|------------------|

Value

UI section of providing discriminative gene set for preparing table

test_data_selection_server
SVMDO

Description

SVMDO

Usage

innerServer_rad(input, output, session)

Arguments

| | |
|---------|----------------|
| input | server input |
| output | server output |
| session | server session |

Value

Server section of providing information about selected radio button

test_data_selection_ui
SVMDO

Description

SVMDO

Usage

innerUI_test_data(id)

Arguments

| | |
|----|------------------|
| id | connection input |
|----|------------------|

Value

UI section of providing information about selected radio button

top_val_based_deg_filtration
SVMDO

Description

SVMDO

Usage

```
innerServer_5(input, output, session, top_val)
```

Arguments

| | |
|---------|--|
| input | server input |
| output | server output |
| session | server session |
| top_val | top gene number value provided from top_val_server |

Value

Server section of selecting differentially expressed genes based on top gene value

top_val_based_deg_filtration_ui
SVMDO

Description

SVMDO

Usage

```
innerUI_top_gene_selection(id)
```

Arguments

| | |
|----|------------------|
| id | connection input |
|----|------------------|

Value

UI section of selecting differentially expressed genes based on top gene value

| | |
|----------------|--------------|
| top_val_server | <i>SVMDO</i> |
|----------------|--------------|

Description

SVMDO

Usage

innerServer_4(input, output, session)

Arguments

| | |
|---------|----------------|
| input | server input |
| output | server output |
| session | server session |

Value

Server section of entering top gene value

| | |
|------------|--------------|
| top_val_ui | <i>SVMDO</i> |
|------------|--------------|

Description

SVMDO

Usage

innerUI_top_gene_val(id)

Arguments

| | |
|----|------------------|
| id | connection input |
|----|------------------|

Value

UI section of entering top gene value

Index

classification_server, 3
classification_ui, 3
clinic_data_input_server, 4
clinic_data_input_ui, 4

deg_data_table_ui
 (gene_list_table_visualization_ui),
 10
deg_server, 5
deg_ui, 5
disc_gene_download_ui, 6
disc_gene_dw_server, 6
do_based_gene_filtration_server, 7
do_based_gene_filtration_ui, 7

expression_dataset_input_server, 8

gene_directory_selection_server, 8
gene_directory_selection_ui, 9
gene_list_name_server, 9
gene_list_name_ui, 10
gene_list_table_visualization_ui, 10
globals, 10
gui_obj_removal_server, 11
gui_obj_removal_ui, 11

innerServer
 (gene_directory_selection_server),
 8
innerServer_10 (gene_list_name_server),
 9
innerServer_3 (deg_server), 5
innerServer_4 (top_val_server), 21
innerServer_5
 (top_val_based_deg_filtration),
 20
innerServer_6
 (do_based_gene_filtration_server),
 7
innerServer_7 (classification_server), 3
innerServer_8
 (survival_analysis_server), 16
innerServer_9 (gui_obj_removal_server),
 11

innerServer_clinic
 (clinic_data_input_server), 4
innerServer_exp
 (expression_dataset_input_server),
 8
innerServer_exp_ui, 12
innerServer_rad
 (test_data_selection_server),
 19
innerUI_classification
 (classification_ui), 3
innerUI_clear_env (gui_obj_removal_ui),
 11
innerUI_clinic_data
 (clinic_data_input_ui), 4
innerUI_collect_plot_data
 (plot_list_ui), 13
innerUI_deg_analysis (deg_ui), 5
innerUI_disease_ont_class
 (do_based_gene_filtration_ui),
 7
innerUI_exp_data (innerServer_exp_ui),
 12
innerUI_gene_names (gene_list_name_ui),
 10
innerUI_path
 (gene_directory_selection_ui),
 9
innerUI_plot_inject (plot_push_ui), 14
innerUI_plot_show (plot_show_ui), 15
innerUI_surv (survival_analysis_ui), 16
innerUI_table_show (table_ui), 18
innerUI_test_data
 (test_data_selection_ui), 19
innerUI_top_gene_selection
 (top_val_based_deg_filtration_ui),
 20
innerUI_top_gene_val (top_val_ui), 21

linebreaks (runGUI), 15

package_req_list, 12
plot_list_server, 12
plot_list_ui, 13

plot_push_server, 13
plot_push_ui, 14
plot_show_server, 14
plot_show_ui, 15

runGUI, 15

surv_plot_dw_server, 17
surv_plot_dw_ui, 17
surv_plots_download_ui
 (surv_plot_dw_ui), 17
survival_analysis_server, 16
survival_analysis_ui, 16

table_server, 18
table_ui, 18
test_data_selection_server, 19
test_data_selection_ui, 19
top_val_based_deg_filtration, 20
top_val_based_deg_filtration_ui, 20
top_val_server, 21
top_val_ui, 21